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Abstract:

This paper identifies the key determinants of profitability of Indian banks. It integrates the macroeconomic environment and industry level variables of India for predicting profitability of Indian banks. A simultaneous equation system has been formulated to derive the estimates of net interest income (NII) and Credit for the banking system as a whole. Net interest income as well as efficiency ratio have significant role in determining profitability in Indian banking scenario. The Net interest income reacts inversely to bond yields and positively to credit. This stems from the inverse relationship of credit demand to bond yields and positive relationship of GDP with credit creation. Further, Deposit mix (higher share of low cost deposit in the total deposits) has favourable impact on NII%.

Introduction

An important component of financial planning is the forecasting of profitability. This requires not only an insight of industry specific variables but also involves studying the impact of variables pertaining to the economy on the industry since each industry has its unique characteristics and has unique way to react to external environment.

It is generally seen that Net Interest income (NII) of banks is affected by market interest rate which is mainly determined by interplay of money supply and demand. While money supply is determined by the regulator, money demand is market driven. Macro variables thus have its impact on interest rate of banks.

Our objective is to develop a model for forecasting net interest income of all scheduled commercial Banks (ASCB) of India by taking into account macro variables. The determined net interest income of banks is used as a key explanatory variable for forecasting the profitability of Indian banks.

While studying relationship between Profitability of a bank vis-a-vis pricing and operating efficiency, Rose and Kwast(1982) identified that asset variables deflated by total assets, Liability variables deflated by total assets, market demand characteristics, market supply conditions including market structure and the cost of non-financial factor inputs, and macroeconomic conditions as key determinant of bank profitability.

Rivarda and Thomas (1997) tried to assess whether interstate presence has impact on profitability and riskiness of banks. The empirical findings also support the argument that interstate banking activity lowers earnings volatility and risk of bank insolvency.

Verma and Bodla (2006) found that (Net Interest Income), OE (Operating Expenses), P&C (Provision & contingencies) and Spread have high explanatory power in determining profitability of Indian banks. However, CD ratio, NPAs and BPE (Business per Employee) have low explanatory power.

Murthy(2007) identified that though cost to income ratio, net interest margin, loan loss provision are critical factors influencing bank profitability of GCC countries, Leverage (equity to total asset) is not at all an important determinant .

Pasiouras & Kosmidou (2007) examined banks in 15 EU countries and inferred that bank's specific characteristics and the overall banking environment (financial market structure and macroeconomic conditions) affect the profitability of commercial domestic and foreign bank.

Manoj (2010) assess the determinant of profitability of old private sector banks especially in Kerala state found that while non interest income is important determinant of profitability of new generation private sector banks, the old generation private sector Banks remained dependent in rural areas for their profitability. The study also stresses the crucial linkage between Govt. Securities (G-sec) and Net Interest Margin (NIM).

Traditional Investment Saving/Liquidity preference Money supply (IS-LM) model originally conceived by Roy Harrod, John R. Hicks, and James Meade(1936)[1]depicts effect of macro-variables on the interest rate (prices of product). Bernanke and Blinder (1988) developed a model taking three assets: money, bonds, and loans. They find that both borrowers and lenders choose between bonds and loans according to the interest rates on the two credit instruments. The above depiction of relationship is of utmost importance towards inferring relationship between macro-economic variables and bank balance sheet.

Rao (2006) studied the impact of monetary policy on bank's profitability with the help of regression equation wherein the impact of money policy instrument on the profitability of bank is studied.

Using data from National Statistics Organisation (NSO), Reserve Bank of India(RBI) and National Stock Exchange(NSE), we form a ***simultaneous equation model*** to construct profit planning scenario. Simultaneous equation model are used in the economic relationships are jointly dependent. The model has been built through three intertwined blocks. Further, identification test, test of simultaneity, stationarity test, test for detection and remedy of multicollinearity, heteroscedasticity and autocorrelation have been carried out for the modelling purpose:

In section 1 we examine how the market variables: loan demand, loan supply and interest rate interact and how they are affected by exogenous variables. Subsequently, credit and bond yields are determined given the exogenous variables: GDP and Deposit.

[1] The IS/LM model was introduced at the Econometric Conference held in Oxford during September, 1936. Roy Harrod, John R. Hicks, and James Meade attempted to summarise using mathematical models John Maynard Keynes' General Theory of Employment, Interest, and Money. Hicks, eventually, invented the IS/LM model (originally using LL, not LM).

In Section 2 major determinants of profitability of Indian Banks have been assessed with the key object of identifying the effect of Net Interest Income on profitability.

In Section 3 we determine Net Interest Income using the results obtained in Section 1 and hence draw a relationship among bond yields, GDP, Deposit and Credit on NII of the banking industry.

1. Estimating Credit and Interest Rates

At the plinth of loan market is the well known LM function from the popular IS-LM framework which shows the equilibrium condition in the money market. **LM curve, specifically, consists of the points where the level of the interest rate equilibrates income in the money market.** Bernanke and Blinder(1988) held **that, as per** the IS-LM framework in aggregate demand determination bank deposit, bank loans clubbed together with other debt instruments. They had relaxed the assumption of perfect substitutability of bond and credit interest rate.

However, in our discussion we will assume perfect substitutability of bond and loan prices because:

- Though interest rate varies on account of cost of capital, level of risk and cost of transaction both has some degree of relationship.
- Further as per Modigliani-Miller Theorem (1958) we assume perfect substitutability of loan market in the presence of perfect information.
- This is also assumed for simplicity.

Hence, loan demand function (L^d) can be modelled as:

$L^d = \alpha_0 + \alpha_1$ BOND $+\alpha_2$ GDP + ε.....(1)

Here, $\alpha_{0=}$ Value of loan demand when bond is zero.

$\alpha_{1 =}$ measures the sensitivity of loan demand to bond /Bond Yield.

ε = captures everything else that affects change in Y not captured by X

BOND = Bond interest rate or bond yield. Here we have taken average of bond yields with maturity of 3m to 10y since, a typical banking company generally have maximum of its assets within this range.

Bond yield (Govt. Sec) has been used here since interest (price of banking products) is positively related and among the various interest rates prevalent Indian finance market this is the best alternative.

GDP= Gross Domestic Product. It has been brought into the model in line with Bernanke and Blinder, (1988) "to capture transaction demand for credit, which might arise for working capital requirement, liquidity consideration etc."

Bernanke and Blinder(1988)used simplified bank balance sheet to develop a Loan Supply Simplified here means ignoring the net worth.

As such, a typical simplified bank's balance sheet would consist of the following:

Table: 1 : Simplified Bank's Balance sheet

Assets	**Liabilities**
Reserves (R= required reserve+excess Reserve) Loans (Ls) Bonds (B)	Deposits (D) Net Worth (ignored in simplified balance Sheet)

Therefore, a simplified bank's balance sheet can be written as below: Ls + B + E = D- γD

Here γ = % of statutory reserve

E = Excess Reserve, (Bernanke and Blinder, 1988).

In view of the perfect substitutability of customer loan market with bond market we consider only one variable on the asset side i.e. Loan. Further, we assume that the banks in the system keep just the required amount of statutory reserve (**γ**). As such, our portfolio loan will have the following functional form:

Ls = f (Bond yield, Deposit, Statutory reserve percentage)

Or,

$$\mathbf{L^s = \beta_0 - \beta_1\ BOND + \beta_2\ Deposit\ (1-\gamma) + \varepsilon} \quad \text{.....(2)}$$

Where,

Deposit (1-γ) = the amount of Deposit available for credit creation after providing for statutory Reserve requirement (adjdep).

When the loan market is at equilibrium we have $\mathbf{L^s = L^d}$ **.** This determines the loan demand, loan supply and risk free interest rate.

Exogenously determined variables are GNP, Industry level Deposit, and %statutory reserve.

For estimating the model we apply two-stage least square method using EViews software.

Equation 1: Credit Demand has an inverse relationship with bond yields. Thus, reiterating the underlying economic law of demand, this states that ceteris paribus, demand decreases as price increases and vice versa. It may be mentioned here that bond yields has direct relationship with interest rate.

On the other hand, credit demand has positive relationship with Gross Domestic Product. A higher economic activity increases loan demand.

Equation 1: credit=54.79-1.214*bond+1.411*gdp (ref. Table 4 of appendix)…….(3)

Se = (4.78) (0.431) (0.2905)

T stat = (11.41) (-2.817) (4.85) R-sq = 0.6355

Equations 2: A rising interest rate scenario leads to low economic activity, leading to lower credit and deposit growth. This strengthens the underlying policy stance generally followed by monetary regulator that in a period of rising inflation raising the interest rate will bring down credit growth which eventually lowers the aggregate demand and inflation in the economy. However, in a bout of inflationary tendency which is in sync with rising bond

yields deposits scarcely increase. This phenomenally explains the following relationship given by following estimated equation.

Equation 2: Bond = 34.4320-0.1784*credit-0.2664*adjdep (Ref. table 5 of Appendix)…(4)

Se = (4.11) (0.0579) (0.0652)

T stat = (8.38) (-3.08) (-4.089) R-sq = 0.66744

Similar kind of relationship between credit and deposit has also been established by Ertürk & Korkut (2008) when they said "A good part of bank credit expansion, it appears, was not reflected in total deposits". Similarly, Congregado, Vega, and Garcia-Machado (2010) also mentioned such dichotomy in the presence of credit rationing

At equilibrium the credit demand equals to its supply.

By solving the simultaneous equations we determine credit% and bond yields on the basis of exogenously given GDP rate and adjdep as %age to select assets.

GDP growth rate:

As per estimation in the recently released economic survey the advanced estimate for Financial Year (FY) 2011 GDP growth is 8.6%. And Centre monitoring Indian Economy (CMIE) pegged GDP growth for (FY) 2012 at 8.8%. Assuming downside for FY'2011 and upside for FY'2012 we added two more situations.

Adjusted deposit% (Adjdep%):

While liquidity crunch kept deposit % low in FY'2011 and in FY'2012 it is likely to go up since, unlike previous year liquidity is not expected to be stressed and until now the other avenues of investment for eg., national stock markets are not very buoyant . Further, though the regulator has not increased the statutory reserve requirement, it is unlikely that this will be reduced in view of the ongoing inflationary pressure. Hence, we assume adjdep% will be between 62% to 63% for FY'2011, and between 63% to 65% for FY'2012. Therefore, we create the following four scenarios:

Table 2 : Estimation of Bond Yield% and Credit%

	adjdep% / GDP%	62%	63%
2011	8.4%	bond yield=7.69 credit% = 57.31	bond yield=7.35 credit% =57.72
	8.6%	bond yield=7.62 credit% = 57.67	bond yield=7.28 credit% =58.08
	adjdep% / GDP%	63%	65%
2012	8.8%	bond yield=7.22 credit% = 58.44	bond yield=6.54 credit% =59.27
	8.9%	bond yield=7.19 credit% = 58.62	bond yield=6.51 credit% =59.45

Table 2 shows that a higher deposit share reduces the bond yield while increases the credit% to select assets. An increase in deposit implies falling bond yields as has been recorded in our estimated equation which (falling yields) eventually leads to higher credit

Further, as GDP% increases bond yield reduces and Credit% to select assets increases. This only manifests increased economic activity resultantly increases credit and is by-product of lower bond yields. This conforms to the economic theories that in a period of boom characterised by high growth rate the optimistic environment of the economy results in higher credit demand.

2. Estimating Profitability of ASCBs

Though the past researches suggest that profitability is determined by many factors like cost to income ratio, Net Interest Income, Leverage ratio, NPA etc., the objective in our model is to identify the **effect of Net Interest Income on profitability**. Hence, other determinants e.g., Cost to income ratio or efficiency ratio, Leverage Ratio etc. are considered as exogenous variables. We have taken select assets viz., Cash, inter bank balances, Credit and investment as denominator for calculating the ratios.

We estimate the following profitability model by picking some key determinant identified in earlier studies.[2]

$$Profit\% = \vartheta_0 + \vartheta_1\, NII\% + \vartheta_2\, Cost\ to\ Income\% + \vartheta_3\, CAR\% + \vartheta_4\, NPA\% + \varepsilon$$

In view of the existence of unit root we have estimated the equation on 1st differenced series. Running the above equation on ASCBs

Profit Function of ASCB (detailed at Table 6 of Appendix)

DPROFIT=-0.0502+	**0.6828*DNII-**	**0.07060*DEFF+0.08117*DCAR+0.01149*DNPA[3]…….(5)**				
Se	**(**0.075420)	(0.245804)	(0.013803)	(0.141480)	(0.052328)	
Tstat (-3.66560)	(2.77781)	(-5.11472)	(0.57369)	(0.21955)	R^2= 95%	

The above fitted model explains the importance of net interest income as well as Efficiency ratio (cost to income ratio) in determining profitability in Indian banking scenario.

For all scheduled commercial banks, post liberalisation, it is the efficiency ratio which played a pivotal role in determining profitability (highly significant). The deregulated environment and increased competition due to entry of private and foreign players augmented the importance of non-traditional sources and reduced the reliance on NII. However, it is still an important determinant of profitability in India. It may be mentioned here, a high NII is considered a dampener for competitive banking though it has positive contribution towards bottom-line.

A high cost to income ratio, one of the key determinants of profitability, is perceived as a sign of inefficiency. Thus the efficiency ratio has inverse relationship with profitability. Capital Adequacy Ratio manifests the risk bearing capacity of a bank in the event of a bank failure. In the aftermath of collapse of many banks' due to the recent 2008 crisis, CAR%

[2] Profit% = operating profit as %age to Asset, NII%= Net Interest income as %age to asset, CAR%=Capital Adequacy% , NPA%= Gross NPA%, Cost to Income%= operating cost to operating income

[3] DPROFIT= 1st difference of Profit% , DNII = 1st difference of NII%, DEFF= 1st difference of Cost to Income%, DCAR= 1st difference of CAR%, DNPA= 1st difference NPA%

has become all the more essential. However, for all scheduled banks, a high capital adequacy ratio did not inflate the net income, though it improves brand image, customer confidence etc.

Insignificance of Gross NPA suggests dropping of this variable from the model. It has no effect on the predictability. However, the deleterious effect of NPA on the performance of Banks cannot be belittled. Because NPAs requires higher provisioning which reduces the return, reduces Interest Income and limits recycling of Assets. The lower significance of Gross NPA is due to fact that provisioning requirement for NPA is not included in operating profit% calculations. Another major means for reducing NPA, One Time Settlement, has very minimal impact on profitability. Further the drastic reduction in NPA was also aided by better credit risk management system and favourable legislation like Securitisation and Reconstruction of Financial Assets & Enforcement of Security Interest Act, 2002 (SARFAESI Act) which contributes more to sustainability of profit in the longer term rather than having an impact on its increase/decrease in short term.

After estimating the profitability we integrate macro environment and industry as mentioned in the introduction.

3. Determination of Net Interest Income

Instead of determining the total revenue and cost we restrict ourselves only to the income which are related to interest rate, i.e., Interest income and interest expenses. Net Interest Income measures the income of banks received from interest on assets (commercial loans, personal mortgages, etc) minus its expenditure on interest on liabilities (personal bank accounts, etc).

In India the major income and expenditure item of the banking sector are Interest Income and interest expenditure (interest income is about 86% of total Income and interest expenditure is app. 74% of total expenditure of ASCBs) [source: RBI statistics]

As such in our model we determine Net Interest Income using the macro variables.

Determination of Interest expenses & income:

Bank pays interest rate on deposit. Deposit in its turn consists of Loan portfolio of the bank and the excess reserve over and above the loan portfolio, which is required to maintain as per statutory requirement.

Further, we add a risk premium[4] component in our model. "Risk premium (RP) is measured by calculating the 'difference' of rate of raising money from the "govt. security rates similar in terms of maturity of the subordinate bonds of banking sector".

Further, all deposit products of bank does not cost the bank equally. The checking deposit products generally have low interest rate. Therefore, for calculating interest expenses, we

[4] A risk premium is the minimum amount of money by which the expected return on a risky asset must exceed the known return on a risk-free asset, "Risk premium of bank is defined as the premium the industry pays over govt. of India to raise money".

apply interest cost on deposits portfolio except the no cost portion (say μ). μ can be estimated/ forecasted for the next period by studying historical time series data.

Hence, the interest expenses can be modelled as:

Interest Expenses = (i+RP) * [(1-μ) (L^s + Excess Reserve)]……(6)

Here,

i is the risk free interest rate of the market

L^s + Excess Reserve = Deposit

RP = Risk Premium

By giving loan bank forego the opportunity to raise 'Risk-Free' asset from market. Regulatory reserve maintained also entails a cost which is incorporated. To this a transaction cost premium and a profit premium (since the bank needs profit from its business.)

Hence, interest income can be modelled as:

Interest Income= [i +RP+ SLR & CRR[5] cost (or statutory reserve cost)+ Transaction Premium+ Expected Profit premium] * L^s……(7)

The next step is to estimate NII from the previous two equations 6 and 7

Net Interest income = Interest Income – Interest Expenses

Thus, the interest income and interest expenses can be derived from the credit, reserve ratio and interest rate by using equations 6 and 7.

i = interest free rate estimated (yield from 1st section)

RP = risk premium banking industry 1.20%

μ= 28% (for ASCBs) as per the prevailing trend

Statutory Reserve = 30% assumed in line with prudential requirement

SLR and CRR cost:

As per RBI's requirement the bank has to keep CRR and SLR which entails cost to the bank. Since SLR is for maintaining asset quality its cost is directly loaded to loans and advances whereas cost of CRR is as per the requirement for statutory reserve.

Thus SLR Cost = $\frac{SLR\ REQUIREMENT\%}{1 - SLR\% - CRR\%} * RISK\ PREMIUM$ = 0.0043 (FOR ASCB)

Transaction Premium:

Transaction premium maps the transaction cost. As per RBI, the "overhead cost for banks would comprise a minimum set of overhead cost elements such as aggregate employee compensation relating to administrative functions in corporate office, directors' and auditors' fees, legal and premises expenses, depreciation, cost of printing and stationery, expenses incurred on communication and advertising and IT spending etc." (The Loan Pricing System: Issues and Options 2010)

[5] SLR= Statutory Liquidity Ratio & CRR= Cash Reserve Ratio

As per RBI's document on base rate (The Loan Pricing System: Issues and Options ,2010) the estimated un-allocable overhead cost of ASCBs is 0.99%. Assuming slight increase in the same we take this @1.21% for both Financial Years.

Expected Profit premium:

Profit premium is included in the interest income calculation to show the viability of traditional banking business. Here it is assumed that expected margin required by the management is 2%. Therefore, calculated expected profit premium, as %age to 'Deployable Deposit', is 2.9%, which assumed for FY 2011 and 2012.

Net Interest Income of ASCBs:

Table 3 : Estimation of NII%

2011	2012	2011	2012	2011	2012	2011	2012
		Intt Income%		Intt Expense%		NII%	
bond yield=7.69 credit% = 57.31	bond yield=7.22 credit% = 58.44	7.96%	7.84%	5.59%	5.36%	2.37%	2.48%
bond yield=7.28 credit% =57.88	bond yield=6.51 credit% = 59.45	7.83%	7.55%	5.38%	4.98%	2.45%	2.59%
bond yield=7.62 credit% = 57.67	bond yield=7.19 credit% = 58.62	7.97%	7.19%	5.57%	5.35%	2.40%	2.49%
bond yield=7.35 credit% =57.22	bond yield=6.54 credit% = 59.27	7.75%	7.55%	5.37%	4.97%	2.38%	2.57%

It is observed that Net interest income reacts inversely to the bond yields and positively to credit which in turn stems from the inverse relationship of credit demand to bond yields and positive relationship of GDP with credit creation.

4. Forecasting Profitability:

After obtaining the NII, we forecast profit at two different levels of NII using equation 8. It is assumed that efficiency ratio will slightly decline to 42.90% in FY'2011, since we expect that other income may have better prospects. The forecasted profits for FY'2011 and FY'2012 are given in Table 4.

The profit function is:

DPROFIT= -0.05020 +0.6828 *DNII -0.07060 *DEFF…….(8)

(CAR and NPA dropped from the model since insignificant)

Table 4: Profitability Forecasting

year	estimated NII% to select asset*	change in profit%	Profit% to select asset
2011	B 2.45	0.06369	2.18
	W 2.37	0.00906	2.13
2012	B 2.59	0.04539	2.23
	W 2.48	0.02491	2.15

Profitability is forecasted to improve by 6bps despite a lower NII% in FY'2011 (previous year NII was at 2.49%) given the efficiency ratio and other things remaining the same.

Hence our forecasted profitability for the FY'2011 will hover between 2.13% to 2.18% to select assets, given the assumptions of the model.

And in FY 2012 increase in profit% will be less than proportionate to increase in NII%. Assuming every other situations including efficiency ratio to be same as in the previous year, the NII% to select asset (given +11 bps and +14 bps change in NII%) will impact profitability within the range of +3 bps to +5 bps. The reasons may be attributed to decreasing reliance of Indian banking industry on the traditional sources of business as stated earlier.

However, before applying the model the following points of cautions has to be borne in mind:

- The model assumes Net Interest Income one of the key determinants of profitability.
- The model explains as NII, Profit in relative term (as %age to Select Asset) rather than absolute terms.
- The model uses the forecasts on GDP, Deposit made by professional forecaster.
- The model may be utilised for a whole financial year. Even if the same is used during the year appropriate annualised figure may be used to arrive at accurate results.
- Further, the model utilises the quantitative dimension of profitability. However, the qualitative dimensions and fundamentals of Indian banking, which is generally very sound, also impact the profitability.

5. Findings and Conclusion

The following are the major findings from the above study:

- Credit Demand has an inverse relationship with bond yields on the other hand, has positive relationship with Gross Domestic Product. A higher economic activity increases loan demand
- Deposit does not always lead to increase in credit supply growth. The reasons may be attributed to:
  a. decreasing dependence of modern bank on deposits for credit creation and
  b. During a period of rising interest rate scenario the bout of inflation pushes people to spend more rather than hoard.
- Net interest income as well as efficiency ratio has significant role in determining profitability in Indian banking scenario.
- Deposit mix (higher share of low cost deposit in the total deposits) has favourable impact on NII%.

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Data web Resources

www.rbi.org.in
www.nseindia.com
www.mospi.gov.in
reuters software.

Appendix

APPLYING TWO STAGE LEAST SQUARE

Equation 1: credit=54.79-1.21*bond+1.41*gdp

Table 4: Output of Equation 1

Dependent Variable: credit
Method: Two-Stage Least Squares
Date: 02/07/11 Time: 00:20
Sample: 1997:1 2010:4
Included observations: 56
credit=C(1)+C(2)*bond+C(3)*gdp
Instrument list: C adjdep gdp

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	54.78703	4.782730	11.45518	0.0004
C(2)	-1.213795	0.430854	-2.817182	0.0068
C(3)	1.411249	0.290592	4.856458	0.0030

R-squared	0.635535	Mean dependent var	54.75746
Adjusted R-squared	0.626876	S.D. dependent var	5.826785
S.E. of regression	4.173882	Sum squared resid	923.3282
Durbin-Watson stat	2.157367		

White Heteroskedasticity Test:

F-statistic	2.897757	Probability	0.007748
Obs*R-squared	7.11134	Probability	0.010744

Heteroscedasticity: The Obs*Rsquared statistic vis a vis χ^2

qchisq = (.95,3) = 7.84 Here obs *R sq< χ^2 : not heteroschedastic

Durbin Watson

D_l = 1.32 d_u = 1.47 4- d_u= 2.53

Since, d_u <d<4-d_u hence, there is no autocorrelation too

Equations 2: bond = 34.4320-0.1784*credit-0.2664*adjdep

Table 5 : output of Equation 2

Dependent Variable: bond
Method: Two-Stage Least Squares
Date: 02/07/11 Time: 00:27
Sample: 1997:1 2010:4
Included observations: 56
bond=C(1)+C(2)*credit+C(3)*adjdep
Instrument list: C gdp adjdep

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	34.43197	4.109165	8.379311	0.0010
C(2)	-0.178392	0.057881	-3.082032	0.0033
C(3)	-0.266448	0.065158	-4.089255	0.0011

R-squared	0.667448	Mean dependent var	7.997663
Adjusted R-squared	0.655842	S.D. dependent var	2.227278
S.E. of regression	1.716823	Sum squared resid	156.2165
Durbin-Watson stat	2.084735		

White Heteroskedasticity Test:

F-statistic	2.115850	Probability	0.022773
Obs*R-squared	6.99768	Probability	0.026590

Heteroscedasticity:

qchisq = (.95,3) = 7.84 Here obs *R sq< χ^2 : not heteroschedastic

Durbin Watson

D_l = 1.32 d_u = 1.47 4- d_u= 2.53

Since, d_u <d<4-d_u hence, there is no autocorrelation too

Estimation of Profit of ASCB

DPROFIT=-0.05020+ 0.6828*DNII- 0.07060*DEFF+0.08117*DCAR+0.01149*DNPA[6]

Table 6: Output of Profit of ASCB

Dependent Variable: DPROFIT
Method: Least Squares
Date: 02/19/11 Time: 15:43
Sample(adjusted): 2002 2010
Included observations: 9 after adjusting endpoints
DPROFIT=C(1)+C(2)*DNII+C(3)*DEFF+C(4)*DCAR+C(5)*DNPA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.050199	0.075420	-3.665601	0.0221
C(2)	0.682796	0.245804	2.777806	0.0399
C(3)	-0.070601	0.013803	-5.114720	0.0069
C(4)	0.081167	0.141480	0.573699	0.5969
C(5)	0.011489	0.052328	0.219551	0.8370

R-squared	0.952045	Mean dependent var	0.053391
Adjusted R-squared	0.904090	S.D. dependent var	0.328558
S.E. of regression	0.101752	Akaike info criterion	-1.432370
Sum squared resid	0.041414	Schwarz criterion	-1.322800
Log likelihood	11.44566	Durbin-Watson stat	2.084736

White heteroscedasticity test:

Heteroscedasticity: The Obs*Rsquared Vs χ^2

Obs*Rsq= 9.000 qchisq = (.95,4) = 9.4877

Here obs *R sq< χ : not heteroschedastic

Durbin Watson D statistics for finding autocorrelation

D_l = 0.49 d_u = 1.70 4-du = 2.30

Since, $d_u < d < 4-d_u$ hence, there is no autocorrelation too

[6] DPROFIT= 1st difference of Profit% , DNII = 1st difference of NII%, DEFF= 1st difference of Cost to Income%, DCAR= 1st difference of CAR%, DNPA= 1st difference NPA%

Table 7: ASCB Details.

	profit	NII	intt income	intt expense	other income	other expense	Total of Select Asset*
2001	19757	36950	115091	78141	16985	34178	1294974
2002	29837	39442	126958	87516	24074	33679	1535513
2003	40682	47111	140718	93607	31656	38085	1696746
2004	52592	56766	144333	87567	39528	43702	1975019
2005	51024	66722	155801	89079	34435	50133	2355509
2006	54394	78227	185388	107161	35368	59201	2785851
2007	65977	89255	231675	142420	43041	66319	3459946
2008	83589	100481	308482	208001	60391	77283	4326166
2009	110898	125259	388482	263223	75220	89581	5241330
2010	122417	143667	415751	272084	78519	99769	6289596

Source: RBI

* Cash, Inter Bank Balances, Credit, and Investment.