

W P S (DEPR) : 17 / 2012

RBI WORKING PAPER SERIES

---

Asset Liability Mismatches (ALMi)  
in the Indian Banking Sector  
– The Extent, Persistence and Reasons

---

Rakhe P.B.



DEPARTMENT OF ECONOMIC AND POLICY RESEARCH  
NOVEMBER 2012

The Reserve Bank of India (RBI) introduced the RBI Working Papers series in March 2011. These papers present research in progress of the staff members of RBI and are disseminated to elicit comments and further debate. The views expressed in these papers are those of authors and not that of RBI. Comments and observations may please be forwarded to authors. Citation and use of such papers should take into account its provisional character.

Copyright: Reserve Bank of India 2012

# Asset Liability Mismatches<sup>1</sup> (ALMi) in the Indian Banking Sector – The Extent, Persistence and Reasons<sup>2</sup>

By

Rakhe P.B.<sup>3</sup>

*High growth observed in infrastructure loans during the recent years prompted the study to analyse the ALMi positive gap of the banking sector. During the period under study, March 2006 to September 2010, the banking sector reported ALMi positive gap to the extent of 14 per cent of long-term assets indicating that creation of long-term assets exceeded the mobilisation of long-term liabilities. The bucket-wise analysis of ALMi positive gap in the long-term buckets shows that banks have created highest ALMi positive gap in the 'more than five years' category (42.1 per cent) as compared with 'three to five years' (31.0 per cent) and 'one to three years' (26.9 per cent) categories. However, at the aggregate level, the ALMi positive gap in the long-term buckets was not significantly persistent. Higher profitability of long-term loans as well as higher responsiveness of long-term loans to the output gap contributes to the ALMi positive gap of the banking sector. One per cent increase in long-term loans causes the gross income of the banking sector to increase by 1.07 per cent, whereas one per cent increase in short-term loans increase the gross income by 0.42 per cent. Further, long-term loans increase by 0.33 per cent with one per cent increase in output gap, whereas the responsiveness of long-term deposits to output gap was not significant. A sector-wise analysis of long-term loans indicated that apart from infrastructure loans, personal loans could also be leading to ALMi positive gap owing to the higher share of long-term loans in the total outstanding loans.*

**JEL : G21, G18.**

**Key Words – banks, asset liability mismatches, maturity, liquidity.**

## Section I: Introduction

The recent global financial turmoil demonstrated that maintenance of adequate liquidity is a *sine qua non* for the uninterrupted functioning of the banking system. This is reflected in the proposed advancements to the existing Basel II framework in terms of two new liquidity ratios, viz., 'liquidity coverage ratio' and 'net stable funding ratio'. While the liquidity concerns in the wake of the global financial turmoil was, mainly, a result of the net outflow of foreign capital, a liquidity crisis may also arise owing to the pattern of maturity profile of assets and liabilities, *i.e.*, if the maturity of liabilities is shorter than the maturity of assets. However, it has to be kept in mind that this maturity mismatch is an inherent byproduct of

---

<sup>1</sup> Calculated as assets minus liabilities.

<sup>2</sup> The study analysed data on scheduled commercial banks excluding regional rural banks and local area banks.

<sup>3</sup> Smt. Rakhe P.B. is Assistant Adviser, Department of Economic and Policy Research (DEPR), Regional office, Kolkata. The author is grateful to Dr. Himanshu Joshi, Director, DSD, DEPR, CO, Mumbai for his guidance and encouragement, without which it would not have been possible for undertaking the study. The author is also thankful to OSMOS Division, Department of Banking Supervision, and Resource Management Division, Monetary Policy Department for data supply. The data assistance provided by Shri Paul D'mello and Shri R. Pimputkar, Assistant Managers, BRD, DEPR is also thankfully acknowledged.

credit intermediation whereby short-term liabilities are transformed into long-term assets. Regulators also encourage this pattern of financing of long-term assets to an extent as retail funding (demand and current deposits placed mostly in the short-term buckets) is more stable since it is coming from the household savings. On the other hand, experience shows that wholesale funding evaporates quickly during the time of crisis. *Albeit*, there may be a need to limit the size of ALMi in the larger interest of the financial soundness of the banking sector.

In the Indian context, the rapid growth observed in banks' lending to the infrastructure sector which are long-term in nature coupled with dependence of the banking system on short-term deposits raises concerns with regard to ALMi (RBI, 2010).<sup>4</sup> According to the Planning Commission estimates, the funding requirements of the infrastructure sector during the 12<sup>th</sup> plan period are one trillion US dollar. Though the Government is making concerted efforts to develop other avenues of financing arrangements for the infrastructure sector, the indirect and direct involvement of banks would not be negligible. In this background, the present study attempts to analyse the nature, extent and factors leading to ALMi of the Indian banking sector in the context of huge infrastructure requirements of a growing economy.

Followed by introduction, a brief description of data used in the study is provided in Section II. An analysis of trends in banks' financing to infrastructure sector is presented in Section III. Section IV analyses the trends in asset-liability mismatches of the Indian banking sector. Persistence of ALMi positive gap is analysed in Section V. Section VI spells out possible reasons for the ALMi of the banking sector. Section VII analyses the financing pattern of ALMi positive gap of the banking sector. Certain policy implications of ALMi of the banking sector are discussed in Section VIII. Section IX draws broad conclusions.

## **Section II: Data**

Data on asset liability mismatches are sourced from the Off-site Monitoring and Surveillance (OSMOS) returns submitted by banks to the Reserve Bank. Asset-liability mismatches are analysed in various maturity buckets in which data are reported by banks to the Reserve Bank. ALMi in each bucket is calculated as assets minus liabilities. Thus, a positive number of ALMi indicates that banks have created more assets than liabilities in a particular time bucket, thus, imply the existence of ALMi problems on the liquidity front. While arriving at ALMi of the banking sector in various time buckets, the maturity profile of loans and

---

<sup>4</sup> Reserve Bank of India (2010), 'Financial Stability Report'.

advances, investments, deposits and borrowings in Indian rupee were considered. Assets and liabilities in various foreign currencies were not considered.

Further, the maturity profile of capital funds raised by the banking sector was also not considered for arriving at ALMi as capital funds are primarily meant for absorbing credit risk, market risk and operational risk. Thus, it may not be prudent to ignore ALMi in other assets and liabilities by leveraging on the available total long-term capital funds. Hence, liquidity management on an ‘on-going entity’ basis, may not depend too much on the capital funds. However, capital funds may play an important role when the entity faces solvency.

Data on bank credit to infrastructure sector has been sourced from the monthly returns submitted by banks to the Reserve Bank. Sectoral composition of long-term loans is sourced from the Basic Statistical Returns. Quarterly data on GDP is sourced from the Central Statistical Organisation.

### **Section III: Trends in Infrastructure Financing**

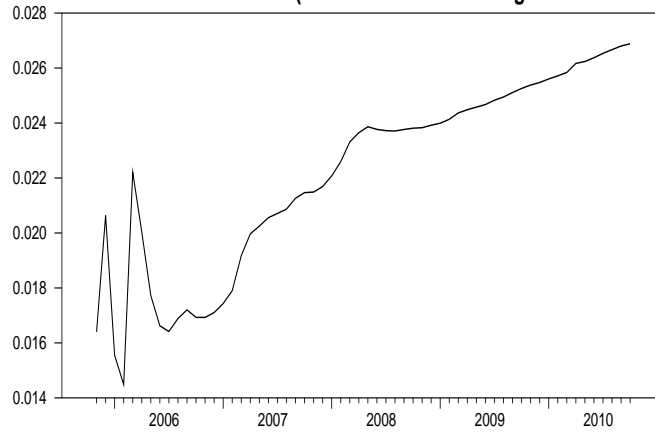
It has been estimated that the infrastructure lending requirements during the 12<sup>th</sup> Five year plan period (2012-17) would be approximately USD 1 trillion.<sup>5</sup> The higher plan expenditure towards infrastructure coupled with lack of alternative sources of funding indicates that banks may have to finance infrastructure in a much bigger way. Infrastructure financing of banks witnessed an increasing trend during the recent years raising some concerns with regard to the ALMi position of the banking sector. The share of bank credit to the infrastructure sector in the total non-food credit increased from 8.18 per cent in September 2005 to 14.54 per cent in December 2010. The increase in the share of the infrastructure loans was mainly due to a significantly higher growth observed since January 2008 (Chart 1). The CUSUM statistic obtained by regressing time on banks’ lending to infrastructure sector along with the upper and lower critical levels at 95 per cent significance level is provided in Chart 2. It can be discerned from Chart 2 that till January 2008, lending to infrastructure was stable with the CUSUM statistic lying between the band provided by the upper and lower critical values. However, since then the CUSUM statistic crossed the upper critical value and witnessed an accelerating trend. This indicates a structural break in the growth rate of banks’ lending to the infrastructure sector since January 2008. Or in other words, since January 2008, banks’

---

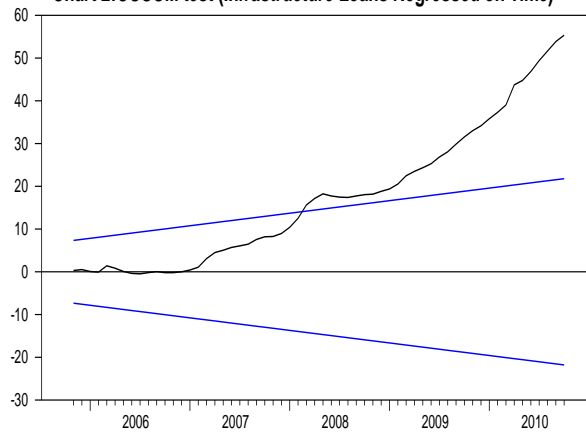
<sup>5</sup> Government of India, Planning Commission, ‘Faster, Sustainable and More Inclusive Growth – An Approach to the Twelfth Five Year Plan’.

lending to infrastructure sector witnessed a statistically significant higher growth rate as compared with its growth during the period prior to it.

**Chart 1: Recursive coefficients (Infrastructure Loans Regressed on time)**



**Chart 2: CUSUM test (Infrastructure Loans Regressed on Time)**



The stationary properties of the data series may reveal whether this sudden increase in banks' lending to infrastructure sector is transient or permanent in nature. In the case of banks' lending to the infrastructure sector, a structural break is quite possible as evident from Chart 2. Thus, the Andrews-Zivot unit root test was applied on the series. The results are provided in Table 1. The test results indicate that banks' lending to the infrastructure sector is stationary (significant at five per cent level) with one structural break.

**Table 1: Stationarity of Banks' Lending to Infrastructure Sector – Andrews-Zivot Test Results**  
(Sample: March 2006 to September 2010)

Model	Test Statistic	Critical Values		
		1 per cent	5 per cent	10 per cent
Level Structural break in the intercept Lag length - four	-5.29**	-5.34	-4.93	-4.58

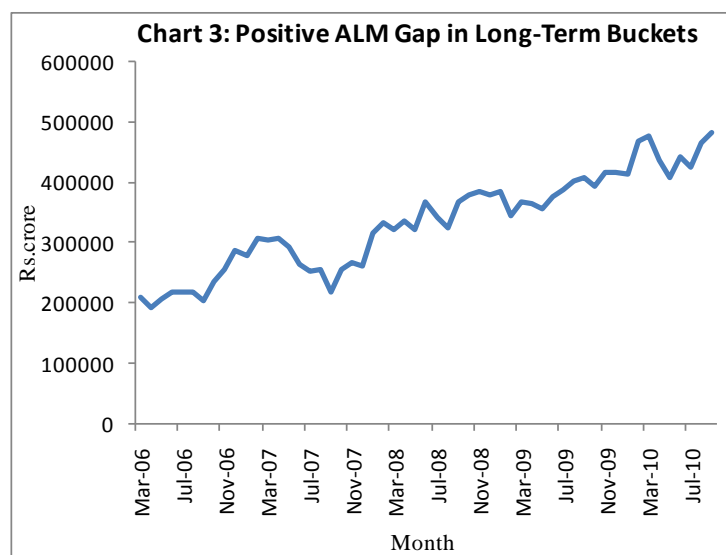
L: Level, C: Constant, T: Trend.

\*\* : Significant at five per cent level.

## Section IV: Trends in Asset-Liability Mismatches

### Long-term buckets<sup>6</sup>

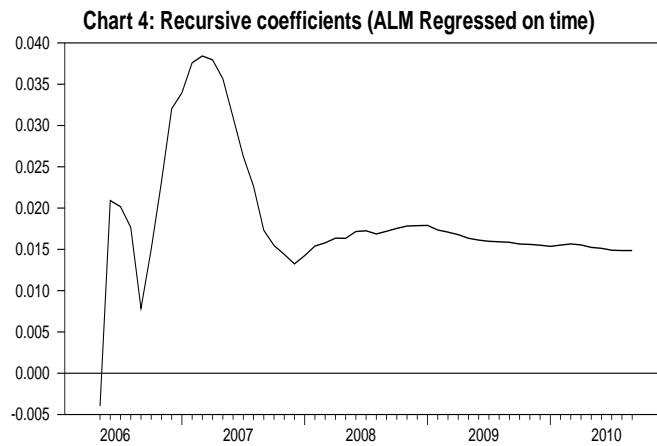
The analysis of the maturity profile of long-term assets and liabilities indicates that at the aggregate level, the long-term assets are more than the mobilised long-term liabilities. The ALMi calculated as long-term assets minus long-term liabilities never turned out to be negative during the recent years implying that the higher growth observed in the long-term loan segment of the Indian Banking sector is leading to asset liability mismatches in the banking sector. Further, the ALMi position witnessed a continuous deterioration during the recent years as the positive gap between long-term assets and long-term liabilities got widened (Chart 3).



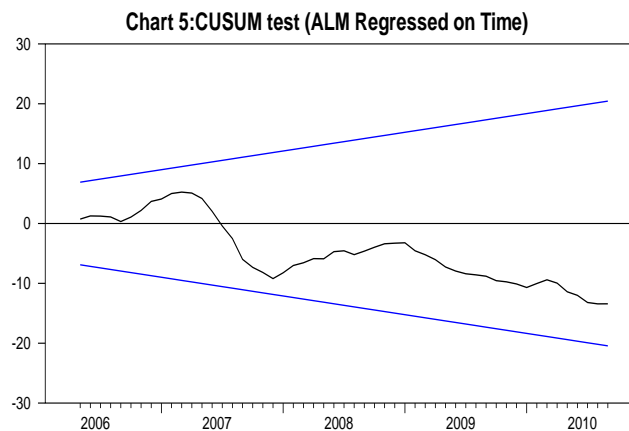
During the period from March 2006 to December 2010, the ALMi positive gap in the Indian banking sector witnessed a statistically significant trend growth of 1.49 per cent. The analysis of recursive coefficients did not indicate any structural break in the series. Rather, the

<sup>6</sup> Assets and liabilities whose maturity is more than a year.

recursive coefficients exhibited a stabilising trend with the progressive expansion of the data sample (Chart 4).



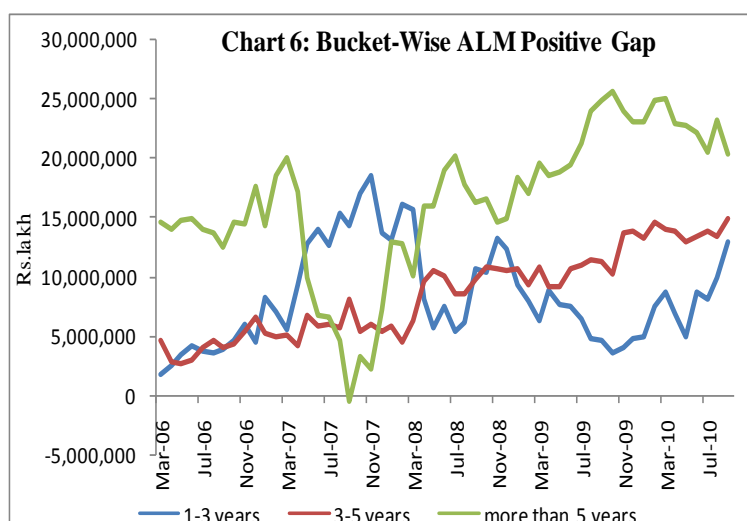
The results of CUSUM test also confirmed the absence of structural break in the ALMi positive gap in the Indian banking sector and the test statistic did not show a statistically significant instability throughout the sample (Chart 5).



### **Bucket-wise Analysis of ALMi Positive Gap**

A bucket-wise break-up of ALMi positive gap shows that the banking sector has the highest ALMi positive gap in the bucket ‘more than five years’ followed by ‘3-5 years’ and ‘1-3 years’. As at end-September 2010, ALMi positive gap in the ‘more than five years’ bucket constituted 42.1 per cent of the total ALMi positive gap, followed by 3-5 years bucket (31.0 per cent) and 1-3 years bucket (26.9 per cent) (Chart 6).





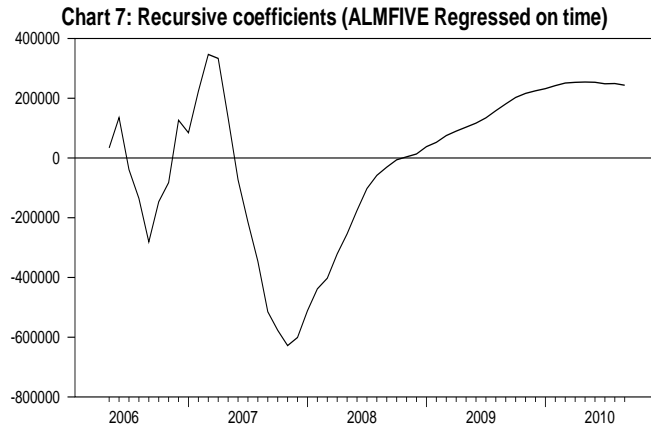
The movements in the bi-annual mean values of the ALMi positive gaps in various long-term buckets show that in the ‘3-5 years’ bucket as well as in the ‘beyond 5 years’ bucket, the mean value of ALMi positive gap exhibited an increasing trend during the recent period. In ‘1-3 years’ bucket, though the mean value of ALMi positive gap declined from the level reported during 2007-08, witnessed an increase during the first half of the 2010-11. The mean value of ALMi positive gap in the ‘beyond five years’ category is substantially higher in comparison with other long-term buckets during the period (Table 2).

**Table 2: Bi-Annual Mean values of ALMi Positive Gaps in Various Long-term Buckets**

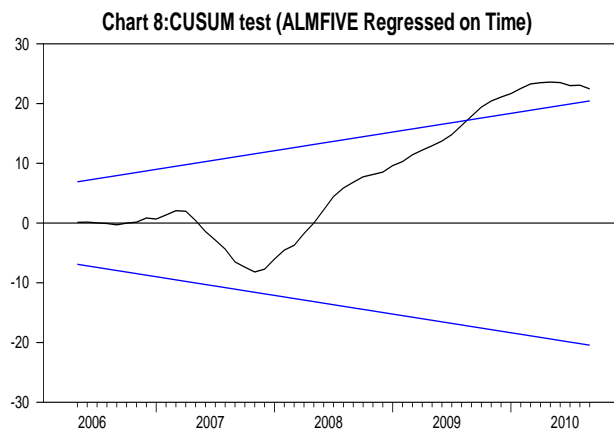
(Rs. crore)

Time Period	1-3 Years	3-5 Years	Beyond 5 Years
April-September 2006-07	35,359	34,451	1,39,495
October-March 2006-07	59,752	52,386	1,65,550
April-September 2007-08	1,30,147	60,669	73,994
October-March 2007-08	1,56,696	55,242	80,791
April-September 2008-09	72,480	95,285	1,75,271
October-March 2008-09	99,606	1,04,663	1,68,442
April-September 2009-10	66,124	1,04,634	2,11,550
October-March 2009-10	55,513	1,32,805	2,42,811
April-September 2010-11	86,039	1,37,493	2,19,859

An analysis of the recursive coefficients of ALMi positive gap in the ‘beyond five years’ category shows that the estimates are not stabilising through the whole sample, instead witnessed an increasing trend with the progressive expansion of the sample size (Chart 7).



Further, the CUSUM test statistic indicates that during the second half of 2009 there was a structural break in the ALMi positive gap in the ‘more than five years’ category. Thus, even though the overall ALMi positive gap has not grown into alarming heights, the increasing ALMi positive gap in the ‘more than five years’ category raises some concern (Chart 8).



## **Section V: Persistence of ALMi Positive Gap in the Long-term Buckets**

### **Absence of Mean Reversion**

An analysis of persistence of the ALMi positive gap is carried out following the methodology developed by Marques (2004). Accordingly, the persistence of ALMi positive gap is estimated on the basis of absence of mean reversion, that is

$$\gamma = 1 - \left(\frac{n}{T}\right)$$

Where n stands for the number of times the series crosses the mean during a time interval with T+1 observations. It is theoretically proved that for a symmetric zero mean white noise

process  $E(\gamma) = 0.5$ . Thus, if the value of  $\gamma$  is close to 0.5, it means that there is no significant persistence. On the other hand, if the value of  $\gamma$  is significantly above 0.5 it signals the existence of significant persistence. Under the assumption of a symmetric white noise process (zero persistence), the statistic

$$\left[ \frac{\gamma - 0.5}{\frac{0.5}{\sqrt{T}}} \right] \cap N(0; 1)$$

is used for testing the statistical significance of the measure of persistence  $\gamma$ .

The value of  $\gamma$  for the ALMi positive gap during the entire sample period, *i.e.*, March 2006 to September 2010 for all SCBs is 0.47, which is slightly lower than 0.5. This indicates that there is no significant persistence in the ALMi positive gap during the period under study at the aggregate level.

The bucket-wise analysis of persistence shows that in none of the time buckets, the persistence is significant at five per cent level. However, at ten per cent level, it is persistent in the ‘one to three years’ time bucket (Table 3).

**Table 3: Measure of Persistence of ALMi Positive Gap – Bucket-wise**

Time Buckets	Persistence ( $\gamma$ )	Significance $(\gamma - 0.5)/(0.5/\sqrt{T})$
One to Three Years	0.60	1.483 <sup>b</sup> (0.0606)
Three to Five Years	0.47	-0.404 <sup>b</sup> (0.3264)
More than Five Years	0.47	-0.404 <sup>b</sup> (0.3264)

<sup>b</sup>Acceptance of the null hypothesis of zero persistence at 5 per cent level.

**Note:** Number of Observations used for the analysis is 55.

## Section VI: Factors leading to ALMi Positive Gap

### Growth Rates

An ALMi positive gap in the long-term buckets arises when the growth rate of long-term liabilities lags behind the growth rate of long-term assets. The compound growth rate of long-term liabilities for the period March 2006 to September 2010 at 1.305 per cent is marginally lower than the compound growth rate of long-term assets during the same period at 1.337 per cent. This means that on an average in every month, while the long-term assets are growing at 1.337 per cent, the growth in long-term liabilities is lagging behind by 0.032 per cent. Notably, the compound growth rate of long-term deposits at 1.306 per cent lagged behind the compound growth rate of long-term loans at 1.503 per cent (Table 4).

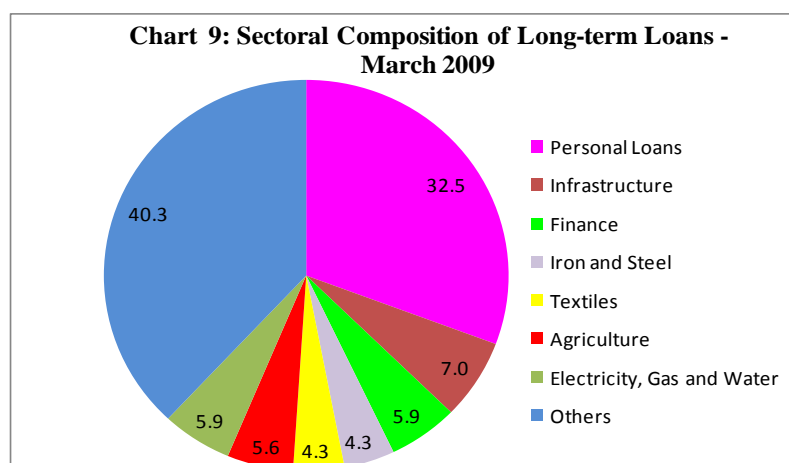
**Table 4: Compound Growth rates of Long-term Assets and Liabilities**  
(Sample: March 2006 to September 2010)

Item	Compound Growth Rates
Long-term Assets	1.337
Long-term Liabilities	1.305
<b>Long-term Loans</b>	<b>1.503</b>
Long-term Investments	1.074
<b>Long-term Deposits</b>	<b>1.306</b>
Long-term Borrowings	1.289

Thus, it is clear that low growth observed in long-term deposits coupled with high growth observed in the long-term loans segment is one of the important reasons for ALMi in the banking sector.

### Sector-wise Analysis

An analysis of sector-wise composition of outstanding long-term loans was attempted to identify the major sectors contributing to ALMi in the banking sector. As is evident from Chart 9, 32.5 per cent of the outstanding long-term loans are personal loans. Infrastructure loans constituted 7.0 per cent of the total outstanding long-term loans as at end-March 2009. Other major components are finance, agriculture, iron and steel, and textiles (Chart 9).



Thus, it is not only infrastructural loans, but also the increase in personal loans that (exclusive of amount outstanding against credit cards) can result in ALMi of the banking sector. Further, the percentage of long-term loans to total loans outstanding in each sector is provided in Table 5.

**Table 5: Share of Long-term Loans in the Outstanding Loans of Various Sectors**  
(as at end-March 2009)

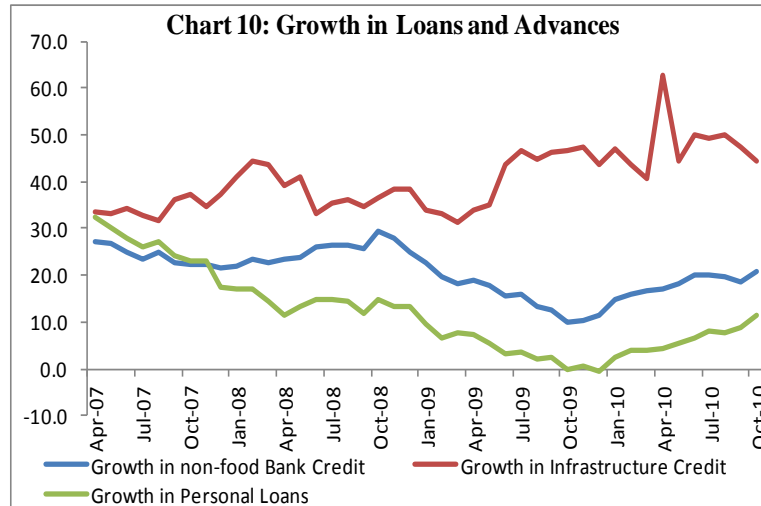
Sector	Per cent Long-term Loans as a per cent of total Loans Outstanding
Total personal loans	83.4
<i>of which:</i> Housing	99.8
Education	83.6
Vehicles	68.8
Consumer Durables	50.3
Others	42.1
Non-conventional Energy	66.3
Tourism, Hotels and Restaurants	64.0
Infrastructure	52.4
Iron and Steel	44.3
Agriculture	34.3
Finance	33.8
<b>Total Bank Credit</b>	<b>42.4</b>

Source: Basic Statistical Returns, 2009.

Percentage of long-term loans in the total outstanding loans of the various sectors reveals that the housing sector has the highest per cent of long-term loans in the total loans outstanding at 99.8 per cent as at end-March 2009. Further, out of the education loans, 83.6 per cent and out of total vehicle loans 68.8 per cent are of long-term in nature. Accordingly, as at end-March 2009, 83.4 per cent of the total personal loans belonged to the long-term category. Notably, 52.4 per cent of infrastructure loans are also long-term in nature.

An analysis of growth rates of total non-food credit, infrastructure credit and personal loans reveals that infrastructure credit witnessed higher growth as compared to growth in total non-food credit during the period March 2007 to October 2010. However, during the same period, the growth in personal loans was less than the growth in overall non-food credit (Chart 10).

In sum, two loans segments, *viz.*, infrastructure loans and personal loans, are leading the long-term loans segment of the banking sector, thus, could be one of the contributing factors of the ALMi positive gap in the long-term buckets.



### Responsiveness of the Banking Sector to Output Gap

The analysis of growth rates indicated that the divergent pattern of behavior of long-term deposits and long-term loans is one of the contributing factors of the ALMi positive gap in the long-term buckets. In this context, it may be interesting to understand whether this divergent pattern of growth rates is a natural byproduct of the general pro-cyclical behavior of the banking sector as it is well established in the literature that banking sector behaves in a pro-cyclical way (Borio *et.al*, 2001). Thus, it may be important to examine whether the differences in responses of different components of assets and liabilities of the banking sector to the output gap is leading to ALMi positive gap. Output gap is calculated by decomposing the cyclical and trend component of log GDP using Hodrick-Prescott Filter.

The responsiveness of various components of assets and liabilities to output gap was established by estimating the following equation:

$$\log dY = \alpha + \beta \text{ Output Gap} + \sum_{k=1}^n \gamma_k Z_k + \varepsilon$$

Where Y represents the dependant variable and  $Z_k$  represents a set of K explanatory variables other than output gap. The coefficient of output gap shows the responsiveness of the dependant variable to the output gap (Alesina, *et.al*, 2005). The regression results are provided in Table 6. In Table 6, each column represents an estimated equation.

**Table 6: Responsiveness of Indian Banking Sector to Output Gap**  
(Sample: 2006-2007 Q3 to 2010-11 Q2)

Independent Variables	Dependent Variables			
	Long-Term Loans	Short-Term Loans	Long-Term Deposits	Short-Term Deposits
Constant	0.112 (0.252)	0.876(1.560)	0.285(0.466)	1.259*(3.115)
Output Gap	-	0.358***(1.857)	-	-
Output Gap(-1)	0.326*(2.907)	-	-	0.273***(1.961)
Output Gap(-2)	-	-	0.220(1.539)	-
LLTL(-2)	0.998*(34.36)	-	-	-
LSTL(-1)	-	0.944*(24.67)	-	-
LLD(-1)	-	-	0.984*(25.04)	-
LSD(-1)	-	-	-	0.921*(34.77)
Adjusted R <sup>2</sup>	0.98	0.97	0.97	0.98
DW	2.42	1.58	1.65	2.05
F-Statistic	634.6 (p-value: 0.00)	313.6 (p-value: 0.00)	318.5 (p-value: 0.00)	610.3 (p-value: 0.00)

Note: 1. Dependant Variables were taken in Log form.

2. Figures in parentheses are respective t-values.

3. The period of analysis starts from October 2006 in the above table. In two of the above regressions, variables were included with a two quarter lag as this was showing meaningful relationships. This is the reason even though data were available from March 2006, for all four regressions we have restricted to data from October 2006 onwards to maintain uniformity of time periods across the four regressions reported.

\*: Significant at one per cent level.

\*\*\*: Significant at ten per cent level.

Output Gap(-1) – First Lag of Output Gap, Output Gap(-2) – Second Lag of Output Gap, LLTL(-2) – Second Lag of log Long-Term Loans, LSTL(-1) – First Lag of log Short-Term Loans, LLD(-1) – First Lag of log Long-Term Deposits, LSD(-1) – First Lag of log Short-Term Deposits.

The results indicate a significant positive relationship between the first lag of output gap and long-term loans. As the output gap in period t increases by one per cent, the long-term loans in period t+1 increases by 0.33 per cent. However, the responsiveness of long-term deposits to output gap was not significant at any lag of output gap. Thus, it can be inferred that these differences in responsiveness of long-term loans and long-term deposits are partially responsible for the ALMi positive gap in the long-term buckets of the Indian banking sector.

Further, it can also be understood from Table 6 that short-term loans respond to output gap immediately without any lag effect. The short-term loans increases by 0.36 per cent with every one per cent increase in output gap. However, this result is significant only at ten per cent level. The responsiveness of short-term deposits is lower than that of short-term loans and also has a lag effect. The short-term deposits increase by 0.27 per cent in period t+1, if there is a one per cent increase in output gap in period t.

Thus, in general, the responsiveness of deposits to output gap is lower as compared to the responsiveness of loans to output gap. This may be quite natural as in an upturn of economic

growth, the demand for loans and advances from the real sector also goes up sharply owing to the widespread optimism.

### Financing of Long-Term Loans and Maintenance of Profitability

This section examines whether financing long-term loans is a good option for maintaining profitability of the banking sector. Thus, an attempt has been made to understand the response of gross income of the banking sector with the increase in short and long-term loans. Panel data analysis was employed to understand the relationship between gross income of the banking sector and, short and long-term loans. The analysis was undertaken at the bank level, taking data for twenty nationalised banks for the period 2006 to 2010, as they account for a sizable portion of the total assets of the banking sector. Symbolically, the model used in the study can be written as:

$$g_{it} = c + \sum_{k=1}^K \beta_k X_{it}^k + \varepsilon_{it}$$

Where

$$\varepsilon_{it} = v_i + u_{it}$$

$g_{it}$  is the gross income of bank  $i$  at time  $t$ , with  $i = 1, \dots, N$ ;  $t = 1, \dots, T$ ,  $c$  is a constant term,  $X_{it}$ s are  $k$  explanatory variables and  $\varepsilon_{it}$  is the disturbance with  $v_i$  the unobserved bank-specific effect and  $u_{it}$  the idiosyncratic error. As the Hausman test was significant at one per cent level, the results of fixed effects model are reported in Table 7.

**Table 7: Differential Impact of Long-term Loans and Short-term Loans on Gross Income**

Dependent variable: Log of Gross Income  
 Sample: Annual Data 2006 to 2010 across 20 nationalised banks  
 Number of pooled observations: 100  
 Model: Fixed Effect Model

Variable	Coefficients	t-stat	p-value
Constant	-5.995*	-4.145	0.0001
LLTL	1.068*	4.924	0.0000
LSTL	0.422*	3.063	0.0030
Hausman Test Statistic: 11.725 (p-value: 0.0028)			
Adjusted R <sup>2</sup> : 0.89			
DW: 1.47			
F-Stat: 34.100 (p-value: 0.00)			

\*: Significant at one per cent level.

LLTL: Log of long-term loans, LSTL: Log of short-term loans.

The results indicate that long-term loans have a higher impact on the gross income of the banking sector as compared with short-term loans. With every one per cent increase in long-



term loans, gross income of the banking sector increases by 1.07 per cent. Whereas, one per cent increase in short-term loans increases the gross income of the banking sector by 0.42 per cent. Thus, it is clear that banks have an incentive to go for more long-term loans even though in the process they are getting into ALMi positive gap in the long-term buckets.

## Section VII: Financing of ALMi Positive Gap in the Long-term buckets

After understanding the probable reasons for the ALMi positive gap, this section examines the financing pattern of ALMi positive gap of the Indian banking sector.

### Analysis of Ratios

An analysis of ALMi gap (assets minus liabilities) in the short-term buckets shows that there exists a negative ALMi gap at the aggregate level indicating that the excess short-term liabilities are used to finance the ALMi positive gap in the long-term buckets. At the aggregate level, 13-15 per cent of total long-term assets are financed by short-term liabilities during the recent years. In other words, during the period April-September 2010-11, 15.6 per cent of short-term liabilities were used to finance 71.9 per cent of the ALMi positive gap in the long-term buckets. Notably, 15.6 per cent of short-term liabilities (held in rupee terms) are not adequate to finance the entire ALMi positive gap in the long-term buckets. This indicates that a part of the ALMi positive gap was financed through liabilities (both short-term and long-term) held in foreign currencies (Table 8).

**Table 8: Bi-Annual Mean values of ALMi Ratios**

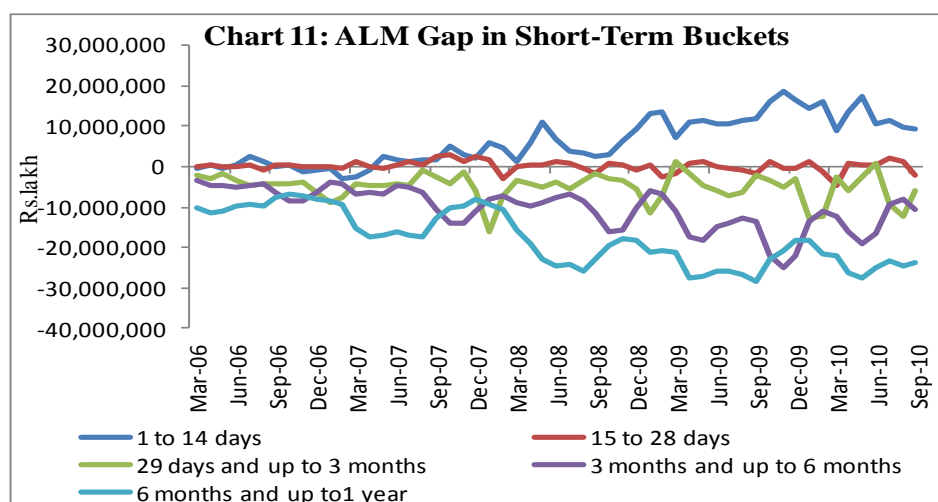
Time Period	ALMi Positive gap in the long-term buckets as per cent of total long-term assets	ALMi Negative gap in the short-term buckets as per cent of total short term liabilities	Percentage of ALMi positive gap in the long-term buckets financed by negative ALMi gap in short-term buckets
April-September 2006-07	13.17	19.89	84.44
October-March 2006-07	15.67	22.25	80.69
April-September 2007-08	13.74	21.75	93.24
October-March 2007-08	14.12	17.59	79.20
April-September 2008-09	15.54	19.88	88.69
October-March 2008-09	15.49	16.78	74.02
April-September 2009-10	14.30	19.54	93.62
October-March 2009-10	14.87	16.25	71.47
April-September 2010-11	14.08	15.61	71.90

**Note:** 1. ALMi gap is calculated as assets minus liabilities.

2. Data are sourced from the quarterly OSMOS returns submitted by banks not from the balance sheets.

Bucket-wise decomposition of the ALMi gap in the short-term buckets shows that highest negative ALMi gap exists in the time bucket 'six months and up to one year' followed by

‘three months and up to six months’ and ‘29 days and up to three months’. On an average, liabilities falling in the time bucket ‘six months and up to one year’ financed around 50 per cent of the ALMi positive gap in the long-term buckets. Similarly, the negative ALMi gap in the time buckets ‘three months and up to six months’ and ‘29 days and up to three months’ financed around 20 per cent and 10 per cent, respectively of the ALMi positive gap in the long-term buckets (Chart 11).



## Section VIII: Policy Implications

It may not be prudent to eliminate ALMi positive gap in the long-term buckets as credit intermediation is essentially the transformation of maturity and liquidity. However, there is a need to limit the ALMi positive gap in the long-term buckets in the larger interest of financial stability. In this context, this section discusses certain policy implications of ALMi positive gap.

In terms of RBI’s Asset Liability Management(ALM) guidelines dated October 24, 2007, Savings Bank and Current Deposits may be classified into volatile and core portions. Savings Bank (10 per cent) and Current (15 per cent) Deposits are generally withdrawable on demand and these proportions may be treated as volatile. While volatile portion can be placed in the Day 1, 2-7 days and 8-14 days time buckets, depending upon the experience and estimates of banks, core portion may be placed in ‘1- 3 years’ bucket. The above classification of Savings Bank and Current Deposits is only a benchmark. Banks which are better equipped to estimate the behavioral pattern, roll-in and roll-out, embedded options, on the basis of past data / empirical studies could classify them in the appropriate buckets, *i.e.*, behavioural maturity instead of contractual maturity, subject to the approval of the Board / Asset Liability

Committee (ALCO). Thus, as the banks gain experience and gain expertise in assessing behavioural patterns of deposits, larger portions of demand deposits may be placed in long term buckets, which will reduce the ALMi in the long-term buckets.

Further, with implementation of Basel III, banks will be required to raise higher equity capital and more perpetual capital instruments, which will be invariably placed in the last bucket of the Statement of Structural liquidity (SSL). Thus, Asset Liability Mismatch is expected to reduce gradually as a result of increase in longer term liabilities.

The analysis has shown that the involvement of the banking sector in financing the long-term requirements of a growing economy is also an avenue for maintaining profitability. The ALMi created in this growth financing process may have to be managed with the help of the financial markets. In other words, banking sector is able to run large ALMi positive gap in the long-term buckets on an on-going basis, only because of the short-term funds available from the financial markets. In a globalised environment, domestic financial markets are highly integrated with the global financial markets. Thus, any disturbance in any part of the world may also accentuate the liquidity risks of the domestic banking sector through the financial markets channel.

Developing adequate other avenues for long-term financing may also be important to reduce burden on banks from long-term financing such as infrastructure loans. Notably, there are already some initiatives to develop other funding sources for infrastructure loans. Some of the initiatives taken in this regard include allowing banks to issue long-term bonds with a minimum maturity of 5 years to the extent of their exposure of residual maturity of 'more than 5 years' to the infrastructure sector and the institution of infrastructure debt funds (IDFs). IDFs will be able to take the debt of infrastructure projects from the banks after completion of the projects and commencement of their commercial operations. Meanwhile, banks should also try to mobilise more long-term resources to expand their lending limit for long-term loans.

### **Section IX: Concluding Observations**

The study analysed the asset liability mismatches in the Indian banking sector and tried to understand the possible reasons of it. The recent concerns with regard to the higher growth observed in the infrastructure loans prompted the study to undertake a detailed analysis of the ALMi of the Indian banking sector. The analysis showed that over a period of time the

financing of long-term assets by short-term liabilities has increased in the Indian banking sector leading to ALMi positive gap. Thus, there may be a need to tailor long-term loans with long-term deposits on the one hand and to develop other avenues for the long-term funding needs of the economy such as infrastructure.

## References

1. Alesina, Alberto and Guido Tabellini (2005), 'Why is Fiscal Policy Often Pro-Cyclical', Working Paper No. 11600, National Bureau of Economic Research.
2. Bhattacharya, Indranil, Mohua Roy, Himanshu Joshi, and Michael D. Patra (2009), 'Money Market Microstructure and Monetary Policy: The Indian Experience', *Macroeconomics and Finance in Emerging Market Economies*, Vol. 2, No. 1, March, Pages: 59-77.
3. Borio, C, Furfine, C. and Lowe, P. (2001), "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options in Marrying the Macro- and Micro-Prudential Dimensions of Financial Stability, BIS Papers, 1, March.
4. Chakrabarty, K.C. (2010), 'Infrastructure Finance: Experiences and the Road Ahead', Speech delivered at the 13<sup>th</sup> Financial Services Convention of Bombay Management Association on 5<sup>th</sup> February.
5. Dias, Daniel and Carlos Robalo Marques (2005), 'Using Mean Reversion as a Measure of Persistence', Working Paper No. 450, March, European Central Bank.
6. Drehmann, Mathias and Kleopatra Nikolaou (2010), 'Funding Liquidity Risk: Definition and Measurement', BIS Working Paper No. 316, July.
7. Kazaziouva, Gledis (2010), 'Interest Rate Pass-Through: Does It Change with Financial Distress? The Czech Experience', Master Thesis, Charles University, Prague.
8. Logan, Andrew (2001), 'The United Kingdom's Small Banks' Crisis of the early 1990s: What were the Leading Indicators of Failure?', Working Paper, Bank of England.
9. Marques, Carlos Robalo (2004), 'Inflation Persistence: Facts or Artefacts?', Working Paper No. 371, June, European Central Bank.
10. Stein, Jeremy (2010), 'An Adverse Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy', Working Paper No. 5217, National Bureau of Economic Research.
11. The Reserve Bank of India, 'Basic Statistical Returns', various years.
12. The Reserve Bank of India, 'Financial Stability Reports', various Issues.
13. Tirole, Jean (2010), 'Illiquidity and all its friends', BIS Working Paper No. 303.