Financial Inclusion and its determinants: Evidence from state level empirical analysis in India

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Abstract

Financial institutions are the catalyst in the economic growth and progress in the modern era. In this respect, there is a rapid thrust for financial inclusion, more so in emerging economies, such as, India.

The study utilizes state-wise panel data spanning over a period from 1995 to 2008 in an attempt to assess the behaviour and determinants of financial inclusion in India. In line with the economic intuition, increase in bank branch network (captured by average population per branch) is having a beneficial impact on deposit and credit penetration. Although, the strength of causality weakens in case of credit penetration. The income level has a positive impact on both credit and deposit penetrations. The finding validates the importance of regional economic conditions on the betterment of financial inclusion. Further, the factory proportion and employee base are coming out to be significant variables indicating that income and employment generating schemes lead the public to be more active, aware, interested with regard to banking activities, which contributes towards financial inclusion. Using test for convergence it is found that the states tend to maintain their respective level of banking activity vis-à-vis the rest with the policy implication that more attention is required to be paid in the low performing regions to enable them to close the gap with respect to better performing regions.

KEY WORDS: Financial Inclusion; Panel data; Banks
JEL Classification: G21; C23

1. Introduction

A strong and sturdy financial system is a pillar of economic growth, development and progress of an economy. A financial system, which is inherently strong, functionally diverse and displays efficiency and flexibility, is critical to our national objectives of creating a market-driven, productive and competitive economy. A mature system supports higher levels of investment and promotes growth in the economy with its depth and coverage.

In the contemporary era of achieving economic power and self reliance, it is imperative for any regime to create congenial conditions for individuals, households and private institutions. The availability of banking facilities and strong bank branch network are the major facilitators of developmental and expansionary activities. In turn the economic agents facilitate in growth,

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development, investment, employment generation, infrastructure improvement, which are now well established in the literature (Feldstein and Horioka, 1980; Brunetti et al., 1997; Ford and Poret, 1991; Hartog and Oosterbeek, 1993).

India has a functioning financial market/system comprising of money market, forex market, capital market, debt market to cater to financial needs and requirements of various participants and segments of society. It ensures a smooth and efficient flow of monetary resources, meeting the funding needs required for growth and prosperity.

India has a historic and well-structured banking system to cater to the financial needs of individuals and households' and contribute towards the improvement and advancement of the nation. Towards these needs, necessary reforms, supervision and continuous monitoring are envisaged to ensure a modern and up-to-date banking practices, healthy competition, financial inclusion and well calibrated de-regulation. The Indian banking sector consists of the Reserve Bank of India (RBI), which is the central bank, commercial banks and co-operative banks. Bank nationalization in India marked a paradigm shift in the focus of banking as it was intended to shift the focus from class banking to mass banking. The rationale for creating Regional Rural Banks was also to take the banking services to poor people.

The banking industry has shown tremendous growth in volume and complexity over the last decade or so. Despite making significant improvements in all the areas relating to financial viability, profitability and competitiveness, there are concerns that much needed banking services have not reached a vast segment of the population, especially the underprivileged sections of the society. Internationally, also efforts are being made to study the causes of financial exclusion and designing strategies to ensure financial inclusion of the poor and disadvantaged. The reasons may vary from country to country and hence the strategy could also vary but all out efforts are being made as financial inclusion can truly lift the financial condition and standards of life of the poor and the disadvantaged.[2]

With the objectives discussed as above, the present study is an attempt to understand the behaviour and determinants of financial inclusion in India. Standard econometric techniques are employed for state-wise panel data spanning over a period from 1995 to 2008. The findings corroborate persistence of a negative influence of average population per branch (APPB) on deposit penetration, signifying thereby how the population growth and concentration are outpacing the rate of banking expansion presently taking place in India. It is, anyway, insignificant

[2] See Leeladhar (2006).

in case of credit penetration. It is interesting to note that income is unambiguously having a positive and significant role in determining the level of financial inclusion. Further, the employee base is coming out to be a significant variable indicating that employed people seem to be more active, aware, interested with regard to banking activities. Using test for convergence it is found that the states tend to maintain their respective level of banking activity vis-à-vis the rest with the policy implication that more attention is required to be paid in the low performing regions.

The rest of the article is organized as follows. Section 2 briefly discusses the scope of financial inclusion, its description and utility. An exposition about the data and key variables is provided in section 3. Section 4 is devoted to the econometric model and methodology employed for the analysis. The results of the basic exploratory investigation are discussed in section 5 followed by section 6, which argues the results of the empirical analysis. The section 7 concludes with overall summary and major findings of the study.

2. The scope of financial inclusion

As per the Rangarajan Committee report (2008) Financial Inclusion is defined "*as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as the weaker sections and low income groups at an affordable cost*". Broadly speaking, Financial Inclusion is the delivery of banking services at an affordable cost to the vast sections of disadvantaged and low income groups. Unrestrained access to public goods and services is the *sine qua non* of an open and efficient society. As banking services are in the nature of public good, it is essential that availability of banking and payment services to the entire population without discrimination is the prime objective of the public policy.

The goals of financial inclusion can be met by initiative of banking sector to cut across various strata of society, regions, gender, income and encourage the public to embrace banking habit. Also, Reserve Bank of India, as the chief regulator has intervened for the success of financial inclusion by various enactments[3], financial literacy drives, leveraging technology etc.

[3] The RBI has asked banks to make a basic banking 'No-frills' account available for low-income individuals, with either zero or low minimum balances and charges. The RBI has also urged all banks to give extensive publicity to such 'No-frills' accounts to enable financial inclusion. Several banks have since introduced such 'no-frills' account with and without value-added features. The RBI has also eased the 'Know your customer' (KYC) norms to keep the procedural hassles involved in opening a bank account to the minimum. This is to enable those belonging to low-income groups to open bank accounts without documents of identity and proof of residence. To extend hassle-free credit to bank customers in rural areas, the guidelines on general credit card (GCC) schemes are simplified to enable customers' access credit on simplified terms and

In India the focus of the financial inclusion has the objective of ensuring at least a bare minimum access to a savings bank account without frills, to all the sections of society. However, there exists a wider horizon for financial inclusion. At one of the ends is the section of the society which is denied and/or ignorant of the most basic banking services of the bank. Whereas, at the other extreme is a segment of population who are active and aware of a wide range of financial services and products at their disposal. In between these two extremes is the public who utilize the banking services only for basic deposit and withdrawal of their money.

Consequences of financial exclusion will vary depending on the nature and extent of services denied. It may lead to increased travel requirements, higher incidence of crime, general decline in investment, difficulties in gaining access to credit or getting credit from informal sources at exorbitant rates, and increased unemployment, etc. The small business may suffer due to loss of access to middle class and higher-income consumers, higher cash handling costs, delays in remittances of money. According to certain researches, financial exclusion can lead to social exclusion, which has an effect on poverty and output[4].

A vast segment of India's population exists on the margins of India's financial systems. Whilst the per-capita savings of this class may not be very high their sheer number means that taken together their savings are of a considerable amount. If their entry in the formal financial sector is made easier these savings can be channelized for an inclusive growth with a distributive justice. Also savings cum risk products that are their primary need can be structured for them once they are part of the formal banking system.

Among the developed nations, UK was one of the earliest to realize the importance of financial inclusion (Kempson 2004, Collard et al. 2001). Around 8 per cent of the households lacked any kind of deposit account. Account holding is lowest for people aged under 20 and over 80 years. Reasons for exclusion vary from low credit scoring, legislation to prevent bank accounts for 'money laundering', mistrust by people on the margins of society, terms and condition of the banks, physical access problems among others. In Australia, the prevalence of unbanked adults is much lower than in other developed nations, with estimates of just three per cent of adults lacking a bank account. There is however growing concern about people being ‘under-banked’ –

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conditions, without insistence on security, purpose or end-use of credit. With a view of providing hassle free credit to customers, banks were allowed to issue general credit cards akin to Kisan credit cards. Also, the banks are encouraged to increase IT infrastructure for increasing the scope and coverage of financial inclusion (Mohan, 2006).

[4] See Burgess and Pande (2003).

that is people who hold an account but make little use of it. Despite the wide access to banking there are clusters of excluded people – most particularly in the indigenous communities. Among the reasons for exclusion are, affordability. Bank pricing for varied services are such that will dissuade potential applicants with low incomes from becoming customers. Documentation requirements by the banks also have a role to discourage account opening. Problems of access and charges are the reasons for banking exclusion in United States also. Access to transaction pertain to difficulty in opening transaction account for consumers without a good credit history.

Access to financial services for people, especially poor and deprived, is critical. Also, access to finance by micro-entrepreneurs is imperative for inclusive and overall growth of the economy. The Indian legislature has been conscious of this fact since early. Bank nationalization in India gave the first vigorous focus of banking to mass banking. The rationale for creating Regional Rural Banks was also to take the banking services to poor people. The branches of commercial banks and the RRBs have increased from 8321 in the year 1969 to 84,504 branches as at the end of March 2010. The average population per branch office has decreased from around 64,000 to less than 14,000 during the same period. The number of 'No frill' accounts have also registered a growth over the last few years (Thorat, 2007). In view of their vast branch network, public sector banks and the regional rural banks have been able to scale up their efforts by merely leveraging on the existing capacity. However, there are still many areas under-banked, particularly in Bihar, Orissa, Rajasthan, Uttar Pradesh, West Bengal and a large number of North-Eastern states, where the average population per branch office continues to be quite high compared to the national average.[5] In this respect, the new branch authorization policy of Reserve Bank of India encourages banks to open branches in the under banked regions. The new policy also places a lot of emphasis on the efforts made by RBI to achieve, inter alia, financial inclusion and other policy objectives. To measure financial inclusion, a multidimensional Index of Financial Inclusion (IFI) has been proposed by Sarma (2008). It The IFI is an index that captures information on various dimensions of financial inclusion in one single digit lying between 0 and 1. It captures the penetration of the banking system, its availability to users and its actual usage. Chakravarty and Pal (2010) employ the axiomatic measurement approach for the measurement of financial inclusion. It improves upon the IFI proposed by Sarma (2008) such that the index can be utilized to determine the percentage contributions by the various factors.

3. Data source and key variables

Annual data from varied sources has been utilized for the analysis. The study is a state-wise panel data analysis spanning over a period from 1995 to 2008.

[5] See Figure 6

Sarma (2008) has proposed ratio of number of bank accounts to population as an indicator of penetration of banking system. In those lines number of deposit accounts per thousand of population, number of credit accounts per thousand of population have been constructed as a measure of financial inclusion, which constitutes our dependent variable[6]. The number of deposit/credit accounts[7] has been collected from Basic Statistical Returns of Scheduled Commercial Banks in India published by Reserve Bank of India. The state-wise population figures has been gathered from the Office of the Registrar General and Census Commissioner of India.

Among the explanatory variables, the foremost is the *population density*. The population density is the population per square kilometer to capture the region-wise demographics and understand the role of population concentration on the penetration of banking system.

A vital variable to examine the segment of population to which a branch caters is the *average population per bank branch* (APPB, henceforth). The APPB is the ratio of population (in thousand) to the total number of branches in the specific territory. The bank offices devoted solely for administrative purpose were excluded while deriving the number of bank branches. The information on branches has been sourced from Branch Banking Statistics published by Reserve Bank of India.

Income is measured by per capita net state domestic product (NSDP) at 1999-00 constant prices. The logarithm of per capita NSDP has been included to understand the influence of states' economic and financial position on the penetration of banking system. The data on NSDP has been collected from Handbook of Statistics on Indian Economy published by Reserve Bank of India.

Credit deposit ratio (CD ratio) is an elementary indicator of how efficiently the deposits are mobilized and is utilized to carry out investment and capital formation activities. A high CD ratio is usually associated with higher investment and growth.

The *proportion of factories* has been taken as a proxy for the level of industrialization and sociological modernization. Usually advanced economies with greater industrialization are expected to have greater role for banking and financial activities.

[6] Ideally adult population figure should have been employed. However, due to absence of a comprehensive state-wise adult population database for non census years, total population figures have been utilized. The total deposit accounts has been utilized instead of savings accounts as by its broad meaning financial inclusion is not limited to opening savings accounts only but availing other banking services also.

[7] Credit figures are as per place of utilization.

Employment status represents the employment status of individuals. Those of a more secure status economically are less likely to be financially excluded (Devlin, 2005). The relevant information along with the data on factories has been collated from Annual Survey of Industries. Both factories and employee information has been normalized by the respective population figures for comparability purposes.

4. Econometric model and methodology

Due to the peculiarities of pooled dataset, observations for an individual may not be independent and the usual ordinary least squares method may provide biased estimates. Hence, we employ the panel data estimation techniques (fixed-effects model and random-effects model) to control for the fixed or random individual differences. The hausman test has been applied to test for the appropriateness of the fixed or random effects model. The basic functional form of the regression equation is as follows,

$$Y_{ij} = \beta_0 + \beta_1 x_{ij} + \alpha_i + \varepsilon_{ij} \quad \ldots (1)$$

Here, Y_{ij} represents the value of endogenous variable for the i^{th} state at the t^{th} period. β_0 stands for the intercept term and X_{ij} is the matrix of exogenous variables. β_1 is the vector of associated parameters. α_i is treated as a random variable with a specified probability distribution (usually normal, homoscedastic, and independent of all measured variables) in case of random effects model, whereas a set of fixed parameters in fixed effects model. ε_{ij} is the usual stochastic disturbance term following normal distribution with mean 0 and variance σ^2.

Separate regressions have been performed for deposit and credit penetration indices. The common set of explanatory variables are population density, APPB, income level, credit deposit ratio, proportion of factories to capture industrialization, employee base. With this we move on to next section which describes the exploratory results based on the summarized data followed by analytical outcomes and explanations.

5. Exploratory results

As per Sarma (2008) index of penetration has been constructed separately for deposit and credit accounts as percentage of deposit/credit accounts to population. The figure 1 displays the trend of ratio of credit accounts to population (credit penetration index). During 1995 to 1999 there has

been decline in the ratio from 5.9 to 5.0 per cent. However, it has continuously improved from 5.1 in 2001 to 9.3 per cent in 2008. The ratio of deposit accounts to population (deposit penetration index) recorded a slight dip during the latter half of the previous decade from 40.1 per cent in 1995 to 38.8 per cent in 1999[8]. However, afterwards the percentage of population having deposit account has more or less shown a continuous improvement with nearly half of the population having some kind of a deposit account during 2008.

Average population per branch (APPB, henceforth) has been long considered a vital indicator of accessibility of banks' branches (Subba Rao, 2007; Burgess and Pande, 2003; Leeladhar, 2006). The movement of APPB is depicted in figure 3, which exhibits a worsening of APPB from 15501 individuals being catered by a single branch in 1995 to 15980 in 1999. The parameter portrayed an inverted U-shape with improvement during the recent years at 15067 people being served per branch in 2008.

A graphical representation of credit penetration index for the year 2008 is illustrated in figure 4 to provide a glimpse of the variation of credit penetration across the various states of India. The states, such as, Maharashtra, Tamil Nadu, Kerala have the highest credit penetration at 22.6, 21.7 and 16.8 per cent respectively, far above the national average at 9.3 per cent. Whereas, the states performing poorest in terms of credit penetration are observed to be Bihar and Assam at 3.6 and 4.2 per cent.

The graph is slightly different in terms of deposit penetration where the states of Delhi and Punjab peaked with 131.4 and 91.7 per cent (Figure 5). The All-India figure stood at 50.7 per cent, pointing that nearly half of the population is utilizing the various financial services related to deposits of one form or another. The states at the bottom of the table are Bihar, Madhya Pradesh at 24.6 and 32.0 respectively followed by 32.7 per cent for Assam, which creates a somewhat similar picture as that of credit penetration.

The figure 6 portrays the APPB. The average All-India APPB in 2008 stood at 15067 per branch. As observed in case of penetration indexes, in case of APPB also Bihar and Assam had the lowest branch network, both catering to more than 20,000 persons per branch. A high branch density with less than 10,000 persons per branch have been computed for Delhi, Punjab and Kerala.

A snapshot of variables for few selected years is provided in table 1. From the table it is evident that the number of branches of Scheduled Commercial Banks in India rose by around 14000

[8] See figure 2.

during the period of the study. The number of credit accounts marked a slight decline of around 57 lakhs in 1999 as compared to 1995. However, there after it has consistently swelled and crossed the figure of 10 crore in 2008. Overall, other variables have risen in magnitude except some minor decline shown by the statistics, viz., number of factories and employment.

The table 2 presents the state-wise means of the variables used in the study. It is evident from the table that the state with largest number of branches and number of deposit accounts is Uttar Pradesh. In case highest number of average credit accounts, it is the state of Andhra Pradesh. However, it is interesting to note that in terms of amount it is Maharashtra, which scores the highest in terms of both credit and deposit amounts.

To examine the relationship between the two indices, the coefficient of correlation between deposit and credit penetration indices is tabulated in table 3. It is observed from the table that although some of the states do have negative and/or insignificant relationship but most of the states have a positive and significant relationship between the two indices. The computed value of All-India correlation coefficient is more than half and also significant. The results indicate that the regions having high credit penetration are also the regions having high deposit penetration and *vice versa*.

One vital doubt which arises is whether there exists a wide variation of penetration indices across the states. In this regard the coefficient of variation is computed in table 4. It is observed that penetration indices do considerably vary across states. For instance, the deposit index varied from as low as 3.9 per cent for West Bengal to a high of 30.3 per cent for Nagaland. The variation seems to be wider in case of credit index. The credit penetration for Uttar Pradesh was lowest at around 10 per cent whereas for Maharashtra the index hovered around 68 per cent.

A closer look reveals that the ranking of the various states also varies according to the penetration index. This has an important bearing as it implies that the utility of banking services may also vary across regions as per the local needs, perceptions, habits, convenience and so on.

6. Empirical analysis

The results of the fixed effects[9] panel data estimation are provided in table 5. The dependent variable in case of model 1 and 2 is the number of deposit accounts per thousand of population, which measures the deposit penetration. The model 1 consists of fixed state effects to control for

[9] The hausman test concluded in favour of fixed effects model both in case of deposit and credit penetration models.

state-wise heterogeneity owing to variations in economic, social and demographic fabric across the regions. The model 2 consists of both state and time fixed effects as policy amendments over time may also have a key role to play in banking industry, which needs to be controlled for a better fit. A better fit is actually reflected in an improved R^2 statistics in model 2 compared to model 1. Qualitatively the results of both model 1 and 2 are quite similar. Contrary to our expectations the population density seems to be having a negative influence on the deposit penetration index. It seems to imply that the branch density in high population concentrated regions is, in fact, lesser compared to more sparsely occupied sections. In line with the intuition, APPB is, actually having a negative and significant impact on deposit penetration in both models 1 and 2. A unit decline in APPB leads to improvement of deposit penetration by approximately 7.2 accounts per thousand of population. The income effect, which is proxied by NSDP (constant prices) is having a positive and significant affect on the dependent variable. An improvement of thousand rupees is enhancing the proportional deposit accounts by approximately 6 units. The credit deposit ratio is coming out to be insignificant in the determination of deposit penetration. The level of industrialization, which is captured by the proportion of factories is turning out to be significant. The employee base is positively and significantly related to the deposit activities. Overall, these findings suggest that state level development and social characteristics have an important bearing on banking activity.

The models 3 and 4 have credit penetration as the dependent variables, focusing on the credit side activity of banking. Unlike, deposit penetration, the population density is having a positive and significant influence on the credit penetration. A unit increase in population density is leading to expansion of credit penetration by around 9.5 credit accounts per thousand of population. APPB is having a negative influence on the credit penetration. However, the level of significance seems to decline with the introduction of time effects. The finding seems to imply that branch density does not seem to be a vital parameter for the public to engage in credit led services. Like deposit penetration, income parameter, is significant with respect to credit penetration also. An increase of thousand rupees in the income is enhancing the proportional credit accounts by approximately 2 units. Credit deposit ratio is having a direct relationship with credit penetration, albeit it becomes insignificant in case of model 4. Similar findings are observed in case of proportion of factories and employees. It points to the fact that although the regional social and developmental factors have positive implications for proliferation of credit activities, its significance is low when controlled for time effects. The usual F-test was performed to test if the restricted form of our model is adequate representation of the data. The test was performed between model 1 and model 2, and model 3 and model 4. In both the cases the results indicate that time effects are significant in explaining the penetration indices (See table 6). Additionally, test of structural change was performed, which indicated a structural change in the year 2001.

The shift could be due to multiple factors, such as phased implementation of the Narasimham Committee report (1998), which emphasized increase of branch network and encouraged private and foreign banks' entry, among other. Additionally, 2001 being a census year is the sole year for which actual population figures are available unlike the rest of the period. The difference in methodologies for projected population figures pre and post 2001 could have a role for the census year being the point of structural change.

Last but not the least, a natural query which arises is that whether the rankings of the states according to their level of credit or deposit penetration indices vary significantly over the years i.e. is there any evidence that the states displaying a lower banking activity in terms of credit or deposit, in the initial years have shown improvement over the years or not[10]. To address the issue, we compute the Kendall's index of rank concordance[11].

Kendall's index of rank concordance is calculated as follows,

$$KI_t = \frac{Var\left[\sum_{t=1}^{T} AR(E)_{it}\right]}{Var\left[T * AR(E)_i\right]} \qquad \ldots (2)$$

where, $AR(E)_{it}$ depicts the actual rank of the i^{th} state in the year t. $AR(E)_{i1}$ is the actual rank of the i^{th} state in the initial year t=1, and T is the number of years for which the data is used for construction of the index.

The value of rank concordance index ranges from zero to one. The closer the index value is to zero the greater the extent of mobility within the distribution and vice versa. The statistic is distributed as chi-squared and we test the null hypothesis of no association among ranks obtained over different years. The test statistics is $\chi^2 = t*(N - 1)*KI$, with (N - 1) degrees of freedom, where t is the number of years of ranking, N is the number of cross sections and KI is the calculated Kendall's index of rank concordance.

The Kendall's index for credit penetration is tabulated in table 7. It may be seen that the null hypothesis of no association among ranks of different years is rejected decisively for all the years at 5 per cent level of significance. Thus, cross sectional dispersion of credit penetration is not diminishing over time and the laggards are not showing any indication of improvement over the

[10] In other words, it is attempted to test for the convergence hypothesis.
[11] See Boyle and McCarthy (1997) for a detailed discussion on Kendall's index of rank concordance.

years. Similar interpretation may be deduced for the deposit penetration index (Table 8). From the results it is clear that there exists stability in ranks obtained by the various states with regard to their level of deposit penetration. So, overall the gap among the states is not showing any evidence of narrowing down.

7. Conclusion

The issue of financial inclusion has acquired a substantial attention in the Indian context since some time now. However, quantitative analysis to understand the behavior and its determinants are scant. The study is an attempt to formally probe the level and causal factors of financial inclusion in India. The study utilizes panel data for the period 1995 to 2008 at the state level. The prominent findings include the continuous improvement of credit and deposit penetration in the current decade. At All-India level the credit penetration and deposit penetration are positively correlated implying that the regions having high credit penetration are also the regions having high deposit penetration and *vice versa*.

The results from the empirical analysis indicate a negative influence of population density on deposit penetration. The finding implies that although deposit accounts have improved over time, but its growth has not matched with respect to the population increase. But, the relationship is not as clear in case of credit penetration as the coefficient is insignificant. The average population per branch is having a negative influence on deposit penetration. It confirms the beneficial impact of improvement of branch network on financial inclusion drive, which occurs due to greater accessibility and convenience. The income level is unambiguously having a positive influence on both penetration proportions. It points to the fact that level of economic condition is a vital determinant of financial inclusion efforts. The outcome corroborates the phenomenon of higher usage and requirement for financial services with increase in the standard of living. Both proportion of factories and employees to population are having a significant and positive influence on deposit penetration. It implies that region's structural and environmental setup has a role in determining the deposit penetration. A positive coefficient for the employee proportion indicates that employed people seem to be more active, aware, interested with regard to banking activities related to both credit and deposit activities. Using test for convergence it is found that the states tend to maintain their respective level of banking activity *vis-à-vis* the rest. This has an important implication for the regions performing low in terms financial inclusion. It seems that due to certain inherent structural characteristics low performing states are unable to close the gap.

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Appendix

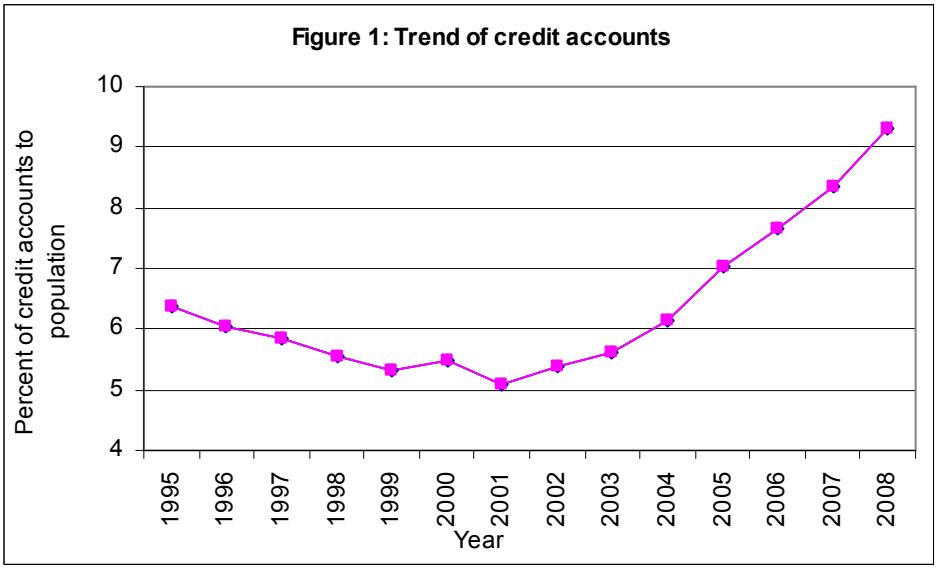
Figure 1: Trend of credit accounts
Percent of credit accounts to population
10
9
8
7
6
5
4
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

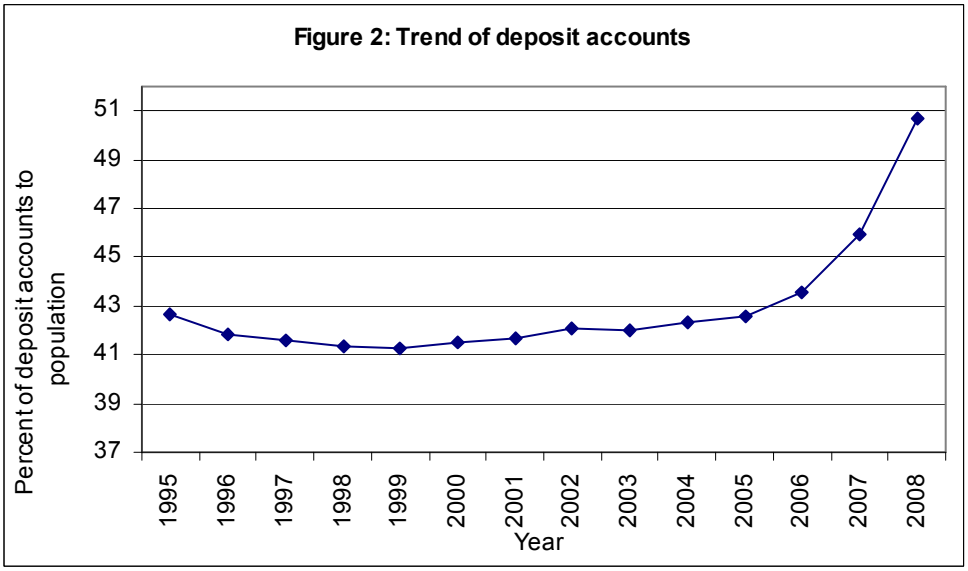
Figure 2: Trend of deposit accounts
Percent of deposit accounts to population
51
49
47
45
43
41
39
37
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

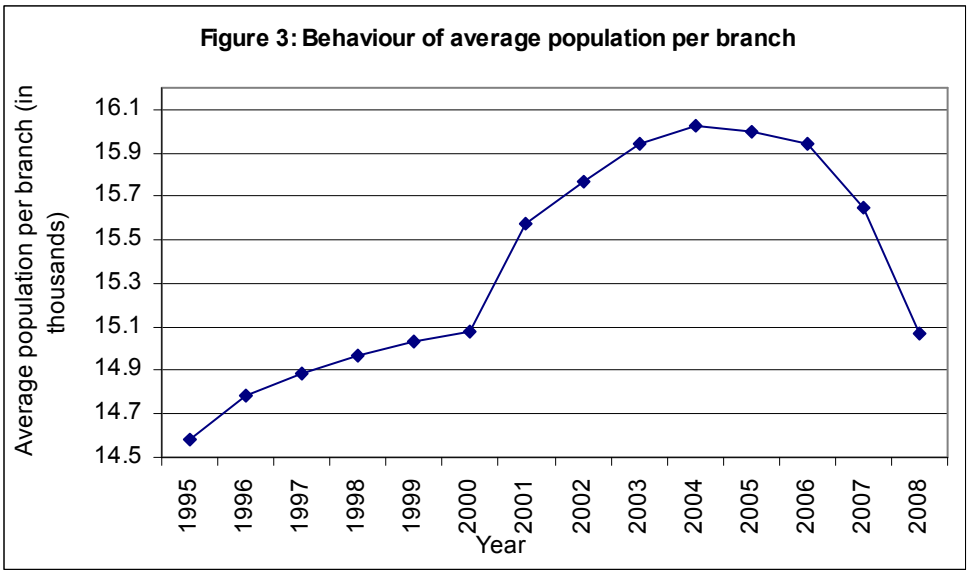
Figure 3: Behaviour of average population per branch
Average population per branch (in thousands)
16.1
15.9
15.7
15.5
15.3
15.1
14.9
14.7
14.5
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

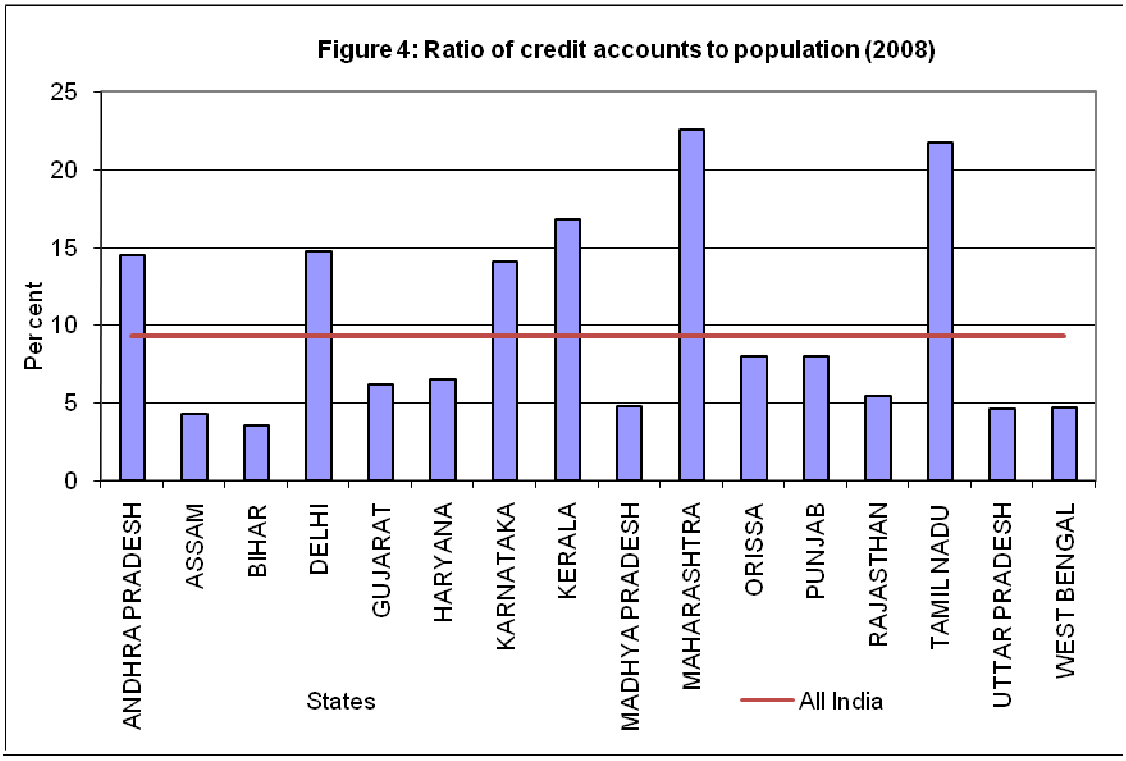
Figure 4: Ratio of credit accounts to population (2008)
Percent
25
20
15
10
5
0
ANDHRA PRADESH
ASSAM
BIHAR
DELHI
GUJARAT
HARYANA
KARNATAKA
KERALA
MADHYA PRADESH
MAHARASHTRA
ORISSA
PUNJAB
RAJASTHAN
TAMIL NADU
UTTAR PRADESH
WEST BENGAL
States
All India

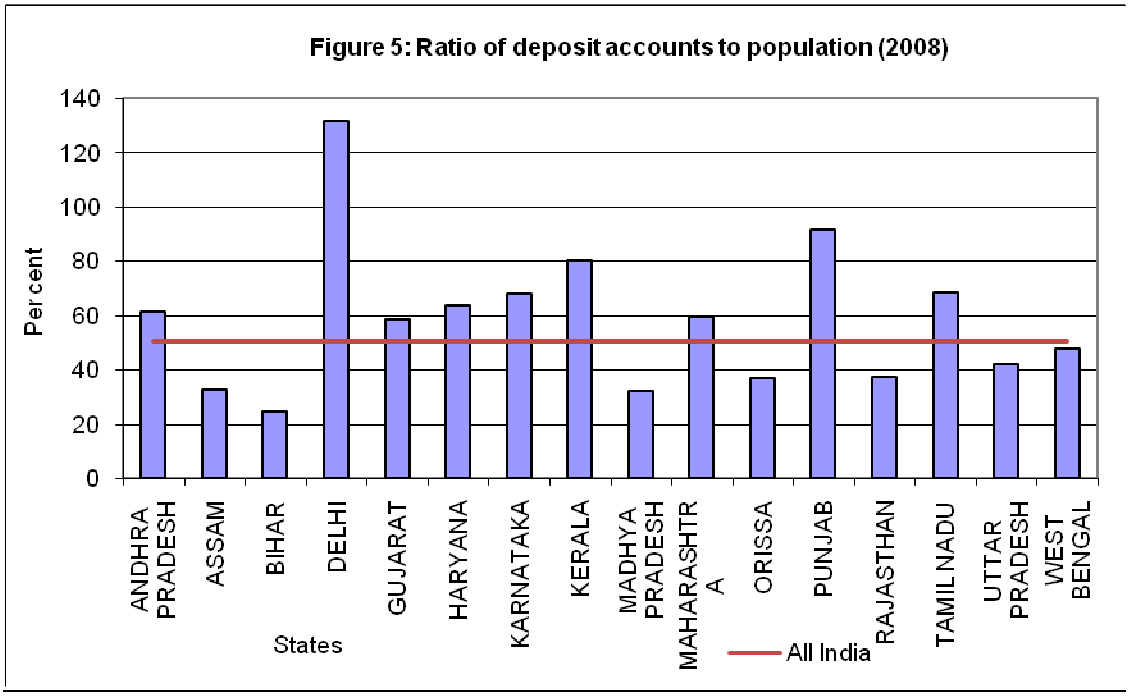
Figure 5: Ratio of deposit accounts to population (2008)
Percent
140
120
100
80
60
40
20
0
ANDHRA PRADESH
ASSAM
BIHAR
DELHI
GUJARAT
HARYANA
KARNATAKA
KERALA
MADHYA PRADESH
MAHARASHTRA
ORISSA
PUNJAB
RAJASTHAN
TAMILNADU
UTTAR PRADESH
WEST BENGAL
States
All India

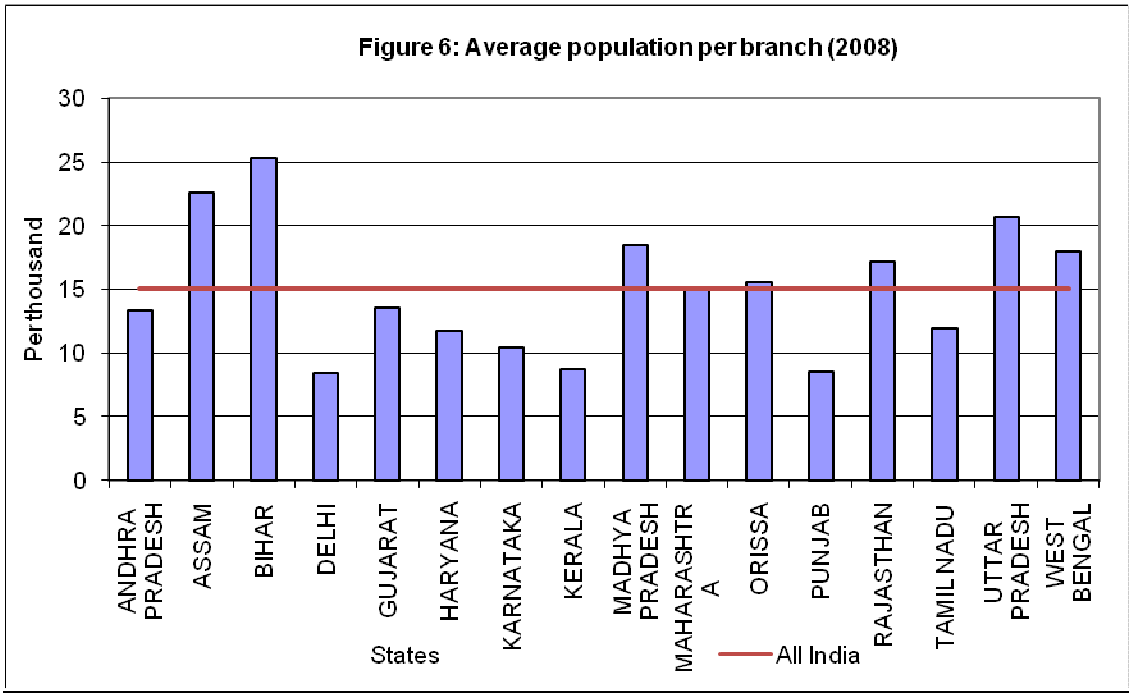
Figure 6: Average population per branch (2008)
Perthousand
30
25
20
15
10
5
0
ANDHRA PRADESH
ASSAM
BIHAR
DELHI
GUJARAT
HARYANA
KARNATAKA
KERALA
MADHYA PRADESH
MAHARASHTRA
ORISSA
PUNJAB
RAJASTHAN
TAMILNADU
UTTAR PRADESH
WEST BENGAL
States
All India

Table 1: The summary statistics of variables for select years

Year	Statistics	Number of branches	Number of credit accounts	Credit amount outstanding (Rs thousand)	Number of deposit accounts	Deposit amount (Rs thousand)
1995	*Sum*	62670	58097104	2109391191	390035696	3791741411
	Average	1790.571429	1815534.5	65918474.72	12188615.5	118491919.1
	Standard deviation	2039.454386	2284442.01	106735017.7	14721910.98	168619493.4
1999	*Sum*	65458	52305456	3824250335	405907925	6981690772
	Average	1870.228571	1634545.5	119507823	12684622.66	218177836.6
	Standard deviation	2122.487873	2043680.743	194445728.9	15486975.98	296017171.8
2003	*Sum*	66657	59491187	7559688154	446080712	12761957017
	Average	1904.485714	1699748.2	215991090.1	12745163.2	364627343.3
	Standard deviation	2150.825018	2278415.942	374019517.8	15620973.75	519474007.4
2006	*Sum*	69885	85435381	15138421296	485097771	20911742362
	Average	1996.714286	2441010.886	432526322.7	13859936.31	597478353.2
	Standard deviation	2243.793906	3524318.613	765104531.6	16768732.95	954627266.6
2008	*Sum*	76169	106990180	24170065173	581658012	32499461730
	Average	2176.257143	3056862.286	690573290.7	16618800.34	928556049.4
	Standard deviation	2437.248598	5062679.974	1220429710	20245528.43	1627451723

Year	Statistics	Number of factories	Per capita NSDP at constant prices (Rs)	Population (thousand)	Employment
1995	*Sum*	122285		971448	913670
	Average	5095.208333	15272.71822	35141.15	382365.125
	Standard deviation	5826.603403	6749.52458	38118.52	400780.3148
1999	*Sum*	130893		984240	8548188
	Average	5235.72	18202.86887	37855.38	341927.52
	Standard deviation	6032.241979	9202.374362	41244.62	379322.3856
2003	*Sum*	127219		1062436	7908697
	Average	5088.76	20200.21875	30355.31429	316347.88
	Standard deviation	5601.320382	10718.13587	38787.41455	351494.705
2006	*Sum*	140160		1114201	9111679
	Average	4521.290323	23749.625	31834.31429	293925.129
	Standard deviation	5831.848273	12603.16151	40819.21156	376634.0599
2008	*Sum*	146384		1147677	10452533
	Average	4722.064516	27415.51852	32790.77143	337178.4839
	Standard deviation	5940.16016	16111.76379	42141.27579	420622.5798

Table 2: Key indicators of the study: State-wise averages of the values

State	Number of branches	Number of credit accounts	Credit amount outstanding (Rs thousand)	Number of deposit accounts	Deposit amount (Rs thousand)
ANDHRA PRADESH	5286.14	7884403.64	577276266.9	33538636.29	712057600.1
ASSAM	1241.14	900369.64	61092635.79	7971979.43	127813362.4
BIHAR	3566.07	3392572.14	114657104.8	22150252.71	346622168.2
CHHATTISGARH	1049.29	703872.63	92947813.13	5237491.75	169871199.9
DELHI	1516	1378898.5	959811018.4	18206136.79	1549895169
GUJARAT	3679.93	2278914.36	465996926	23435848.21	680790713.1
HARYANA	1582.79	1131610.93	175181116.1	11237949.57	280834278.4
KARNATAKA	4816.21	5703168.86	644219332.2	28473608	781956299.3
KERALA	3377.57	4171214.79	282194709.8	22258624.64	527802886.4
MADHYA PRADESH	3463.36	2744087	218416694.7	18988409.79	372609798.3
MAHARASHTRA	6328.21	7340337.64	2170453818	48124595	2871399351
ORISSA	2262.29	2558559.14	124278573.9	10260317.79	200844228
PUNJAB	2597.93	1606236.21	261028369.3	19745249.07	499091596.7
RAJASTHAN	3359.5	2412259.36	232544127.1	17094797.21	325327465.2
TAMIL NADU	4902.93	8789012.21	849125345.1	33956844.64	821917095.4
UTTAR PRADESH	8252.14	6993198.64	421466436.8	64623439	1026354563
WEST BENGAL	4473.14	3990307.93	464314771.8	35641466.07	826839865

State	Number of factories	Per capita NSDP at constant prices (Rs)	Population (thousand)	Employment
ANDHRA PRADESH	15754.14	17376.48	76720.43	994565.43
ASSAM	1646.14	13175.71	27065.93	125718.21
BIHAR	2112.79	6365.47	91946.07	137710.93
CHHATTISGARH	1419.3	12783.61	22219.5	109704.3
DELHI	3463	41588.01	14223	136911.29
GUJARAT	13847.64	20124.54	50602.71	840295.71
HARYANA	4206.36	26853.42	21021.14	348377.14
KARNATAKA	7230.86	17956.8	53115.86	560022.36
KERALA	5010.07	21835.56	32420.36	323295.43
MADHYA PRADESH	3444.29	11561.14	69829.86	308632.57
MAHARASHTRA	18813.57	24002.74	96261.57	1305140.07
ORISSA	1727.57	11471.59	36952.14	154058.29
PUNJAB	7471.29	26113.26	24336.71	415566.5
RAJASTHAN	5326.5	13946.86	56645.93	274175.64
TAMIL NADU	20331.57	20815.91	62626.07	1270091.43
UTTAR PRADESH	10059.71	10007.91	171303.64	658499.93
WEST BENGAL	6169.07	16965.43	80843.93	620707.07

Table 3: Correlation coefficient between deposit penetration and credit penetration index

State	Pearson Correlation Coefficient	Spearman Correlation Coefficient
ANDHRA PRADESH	0.92623*	0.76703*
ASSAM	0.71442*	0.67033*
BIHAR	0.82422*	0.74066*
DELHI	-0.39189	-0.21319
GUJARAT	0.88079*	0.3978
HARYANA	0.72287*	0.81538*
KARNATAKA	0.80541*	0.78462*
KERALA	0.80533*	0.84615*
MADHYA PRADESH	0.60883**	0.52967***
MAHARASHTRA	0.86123*	0.75385*
ORISSA	0.23986	-0.09011
PUNJAB	0.41489	-0.16484
RAJASTHAN	0.82367*	0.49011***
TAMIL NADU	0.71243*	0.68791*
UTTAR PRADESH	0.30639	0.0989
WEST BENGAL	0.3077	0.29231
All - India	0.53688*	0.64415*

* significant at 1 per cent
** significant at 5 per cent
*** significant at 10 per cent

Table 4: Coefficient of Variation of penetration indexes across states

State	Deposit penetration	Credit penetration
ANDHRA PRADESH	17.0	20.0
ASSAM	6.1	21.2
BIHAR	10.1	27.9
DELHI	7.6	34.8
GOA	12.0	21.2
GUJARAT	11.2	15.4
HARYANA	6.1	12.7
HIMACHAL PRADESH	8.4	17.2
JAMMU & KASHMIR	5.4	18.0
KARNATAKA	10.4	21.2
KERALA	9.6	19.3
MADHYA PRADESH	7.3	12.7
MAHARASHTRA	7.5	67.6
MANIPUR	15.6	27.7
MEGHALAYA	10.6	22.3
NAGALAND	30.3	39.7
ORISSA	12.3	12.5
PUNJAB	3.9	11.7
RAJASTHAN	7.6	12.7
TAMIL NADU	9.5	42.4
TRIPURA	10.1	16.2
UTTAR PRADESH	4.6	10.0
WEST BENGAL	3.9	13.3

Table 5: Results of fixed effects panel estimates

Dependent variable	Deposit penetration (Model 1)	Deposit penetration (Model 2)	Credit penetration (Model 3)	Credit penetration (Model 4)
Intercept	443.7922	497.93	3.32	32.67
	(<.0001)	(<.0001)	(0.8567)	(0.1941)
Population density	-76.0926	-64.11	7.67	9.49
	(<.0001)	(<.0001)	(0.1265)	(0.0670)
APPB	-8.6382	-7.16	-1.50	-1.34846
	(<.0001)	(0.0013)	(0.0751)	(0.1437)
Per capita nsdp	0.007757	0.005718	0.002	0.001594
	(<.0001)	(<.0001)	(<.0001)	(0.0019)
CDR	0.256765	-0.09983	0.421	0.189994
	(0.3221)	(0.7359)	(<.0001)	(0.1239)
Proportion of factories	585.6864	655.8228	-99.08	-42.8414
	(0.0001)	(<.0001)	(0.0990)	(0.5007)
Proportion of Employee	4.205584	4.85	2.26	1.272009
	(0.0089)	(0.0132)	(0.0004)	(0.1179)
Model diagnostics				
R-square	0.9880	0.9900	0.8405	0.8502
Time effects	NO	YES	NO	YES
State effects	YES	YES	YES	YES

Number of cross sections: 29
Number of time periods: 14
Total number of observations: 338
Figures in brackets denote the p-value

Table 6: Model selection test

	Model 2 v/s Model 1	Model 4 v/s Model 3
Calculated F-statisitcs [13,290]	4.98*	1.65***

* Significant at 1 per cent level.
** Significant at 5 per cent level.
*** Significant at 10 per cent level.

Table 7: Kendall's index of rank concordance for credit penetration

Year	Kendall's index	Chi-square statistics
1995	1.00	22.00
1996	0.98	43.33
1997	0.98	64.67
1998	0.98	86.32
1999	0.97	106.57
2000	0.97	127.47
2001	0.95	146.15
2002	0.94	166.15
2003	0.94	186.83
2004	0.94	207.28
2005	0.94	227.62
2006	0.94	246.99
2007	0.93	266.24
2008	0.92	284.03

Note: The tabulated value of Chi-square at 5 per cent level of significance is 33.92

Table 8: Kendall's index of rank concordance for deposit penetration

Year	Kendall's index	Chi-square statistics
1995	1.00	22.00
1996	1.00	43.91
1997	0.99	65.62
1998	0.99	87.29
1999	0.99	108.99
2000	0.99	130.66
2001	0.99	152.19
2002	0.99	173.58
2003	0.98	194.87
2004	0.98	215.90
2005	0.98	236.77
2006	0.98	258.12
2007	0.98	279.25
2008	0.98	300.60

Note: The tabulated value of Chi-square at 5 per cent level of significance is 33.92