THE FINANCIAL PERFORMANCE EVALUATION OF REGIONAL RURAL BANKS OF INDIA

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ABSTRACT

In the financial situation of India the RRBs has been survival for 36 years. In these years it improves a lot in banking operation. The advances and investments as developed quickly, but the stake of bills might increase under progression. In the beginning, the RRBs have some different principles and rules. In the preliminary decade, these are mainly focused on proved loans to the poor sections of rural region. They also aimed at charging lower interest rates. This initiated the process of opening multiple branches in remote and rural areas and they also kept a low cost profile. But the preliminary some banks are faced some losses within a short period of time.

The purpose of this research is to evaluate the financial performance evaluation of regional rural banks of India. Specifically, the research aims to analyze the growth and viability of first and second generation reforms period of Indian regional rural banks. The research critically reviewed several literatures purported by different researchers in order to assess the viability of the topic. The research design is descriptive and exploratory in nature. Moreover, secondary data have been used for synthesizing the objectives. The data was edited, classified and tabulated to make it useful and convenient of further analysis with the help of various statistical techniques, Finally conclusion were drawn to confirm the viability of the topic.

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1. Introduction

In the financial situation of India the RRBs has been survival for 36 years. In these years it improves a lot in banking operation. And then it focused on mounting the efficiency of rural credit delivery method in the country. As known point of view the commercial banking sector join with the extensive policy framework concerning social banking through combining shareholding of central government, the state government also involved and subsidized bank.

For production of rural credit availability the RRBs sketched out a strong institutional arrangement. It is developed for institutional credit in the rural region, and particularly in between economically and communally deficient section. The cooperative banks and commercial banks had fair records in terms of geographical area and payment of credit, yet in terms of federation of the population. The domination of rich people in rural areas is affecting the cooperative banks. But the commercial banks exhibited a clean predisposition.

The advances and investments as developed quickly, but the stake of bills might increase under progression. Correspondingly, under investment and share of others might be increased.

The purpose of this research is to evaluate the financial performance evaluation of regional rural banks of India. Specifically, the research aims to analyze the growth and viability of first and second generation reforms period of Indian regional rural banks.

1.1. Problem Statement

In the beginning, the RRBs have some different principles and rules. In the preliminary decade, these are mainly focused on proved loans to the poor sections of rural region. They also aimed at charging lower interest rates. This initiated the process of opening multiple branches in remote and rural areas and they also kept a low cost profile. But the preliminary some banks are faced some losses within a short period of time.

These banks have the limit to allow the 100 percent refinance on their lending activities. Therefore, encouragement for internal resource mobilization was not present. Thus there were some issues for collapse of these banks. Growing business without any analysis and limitations in each branch of banking business also proved to be an unconsidered practice.

Rural banks developing their branches very quickly, in the early 1985, they established 12606 branches. During that time period the credit deposit ratio (C.D.R) had a steep rise. In

December 1986 it was 165% and it finally it came down up to 104%. The Credit Deposit Ratio continuously got worsened thereafter.

Furthermore, the remunerated investment which was 25 Lakh at the preliminary phase was not capable to absorb the loan shortage of maximum of the rural banks. Eventually, the loan growth was nearly 40%. Thus, the problem in question is to evaluate the financial performance of regional rural banks in India.

1.2. Research Objectives

The objectives of this research are:

- To analyze the development prototype of Indian Regional Rural Banks
- To analyze the monetary act and measure of Indian Regional Rural Banks
- To know the credit-distribution of Indian Regional Rural Banks in India;
- To work out the credit-deposit ratio of Indian Regional Rural Banks
- To understand Growth and Viability of First and Second generation reforms period; this portion has considered all Indian Regional Rural from 1991 to 2009.
- To synthesize the pattern of deposit-mobilization and credit disbursement for the growth of rural masses; and to recommend action-based suggestions to improve the overall performance of Indian Regional Rural Banks.

1.3. Research Significance and Scope

The study under question is quite beneficial for academicians, scholars to make a view point the performance and present studies of the RRBs in India. Industrialists, entrepreneurs and service providers may get help from the study after knowing the prospective of RRBs in the Indian market. Additionally, it is possible that Government of India and other ministries of it may be benefited for policy formulation and execution for RRBs in future. In the present study, Regional Rural Banks in India as a whole during 1990-2010 have been studied. To understand the concept better I undertook a study on *Growth and Viability of First and Second generation's reforms period*, this portion has considered almost every RRBs functioning in India for the duration of 1991 t0 2009. I divided the total study period into distinct vise; the first and second generation which comes under the periods 1991 to 1998 and 1999 to 2009 are reforming period for the purpose to learn the impact of deregulation on the financial competence of banks.

2. Literature Review

The commerce correspondent structure has to be considered thoroughly along with biometric know-how. Prose assessment is a reading associating literatures in the selected quarter of delves about which investigator has limited data. In the earlier period, a diversity of revision associated with the fiscal performance of domestic banks has been conducted by researchers.

According to Haslem (1968), beginning with the significant participation, the literature inquires on the features influencing show of banking institutions that has to consider 2 broad aspects i.e. in-house features & external features of banking institutions. The external features are systematic forces which depict the economic circumstances of the trade & also depict economic organization that might be affected.

In the initial periods few finance provision is required for marketing and growing wits that will result in improved loan combination volume between the deprived and liable units and for use of technology for easing the official stages of enclosure. Various amounts of descriptive alternatives have been recommended in the literature for the association of interior & exterior components. With regards to this, Molyneux and Thornton (1992) created a negative & significant relation between the levels of liquidity & productivity, while Bourke (1989) in distinction, unconfirmed report is conflicting impact. According to Guru, Staunton and Balashanmugam (2004), one probable cause for the contradictory outcome might be the unlike broadening of requirement for funding in the instance that has been utilized in the report.

Miller and Noulas (1997) stated that Credit peril may start and have a destructive impact on profitability. This impact might be explained by conserving the reality that with the establishment of the increased number of monetary organizations to the constituents of soaring risk finances; have increased the unpaid loans, therefore these have resulted in losses to various profitable banks. According to Bell and Murphy (1969) and Kwast and Rose (1982), few of other local variables found in the literature are finances establishments using administration, assets & liquidity part, the credit deposit part & loan hitting functioning expenditure. Proper & efficient administration is a latest noteworthy aspect affecting the productivity of banking institutions.

Thus, the literature supports the notion that a functioning cost-related variable must be included in the payout section of a distinctive microeconomic income. In regard to banking

sector, the requirement for risk administration is essential for the economic strength of the banking institutions.

With regard to external determinants having impact on the success of banking institutions, the literature distinguishes among control aspects that explicate the macroeconomic variables like increase in prices, interest toll & persistent efficiency, & variables that stand for market uniqueness. Edwards (1977) purported that the size of bank & monetary system of scale as stated by Benston, Hanweck & Humphrey (1982); Tschoegl (1982), thoughtfulness as stated by Rhoades (1977) and Schuster (1984), raise in market awareness tax as a alternate for assets deficit & government ownership. The frequently utilized macroeconomic variables are the price raises rate, the extended term interest charge along with the growth rate of cash.

Revell (1979) have thrown light on the topic of the relationship between bank productivity & increase in price. He stated that the outcome of increase in prices on bank efficiency is based on the fact that in case banks' pay & other in use functioning cost increase at a faster pace in comparison to increase in price.

Perry (1992) in an equivalent way stated that the level to which increase in prices have impact on bank success is based on whether increase in prices are absolutely knowable. The pressure arises from assets standing of a banking institution on its success is very purposeful & is frequently considered in literatures.

Barth et al. (2004) stated that government ownership of banking institutions is surely indifferently related with bank proficiency. On the other hand, NABARD (2002) offered interpretation of domestic countryside banking institution's feasibility that was pursued by farming backing corporation in the year 1986 for NABARD. The research depicted that viability of domestic countryside banking institutions was essentially based on the fund administration scheme, edge concerning funds mobility & their use and forthcoming expenditure with advances.

In conclusion, numerous researches associated to working of rural banking segment in India have been conducted in the past. Bhatia (1978), in his research entitled, "Banking Structure and Performance − A Case Study of the Indian Banking System" tried to study the financial working of Indian banking structure as reproduced by its result, rate and effectiveness throughout the span 1950-68. He came to know that revenue of the Indian banking structure

in the mentioned span had a rising tendency. The research recommended deregulation of interest duties to improve the effectiveness of monetary societies and to safeguard a viable banking atmosphere which would eventually consequence in better facilities.

3. Research Methods

The proposed research design is descriptive and exploratory in nature. A research design is merely and basically the structure or arrangement for a research that directs the compilation and investigation of the data. Moreover, the research design indicates the methods of research i.e. the method of gathering information and the method or sampling. Descriptive research approach is also called as statistical research method that explains data and distinctiveness for a particular population or experience or event being considered. Additionally, descriptive research relates with all that can be calculated and analyzed. In the present study, secondary data have been used for synthesizing the objectives. The secondary data have been collected from different books, articles, journals, newspapers, Indian Banks Associations (IBA) publications especially the performance highlights of selected Regional Rural Banks, RBI, the annual reports of the banks concerned and views of various committees constituted for restructuring and financial viability of RRBs have been considered.

The data collected from secondary sources is edited, classified and tabulated to make it useful and convenient of further analysis. The various statistical techniques like percentage, compound annual rate of growth, data envelopment analysis, standard deviation, etc. and ranking have been used. For better presentation of the data and to make it interesting and understandable, tables have also been used. The interpretation of data is based on rigorous exercise aiming at the achievement of the objectives of the study and findings of the existing studies.

In order to analyze and present the data findings, following research instruments were used:

- Pearson Correlation
- Malmquist Index
- Growth Rate
- C.V.
- Variance
- t test

- Regression
- Outlier detection
- Shift detector

3.1. Research Limitations

- The current research limits itself because of lack of time just monetary working features of Regional Rural Banks.
- The entire study is completely based on secondary data which has been gathered and submitted from the yearly reports of NABARD and RBI.
- Therefore, due to lack of time and resources, the primary data could not be collected.
- The researcher has limited knowledge of statistical softwares like SPSS, SAP, Excel, etc.

4. Results

The present study is based on estimation of financial performance of RRBs. The prime aim of the research is to evaluate financial performance of all study period RRBs by taking data from NABARD, RBI, Committee reports of RBI and from various previously published articles presenting and interpreting it in simpler and in tabular manner to understand the financial performance.

4.1. Structural Growth of Regional Rural Banks

It is know through inception that RRB has seen a gradual rise in better structure and delivering a better strength. There are other features which are far more remarkable and doo address a massive expansion through networks in rural areas. There are other beginning which RRB's which cover s all the branches like of 17 branches and other 11 districts and have districts covered as 518 and which further grown up to 14,446 branches working more than the 45 percent of the country larger network in rural area and forming a better orientation for the present 45 percent branches in commercial level. There are further orientation of RRB's which do act as a formidable constraint in rural and semi urban branches constituting more than 97 percent of the network branch, the branch network can be enabled through RRB's and have banking in rural range (See Appendix A for Table 4.1).

There is sharp increase in bank numbers which duly went up to more than 40 and do has covering of branch network from the year of inception of 1975 and further has clear table in

each successive year of RRB's. The districts covered are number of branches has significantly increase. It has been further more observed that changing table in a short span of 12 years would necessitate and operate branches covering more than 523 districts and has 14446 branches.

As per October 2006, 137 RRBs were addressed through 18 commercial banks. As per amalgamation process of phase 1 is in process of being the 15 states have 82 to 196 branches. For strengthening the credit sector the government of India processes the result in further consolidation and economies of scale and better risk management capability of RRBs. NABARD is given that full support to the merging process. After completion of this process the RRBs would become as larger organization, and it controlled all the area where it has covered. It is one of the advantages of the financial scale and reduction in transaction amount. The transport process of RRBs is more essential and easy to sponsor banks to deal the affairs of RRBs (See Appendix A for Table 4.2).

4.2. Correlations

This was calculated by comparing the first generations reforms of credit-deposits and investment deposit ratios from the period 1991 to 1998 and second generations' reforms of credit-deposits and investment deposit ratios from the period 1999 to 2009.

In first generation the change in the investment deposit ratio is -921 and .508. And the second generation it is near to = -1. As per the years 2000-2001 the deposit ratio was at more than the 42.1 percent and investment of deposit ratio slightly 20.4 percent and has been equal to 1999-2000. From the year 2001-2002 the deposit ratio of RRBs slightly rise to more than 42.5 percent and it is same as previous year due to decline the investment and various changes in the approved securities. During the year s2003-2004 the credit deposit ratio rises 45 percent due to rise in investments. In the year 2002-2003 the credit deposit ratio declined to 44.7 percent, compare to previous it rises 30.6 percent due to increase in the government securities of 60.6 percent. During the period of 2004-05, the credit-deposit ratio improved to 51.2 percent and the increasing trend also shown in the investment-deposit ratio to 37.3 percent. In 2005-06 the credit-deposit ratio was 55.7 percent while the investment-deposit ratio 57.6 percent. The table shows the only during the period of 2003-04 the credit deposit ratio decreased while the period of 2001-02 had decreased investment-deposit ratio.

Particularly in government securities 334 percent, the investment-deposit ratio rise up to 25.9 percent (See Appendix A for Table 4.4 and Table 4.4).

4.3. Coefficient of Variation (CV)

This was calculated by comparing the first generations reforms of regional rural banks from the period 1991 to 1998 and second generations' reforms from the period 1999 to 2009. Thus, C.V. (Coefficient of Variation) showing that the variability during Second Generation Reforms has been lower when compared the variability during First Generation Reforms across most of the variables. Linear trend was used as the profit was negative during this period (See Appendix A for table 4.5).

4.4. Testing Null hypothesis

A test of the null hypothesis that the difference between two periods measured on different variables a mean value of zero with the help of t test has been carried out. This was performed by comparing the variables during first and second Generation Reforms. The t statistics in all the cases were significant, indicating that the mean values significantly differed during these two periods. t statistic was also significant for one-tail test which indicates that the mean during the second generation reforms was higher than that of during the first generation reforms (See Appendix A for Table 4.6 and Table 4.7).

4.5. Impact of Investments on profitability of RRB's

4.5.1. First Generation Reforms

Impact of Investments on profitability was found not significant during this period. F statistic was not significant indicating the overall fit was not good (See Appendix A for Table 4.8).

4.5.2. Second Generation Reforms

Impact of Investments on profitability was found significant during this period. F statistic was highly significant indicating the overall fit was good. The R2 value was also higher (0.62). Regression Coefficient for investments was 0.023 indicating that for every 1 Rupee increase in the Investments made by RRB's, there was 0.023 Rs rise in the profitability (See Appendix A for Table 4.9). Therefore, NS is not significant (Significant at 1% level).

4.6. Summary of Malmquist Index

TFP index changes are presented in Table 4.10 (See Appendix A). Average Total Factor Productivity change was also more during the Period II. During First Generation Reforms

(1991 to 1998) average Total Factor Productivity change was 0.77. During Second Generation Reforms (1999 to 2009), average Total Factor Productivity change was 0.93. The results on Total Factor Productivity change also indicate that there is still a room for RRB's to improve their performance.

The series data consists of the yearly profit data of the RRB's from 1991 to 2009, to find out if there is any shift in the profits an appropriate indicator variable as a regressor has to be included in the model.

4.7. Outlier Summary

The "Outlier Summary" table shows the most likely types of breaks and their locations within the series span and as per the outlier detection, shift occurred in the year 1998 (See Appendix A for Table 4.11).

4.8. Estimation Span Summary

This shift was included in the model. Shift1998 is the predictor variable to find out the impact of reforms on profitability of the RRB's (See Appendix A for Table 4.12).

4.9. Likelihood Based Fit Statistics for Shift detector

The analysis was carried on the shift 1998 as the regressor. The statistics showed the significance of this shift in profitability (See Appendix A for Table 4.13). Where Full Log Likelihood is -114.8, AIC is at 233.54, BIC at 235.21and Root Mean Squared Error is 217.86.

4.10. Final Estimates of the Free Parameters

The shift variable (shift1998) with an estimate value of 873.31 was highly significant. This indicates that the shift in profitability was during the end of first generation reforms. This analysis clearly shows the break in the series and the impact of the generation reforms on the profitability of RRB's (See Appendix A for Table 4.14).

5. Summary and Conclusion

The performance in every term is having a different connotation and depends in the framework and its applications. As varied Rural Regional Banks activities, there is a reason behind for their every performance. This study evaluated several parameters like growth pattern of RRBs; The credit distribution of RRBs; and the first generation and second generation's reform periods of RRBs.

There are many commercial and co-operative banks are operating in rural areas before establishing the RRB's. Due to the complexity of banks branches, the needs of credits in rural areas are in sufficient. The general element of commercial banks networks, RRB also has also reached great growth in number of banks and its branches accordingly. It also expanded their services for all corners. Additionally, RRB is also encouraging the less credit deposits ration that making big dent on the major function of RRB.

As per First and Second Generation Reforms, the variables of growth and variability during concerned, and Coefficient of Variation (C.V) showing that, the changeability during 'Second Generation Reforms' will become lower while compared with the variability during First Generation Reforms' across most of the variables. It is clearly shows that "second generation reforms, amalgamation were really working.

An analysis of the null hypothesis was made on difference between two periods on various variables with a mean value of '0' with the help of 'T' test. This analysis suggests that second generation is become more effective than first generation. Moreover, the Outlier Summary analysis was very useful to explain about the breaks and locations within duration. According to this method, collisions were happened in the year 1998.

Reserve Bank of India and other agencies are concerned for strengthening the financial position of regional rural banks have resulted in perceptible improvement in the functioning of these banks. Moreover, regional rural banks are thus required to devote utmost attention to their performances to meet global aspirations. This study is an attempt in this direction to analyze the performance of banks in terms of financial, performance and evaluation during the Pre and post-reforms period spanning from 1991 to 1998 and 1999 to 2009 by using Malmquist index.

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Appendix A

TABLE 4.1 Growths of Indian RRBs

Years	No. of RRBs	No. of Branches	No. of District covered
1975	5	17	11
1976	40	489	84
1977	48	1187	99
1978	51	1753	102
1979	60	2420	111
1980	85	3279	144
1981	107	4795	182
1982	124	6191	214
1983	150	7795	265
1984	173	10245	307
1985	188	12606	333
1986	194	12838	351
1987	196	13353	363
1988	196	13920	369
1989	196	14079	369
1990	196	14443	372

1991	196	14527	381
1992	196	14539	392
1993	196	14543	398
1994	196	14542	408
1995	196	14509	425
1996	196	14497	427
1997	196	14461	427
1998	196	14475	451
1999	196	14499	454
2000	196	14301	457
2001	196	14311	476
2002	196	14350	487
2003	196	14311	495
2004	196	14446	518
2005	196	14446	523
2006	133	14526	534
2007	96	14822	594
2008	90	15054	617
2009	86	15484	618
2010	82	15740	619
2011	82	16001	620

TABLE 4.2 Credit-Deposits and Investment Deposit – Ratio

Year	Credit - deposit ratio	Investment-deposit ratio
1991	69.85	4.52
1992	67.88	2.29
1993	64.28	2.12
1994	56.80	3.56
1995	53.74	12.10
1996	49.80	20.32
1997	43.99	21.64
1998	40.65	23.79
1999	39.02	24.69
2000	38.56	24.08
2001	39.30	22.98

2002	39.76	21.26
2003	42.22	34.57
2004	44.48	37.81
2005	51.16	37.45
2006	53.99	33.85
2007	56.91	30.41
2008	58.06	29.69
2009	54.58	30.51

Correlations

Table 4.3: **Second Generation Reform Period**

**. Correlation is significant at the 0.01 level (2-tailed).

		CREDIT - DEPOSIT RATIO	INVESTMENT-DEPOSIT RATIO
CREDIT - DEPOSIT RATIO	Pearson Correlation	1	-.921**
	Sig. (2-tailed)		.001
	N	8	8

INVESTMENT-DEPOSIT RATIO	Pearson Correlation	-.921**	1
	Sig. (2-tailed)	.001	
	N	8	8

Table 4.4: Second Generation Reform Period

		CREDIT - DEPOSIT RATIO	INVESTMENT-DEPOSIT RATIO
CREDIT - DEPOSIT RATIO	Pearson Correlation	1	.508
	Sig. (2-tailed)		.111
	N	11	11
INVESTMENT-DEPOSIT RATIO	Pearson Correlation	.508	1
	Sig. (2-tailed)	.111	
	N	11	11

Table 4.5: Growth and Variability during First and Second Generation Reforms

(In percentage)

	Period I		Period II	
Variables	**Growth Rate**	**CV**	**Growth Rate**	**CV**
Capital	41.08	97.61	16.70	41.34
Total income	21.45	49.26	10.11	34.53
Deposits	24.38	49.86	15.07	44.60
Investments	79.61	105.28	19.06	49.63
Investments in India	79.61	105.28	88.51	58.50
Interest earned	22.48	50.22	9.83	34.26
Interest expended	23.19	48.17	7.43	30.35
Total	22.34	47.25	14.54	43.67

assets				
Other income	14.16	48.41	14.76	43.82
Profit / (loss)	-34.222	-	11.10	41.79

Table 4.6: Comparison of variables during First and Second Generation Reforms

	CAPITAL.		TOTAL INCOME.		DEPOSITS		INVESTMENTS.		INVESTMENTS IN INDIA.	
	Period I	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*
Mean	354.54	2209.29	1380.42	6359.81	11528.66	62174.99	1777.82	19085.38	1777.82	18224.48
t Stat	-5.17		-5.87		-4.81		-4.82		-4.08	
P(T<=t) one-tail	0.00		0.00		0.00		0.00		0.00	
t Critical one-tail	1.74		1.74		1.74		1.74		1.74	
P(T<=t) two-tail	0.00		0.00		0.00		0.00		0.00	
t Critical two-tail	2.11		2.11		2.11		2.11		2.11	

Table 4.7: Comparison of variables during First and Second Generation Reforms

	INTEREST EARNED.		INTEREST EXPENDED.		TOTAL ASSETS.		OTHER INCOME		PROFIT / (LOSS)	
	Period I	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*	*Period I*	*Period II*
Mean	1302.	5916.4	929.7	3473.3	1571	7874	77.7	443.3	-	657.

	68	3	9	6	2.55	1.67	6	7	310.86	86
t Stat	-5.87		-6.07		-4.82		-4.97		-7.36	
P(T<=t) one-tail	0.00		0.00		0.00		0.00		0.00	
t Critical one-tail	1.74		1.74		1.74		1.74		1.74	
P(T<=t) two-tail	0.00		0.00		0.00		0.00		0.00	
t Critical two-tail	2.11		2.11		2.11		2.11		2.11	

Table 4.8: Impact of Investments on profitability of RRB's during First Generation Reforms

Variables	Coefficients	Standard Error
Intercept	-232.483	233.117
Investments	-0.007	0.018

F Statistic 0.05^{NS}

R Square 0.008

Table 4.9: Impact of Investments on profitability of RRB's during Second Generation Reforms

Variables	**Coefficients**	**Standard Error**
Intercept	221.418	126.973

Investments	0.023	0.006

F Statistic 14.72**

R Square 0.62

Table 4.10: Summary of Malmquist Index

Year	TFP change	Average TFP Change
1992	0.50	0.77
1993	0.67	
1994	0.75	
1995	0.80	
1996	0.83	
1997	0.86	
1998	0.88	
1999	0.89	
2000	0.90	0.93
2001	0.91	
2002	0.92	
2003	0.92	
2004	0.93	
2005	0.93	
2006	0.94	
2007	0.94	
2008	0.94	
2009	0.95	

Table 4.11: Outlier Summary

As per the outlier detection, shift was occurring in the year 1998

Year	Break Type	Estimate	Standard Error	Chi-Square	Pr > ChiSq
1998	Level	873.31	287.74	9.21	0.0024

Table 4.12: Estimation Span Summary

Variable	Type	First Obs	Last Obs	Min	Max	Mean	Standard deviation
Profit	Dependent	1991	2009	-802.54	1263.604	249.9791	563.19
shift1998	Predictor	1991	2009	0	1	0.63158	0.49559

Table 4.13: Likelihood Based Fit Statistics for Shift detector

Full Log Likelihood	-114.8
AIC	233.54
BIC	235.21
Root Mean Squared Error	217.86

Table 4.14: Final Estimates of the Free Parameters

Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|

Irregular	Error Variance	0.016	11.32	0.00	0.9989
Level	Error Variance	42806	14682.30	2.92	0.0036
shift1998	Coefficient	873.31	206.90	4.22	<.0001

Appendix B

Performance parameter of Regional Rural banks in India are mentioned below. Formula to **check growth:-**

$$\{(\text{Value of } 2009 - \text{Value of } 1999) / \quad \text{value of } 1999 \quad * 100\}$$

Correlation Analysis:

Correlation considers two variables x and y: - $Y = a + b*X$

Chi-Square:

The referral name for the test of chi-square is chi-square test or x^2 test. Unlike other tests, chi-squared test is statistical hypothesis test. Here, the sampling allocation of the test static is a chi-squared allocation when the value of null hypothesis is coming out to be true, or this is asymptotically true. It means that it is apparent to apply the sampling allocation when the null hypothesis is true. This could probably lead to approximate a chi-squared allocation as aspiration by making the size of the sampling to some higher extent.

"t" test:

Consider that "t" is the variation between two sample means measured using the standard error of those means, or "t". It was observed that there is no major difference in achievement between group 1 and group 2 on the test.

t = Difference between two means / (Variance / Sample size) Standard Deviation:

Standard deviation of the mean = σx = σ/sqrt(n)

Malmquist Index:

The Malmquist Index (MI) is considered to be a joint index which could be used to judge against the production technology of two economies. The reason for this name is Professor Sten Malmquist who introduced this index method, and on whose ideas it is based. It is also called the Malmquist Productivity Index.

It could be noted that the MI of First Generations Reforms relating to Second Generations Reforms is the equal of the MI of Second Generations Reforms relating to First Generations Reforms period. If the MI of First Generations Reforms relating to Second Generations Reforms is less than 1, the total production technology of economy Second Generations Reforms is greater to that of economy First Generations Reforms.

The production function is a key concept of the Malmquist Index as it is a function of most probable production, concerning a set of inputs that are relevant to labour and capital. Thus, in the production function of Economy A, if $\mathbf{S_Q}$ is the set of labour and capital input, then it is considered that Q is the production function of Economy A.

As a result,

$$\mathbf{Q = f_a (S_a)}$$

In order to determine the Malmquist Index of economy A with regard to economy B, it is necessary to replace with the labour and capital inputs of economy A into the production function of economy B, and vice versa. The formula for Malmquist is represented as follows:

$$\mathbf{MI} = \sqrt{(\boldsymbol{Q1Q2})/(\boldsymbol{Q3Q4})}$$

Here,

$Q1 = f_a (S_a)$

$Q2 = f_a (S_b)$

$Q3 = f_b (S_a)$

$Q4 = f_b (S_b)$

Factor Productivity:

From the key sub-segments two aspects of output are Competence and Skill Development. Here, it has been supposed that the previous holding "special" characteristic aspects such as affirmative externalities and non-competiveness are assumed to be a carter of financial development.

It is also mentioned that Total Factor Productivity is often observed as the genuine carter of development that is for the reason, an economy and research expose that whereas efforts and venture are significant donors, Total Factor Productivity may be responsible for up to 60% of development inside economies.

The subsequent expression signifies complete productivity (Y) as a function of total-factor productivity (A), wealth input (K), efforts input (L), and the two inputs' individual stakes of result (α and β are the capital input stake of involvement for K and L correspondingly). It is likely that a rise in any of A, K or L will result in a rise in production. In spite of the point that wealth and effort input are concrete, total-factor productivity seems to be more insubstantial as it can vary from skill to acquaintance of employee (human wealth).

$$Y = A \times K^{\alpha} \times L^{\beta}$$

Sum of smoothed trend and regression effect for profit:

It is the output from the analysis of UCM procedure for the shift. Explained in detail below:

Likelihood based fit statistics for shift detector.

The analysis of time series is frequently helpful to detect modifies over time in the characteristics of the response series. There are two types of changes In the UCM procedure, additive outliers (AO) and level shifts (LS). An additive outlier is an unusual value in the series, the cause of which might be a data recording error or a temporary shock to the series generation process. A level shift represents a permanent shift, either up or down, in the level of the series. We can control different aspects of the outlier search, such as the significance level of the reported outliers, by choosing different options in the outlier statement. The search for AOs is done by default, whereas the check break option in the level statement must be used to turn on the search for LSs.

De Jong and Penzer (1998) implemented detection process in the UCM procedure. In this approach the fitted model is taken to be the null model and the series values and level shifts that are not adequately accounted for by the null model are flagged as outliers. The unusualness response series value at a particular time point with respect to the fitted model. It can be judged by estimating its value based on the rest of the data and comparing the estimated value to the observed value. If the difference between the estimated and observed values is statistically significant, then such value can be regarded as an AO.

Note that this difference between the estimated and observed values is also the regression coefficient of a **dummy** regressor that takes the value 1.0 at and is 0.0 elsewhere, assuming such a regressor is added to the null model. In this way the series value at is regarded as AO if the regression coefficient of this dummy regressor is significant. Similarly, you can say that a level shift has occurred at a time point if the regression coefficient of a regressor, which is 0.0 before and 1.0 at and thereafter, is statistically significant. De Jong and Penzer (1998) provide an efficient way to compute such AO and LS regression coefficients and their standard errors at all time points in the series. The outlier summary table, which is produced by default, simply lists the most statistically significant candidates among these.

Full Log Likelihood - This is the log likelihood of the fitted full model. It is used in the Likelihood Ratio Chi-Square test of whether all predictors' regression coefficients in the model are simultaneously zero.

a) **AIC** - This is the Akaike Information Criterion. It is calculated as AIC = -2 Log Likelihood + 2(s), where s is the total number of predictors in the model. AIC is used for the comparison of models from different samples or non-nested models. It penalizes for the number of predictors in the model. Ultimately, the model with the smallest AIC is considered the best.

b) **BIC** - This is the Bayesian information criterion. Like the AIC, it is based on the log likelihood and penalizes for the number of predictors in the model. The smallest BIC is most desirable.

c) **Root-Mean-Square Error (RMSE)** is a frequently used measure of the differences between values predicted by a model or an estimator and the values actually observed. RMSD is a good measure of accuracy. The smallest RMSE is most desirable

3. C.V.: Coefficient of variation (CV) is a normalized measure of dispersion of a probability distribution.

$$c_v = \frac{\sigma}{\mu}$$

Thus, it can be understood from the above analysis that the role and financial performance of Regional Rural Banks have been evolving in response to policy initiatives as well as the changing business environment.

To recover the power and working of Regional Rural Banks and thus allow them to confront their main purposes, the Government accepted the job of reforming the RRBs. Numerous strategy initiatives were undertaken by the Reserve Bank of India and NABARD to ease divergence of their trade process into fresh regions. For powering the RRBs and letting them economically sturdier and comparable, the Government further measured recapitalization of RRBs letting adverse net value.

Hence, the consequences indicate that the RRBs having maximum of times the least competence tallies are not yet liberal in character. Hence, these banks will have to integrate considerable variations in their strategies to align with specialized working values. Later to examining it is clear that maximum of the banks comprised in the example are functioning at lesser their ideal degree and facing swelling revenues to measure. Lastly, the numerical discoveries recommend that the consequences on Total Factor Productivity alter also specify that there is still a space for RRB's to enhance their working.