Economists generally argue that despite having different characteristics at the starting point, all the economies will ultimately converge to a single state of income growth rate, at least in the long run and thereby inter-economy differences will be reduced. If we go around the world we will observe tremendous variations in standards of living. The poor countries' average per capita income levels are less than one tenth of that of the richer nations. Much research has been devoted to the questions of whether the economies will converge over time to one another, so far as per capita income growth is concerned. More specifically, do the economies that start off as poor grow subsequently faster than the economies that start off as rich? If it happens then the poorer nations will catch up with the rich ones and the world will become a uniform place. In the opposite case, there will be growing disparities among the nations. Whether economies converge depends on why they differed in the first or initial stage. On the one hand, if two economies with the same steady state start off with different capital stocks, then we should expect them to converge. The economy with the lower capital stocks will grow at a faster rate and the economy with higher stock of capital will grow at relatively lower rate. On the other hand, if two economies have different steady state levels of the variable then we should not expect them to converge. Instead each economy will approach its own steady state.

The miraculous history of Japan and Germany is a success story of economic growth. The Second World War destroyed much of their capital bases and pulled down their economic positions to backward states. These two countries had experienced rapid growth of about 8.2 per cent and 5.7 per cent per year respectively but for the United States that was only 2.2 per cent.

6.1 Concepts of Convergence- Beta and Sigma Convergence

In their famous article, Barro and Sala-i-Martin (1992) have explained the concepts of Beta (β) and Sigma (Σ) convergence. By the term $\beta$ convergence they indicated that the
countries with lower per capita income or capital stocks will grow at a faster rate than the countries with higher per capita income or capital stocks and ultimately the poor countries will catch up with the rich ones. That ultimate state of the economy is called the steady state or long run equilibrium. This particular type of β convergence is known as Absolute β convergence. The underlying logic behind the arrival to such single long run equilibrium is that the rich countries with higher stock of capital per capita faces diminishing marginal returns to capital compared to the poor countries with low stock of capital. Another assumption behind Absolute β convergence is that the countries are similar in other parameters like population growth, savings rates, depreciation rates, level of government spending on creation of social infrastructures etc but they differ with regard to the initial capital stocks.

Another concept of β convergence comes into picture, as we cannot take for granted that all countries should have homogeneous character with regard to the above-mentioned parameters. Therefore, they provided another form of the β convergence that is known as Conditional β Convergence. Conditional β Convergence means that each country has its own steady state equilibrium and each country will converge to this steady state. The country with a wider gap between the initial and the steady state capital stock will have faster speed of convergence compared to that of a country with narrower gap between the two.

Choice of the base period is an important issue in this context. Choosing the slump phase in a business cycle as base period may produce an exaggeration of growth rates that may distort the conclusion of the theory. In his work on the convergence of the Indian states Subrahmanyam (1999) suggested that the average of three to five years’ values of the variable as base period’s value may enable us to avoid this kind of problem. But the story regarding convergence does not end here because of the fact that the countries with higher capital stock will grow at slower rate than the country with lower capital stock does not necessarily imply that the cross-country dispersion of real per capita income will tend to fall over time. Therefore, they have developed another form of convergence namely Sigma (σ) convergence which means that the coefficient of variation of real per capita income of countries would gradually decline over time.
6.1.1 Solow-Swan Model of Steady State Growth

According to Barro and Sala-i-Martin (2004) the starting point for the modern growth theory is the classic article of Ramsey (1928). But economists did not widely adopt Ramsey’s approach until the 1960’s. Between Ramsey and the late 50’s, the period immediately after the Great Depression, Harrod (1939) and Domar (1946) attempted to integrate Keynesian economics with different elements of economic growth. They used the production function with a low degree of substitutability among the factors to show that the capitalist system is inherently unstable. The next and more important contributions to economic growth were those of Solow (1956) and Swan (1956). The central aspect of the Solow-Swan model is the consideration of the neo-classical production function that incorporates constant returns to scale, diminishing returns to each of the factors and some positive and smooth substitution among the inputs. This production function is combined primarily with a constant exogenous savings rate ($s$) and a constant rate of depreciation to capital ($\delta$). After that the model incorporated constant population growth rate ($n$) and exogenous technological progress to find the steady state or long run growth rate of the economy. The model shows how savings, population growth and technological progress affect the level of an economy’s output and its growth over time.

Suppose the production function be $Y=F(K,L)$ where $Y$ is aggregate output, $K$ is aggregate capital stock, which is a key determinant of the economy’s output, but the capital stock can change over time leading to change in the economic growth. Specifically, two opposite forces influence capital stock: investment and depreciation. $L$ is the total labour force in the economy. Because of constant returns to scale the per capita production becomes $Y/L=F(K/L, 1)$
or, $y = f(K/L)$
or, $y = f(k)$ where $k$ is the per capita quantity of capital and $y$ is per capita output. The per capita production function is concave because of the assumption of diminishing marginal productivity of $k$. That is $MPk = f' (k) > 0$ and $dMPk/dk = f'' (k) < 0$. 

97
Suppose the savings function is proportional to income i.e. \( S = sY \) where \( s = S/Y \) and \( 0 < s < 1 \). Also suppose that the capital depreciates at the rate \( \delta \) per year, population rises at a constant rate \( n \) then the Solow-Swan growth equation becomes \( \frac{dk}{dt} = i - (\delta + n)k \), where \( \frac{dk}{dt} \) is the change in capital stock per worker over time, \( i \) is the investment per worker and \( (\delta + n)k \) is the break-even investment. Break-even investment has two components: to keep \( k \) constant, \( \delta k \) is needed to replace the depreciated capital and \( nk \) is necessary to provide capital for new workers added through growth of population. In equilibrium per-capita investment is equal to per-capita savings. In other words \( i = sf(k) \). Therefore, after substitution of investment by savings the growth equation becomes \( \frac{dk}{dt} = sf(k) - (\delta + n)k \).

An economy is in steady state position if capital and labour grow at the same time so that capital per worker \( (K/L) \) remains fixed. Hence we get \( \frac{dk}{dt} = 0 \). This means \( sf(k) = (\delta + n)k \). From this equation we can derive the steady state value of \( k \) that we term as \( k^* \).

**Figure-6.1: Steady State Equilibrium**

The steady state value of \( k \) stock depends on the magnitudes of \( \delta, n \) and \( s \). In Figure 6.1 E is the steady state equilibrium position of an economy. If any economy has a capital stock less than \( k^* \) \((k<k^*)\) then its \( sf(k) \) will be greater than \((\delta + n)k\) that will lead the capital
stock to rise and in the opposite case, if $k > k^*$ the capital stock will fall. So the long run equilibrium is stable.

6.1.2 Absolute and Conditional Convergence

Theory of Absolute $\beta$ Convergence states that if all the regions of a geography have a unique steady state level or they are homogeneous in all respects except initial capital stocks the poor regions with lower capital stocks will grow at a higher rate than the that of the rich and ultimately the poor regions will catch up with the richer ones in the long run. The help of Solow-Swan fundamental growth equation can show this.

We have $\frac{dk}{dt} = sf(k) - (\delta + n)k$
The growth rate of per head capital $g_k = \frac{dk}{dt}/k = \frac{sf(k)}{k} - (\delta + n)$
Since $f$ is concave ($f'' < 0$) $f(k)/k$ will decrease as $k$ rises. So $g_k$ will decrease as $k$ increases. An economy with a lower $k$ will have a faster rate of growth. This implies that the growth rate and initial capital stock are inversely related. This is the notion of Absolute $\beta$ Convergence (Figure 6.2).

Figure 6.2: Absolute Beta Convergence
6.1.3 Convergence and Cross Section Regression

We can now derive the expression for \( p \) in the form of cross section regression. Let us suppose that there are \( n \) numbers of regions or countries within a geographical boundary with \( k_i \) being the capital per head of the \( i^{th} \) country. Consider the following regression model:

\[
\log(k_{it}) = \alpha + (1-p) \log(k_{it-1}) + u_{it}
\]

It can be rewritten as

\[
\log(k_{it}/k_{it-1}) = \alpha - p \log(k_{it-1}) + u_{it}
\]

where \( \alpha \) and \( p \) are constants respectively for intercept and slope with \( 0 < p < 1 \) and \( u_{it} \) is a regular disturbance term. In this equation a positive sign of \( p \) means absolute convergence. That is, growth rate of per capita capital \( [\log (k_{it}/k_{it-1})] \) is inversely related to the initial per capita capital \( k_{it-1} \). It is also to note that \( p \) is nothing but the slope of the per capita capital growth function. In other words \( p = -d\log (k_{it}/k_{it-1})/d\log (k_{it}) \). Here \( p \) also works as the notion of speed of convergence. If we plot the data of each region’s growth rate and initial capital stock in a scatter diagram and fit a linear trend through these points then a downward trend will imply convergence of this region. On the contrary, if the fitted line is upward sloping then there is divergence, which means the richer zones become more and more rich and the poorer zones become more and more poor.

The hypothesis of Absolute \( p \) Convergence works well when the group of economies is homogeneous in character with similar values of the parameters. This condition is more likely to be satisfied for different regions of the same country or same geography. But under heterogeneous nature of the regions there should be difference in the steady state levels. Each economy has a separate steady state of per capita capital but at the steady state growth rate of the per worker output will be zero. We then have to modify the theory of absolute convergence to accommodate the concept of conditional convergence. *Conditional \( p \) Convergence* can be presented by the following equation-

\[
\log(k_{it}) = \alpha + (1-p) \log(k_{it-1}) + \gamma Z_t + u_{it}
\]
where $Z$ is the vector of other variables that affect capital stock such as infrastructure development, government policy, degree of trade openness, rate of inflation, etc. Conditional convergence occurs when the partial correlation between the growth rate and the initial level of capital per worker is negative. The essence of the conditional convergence is that an economy grows faster the further it is from its own steady state values of the variables.

**Figure-6.3: Conditional Beta Convergence**

Figure 6.3 illustrates the concept of conditional convergence by taking two economies that are different in two respects. First, they have different initial capital stock per capita i.e $k_{poor} < k_{rich}$ and second, they differ because of their difference in savings rates i.e $s_{poor} < s_{rich}$. But the parameters like growth rate of population and rate of depreciation are same for both the rich and poor countries. The diagram illustrates that the poor countries having less capital stock compared to the rich has lower steady state $k^*_{poor}$ and the rich has higher steady state $k^*_{rich}$. Hence per capita output in steady state will be higher for the rich country. Income difference will persist even in the long run. In such a framework the rich economy can grow faster than the poor if the low saving rate of the poor economy offsets its higher average productivity of capital as a determinant of economic growth.
The neo classical model predicts the conditional convergence in the way that a lower starting value of a variable tends to generate a higher per capita growth rate, once we control the determinants of the steady state value. The two concepts of \( \beta \) Convergence are identical if a group of countries or regions or states tend to converge to the same steady state position.

6.1.4 \( \sigma \) Convergence

Workings of the condition of the Absolute and Conditional Convergence do not necessarily mean that the dispersion of the distribution of the per capita income across cross section of the economies will continuously fall over time. Differences in the per capita incomes across different groups of regions stand for the notion of inequality or divergence among the groups. The model of \( \sigma \) Convergence states that the coefficients of variation of a variable across different regions should be declining over time. We can express the concept of \( \sigma \) Convergence by means of the following regression equation

\[
\log(CV) = a + bt + u_t
\]

where \( a \) is intercept constant, \( b \) is the slope constant or growth rate of CV over time and \( u \) is the random disturbance term. If the sign of \( b \) is found to be negative and significant then we can say that the trend of CV is downward and that there is convergence among the regions or countries by the criterion of \( \sigma \) Convergence is concerned. Nayyar (2008), in his work on economic growth and regional inequality in India, has pointed out that the concept of \( \sigma \) divergence is consistent with the concept of conditional \( \beta \) convergence and vice-versa. For example, a change in relevant parameters that leads the steady state income levels of the rich away from the poor regions will lead to the state of \( \sigma \) divergence, in spite of the fact that each regions may still be conditionally converging to a divergent steady state path.

6.2 Convergence of the States in India

There are immense studies till date on convergence of the states with respect to state domestic products in Indian context. There are a few studies in this area that have dealt
with the study of convergence either in absolute or conditional terms. One such work was
done by Dholakia (1994) who concluded that, over the period 1960-61 to 1989-90, there
is a strong tendency of convergence across twenty Indian states. In another study, Nagraj
et al (1997) have shown the conditional convergence across the states of India during the
period 1960-94. But there is a vast literature on the growth of output of Indian states
where divergence among the states is observed prominently. Dasgupta et. al (2000) did
one of such pioneering work. They found that, during the period 1960-61 to 1995-96, the
Indian states have diverged from each other with respect to the growth of per capita
domestic products but have converged in the shares of different sectors in the state
domestic product. Ghosh et al (1998) have done the work on economic growth and
regional divergence in India for the period 1960 to 1995. They have observed that the
Indian states have been diverging over the period of last 35 years. In their study, Marjit
and Mitra (1996) have pointed out that the state-wise divergence in India may be due to
the imperfection in factor mobility across states. This is a critic to the Solow growth
theory. The study by Ghosh and De (1998) have analysed the regional divergence of the
Indian states and pointed out that the divergence occurred because of distributional and
allocational disparity in the infrastructure development. But the work by Dasgupta et al
disproved their proposition in the sense that even if there is σ convergence in the
infrastructural development of states, there is huge divergence in the growth rates of the
agriculture and manufacturing sectors. Rao et al (1999) have tried to find the pattern of
growth paths of 14 states in India during 1965-94 in terms of other variables in place of
income. They have also observed both the absolute and conditional divergence among the
concerned states.

Most of the studies dealing with the convergence or divergence across the Indian states
do not properly incorporate the effect of major economic reforms initiated by the
government of India in the early nineties upon the growth behaviour of different states.
Ahluwalia (2000) has observed that the degree of dispersion in growth rates of per capita
state domestic product (SDP) across states has increased significantly during the reform
period relative to the decade of 80's. Whereas over all growth of the Indian economy has
accelerated, the growth rates of certain states like Bihar, Orissa and UP have decelerated

103
with the demonstration of both low base of per capita SDP as well as low growth rates of per capita SDP. There is a different type of work by Marjit (2003) that shows the effect of economic reform on wage rate and employment of both the informal and formal sectors. He has shown that liberal trade policy in the form of reduction of tariff rates leads to rise in wage rate and employment of the informal sector and reduces the employment and wage rate of the organized manufacturing and traditional agriculture sectors. So there arises the rising gap between formal and informal sectors. In her work Tribedi (2004) has made an extensive study on the inter-state divergence among the ten major states of India. The study observed that the divergence in the productivity of the organized manufacturing sectors in the states has led the states to be divergent with regard to the per capita growth rates of outputs. It also added that the states like Bihar and West Bengal are diverging away rather than converging to the growth rates of the output of the organized manufacturing sector at the national level. MP and Rajasthan are identified as the good performing states. Thangamuthu et al (2004) highlights inter-regional convergence or divergence so far as industrial sector reform is concerned. They have shown that the industrial performance with reference to all India level appears to be better than even the industrially developed states like Maharashtra, Gujarat, Tamil Nadu and West Bengal. This trend, according to them, proves that there is a clear and perceptible trajectory of convergence among the rich and poor states. The observation of Kumar (2008) has provided us other sources of inequality of distribution of income among different groups. He pointed out that the present government policies have worked in favour of big corporate houses in terms of giving them different sorts of concessions. These concessions have helped them to accrue greater profit margins leading to high rate of capital accumulation of about 23 to 35 per cent and finally helping the Indian economy to prosper. Hence this is another form of evidence of a direct relation between economic reform and inequality across different groups of the country. A recent study by Kar et al (2007) shows that inequality in India remained largely unchanged during the 1980’s but rose dramatically after the initiation of the process of economic reforms. The situation arises because of the fact that the per capita output from the industrial and service sectors have shown the feature of convergence during the 80’s but divergence during the post reform period. Ramaswamy (2007) has shown that the states are diverging from each
other in terms of the economic growth and economic potential during the period 1983 to 2004-05. Very recently the analysis of Bhaduri (2008) on economic reforms and inequality in India suggested that there is a direct relation between economic liberalization and inequality across regions. He has also pointed out two sources of inequalities—slow employment growth and low government spending on the poor. He has opined that the source of present boom in the growth rate of 8-9 per cent is due to increase in labour productivity or efficiency that reduces unit costs and so raising comparative advantage in the world market. Such a spurt in labour productivity is mostly observed in the working of the unorganized sectors. That phenomenon is also observed by Marjit et al. Overall growth rate of the country has risen but amount of employment has been reduced leading to acceleration in inequality among the rich and poor sections of the society. He has also shown that China, having a higher GDP growth rate compared to India, resulted into higher degree of inequality, as its Gini value is 0.5 whereas India’s Gini value is 0.348. A similar study by Nayyar (2008) reveals that the Indian states do not exhibit any state of convergence in per capita incomes, rather they diverge from each other. He has done the study on 16 major states by the help of panel data regression technique. He has argued that the source of divergence may be attributed to the inter-state disparities in the levels of private and public sector investments. Richer states have the higher per capita capital expenditure than the poorer states leading to difference in the per capita income levels.

6.3 Inter-state Convergence of Allocation of Bank Credit

Like other sectors’ development in the economy financial development should have some influence on the growth of the economy through its impact on the rate of savings and investment. Aghion, Howitt and Mayer (in Mathur, 2005) have shown that financial development is a key factor in explaining the process of convergence and divergence across different regions in the world. To them, an economy with low rate of financial development in the initial phase will tend to grow slower than the economy with high rate of financial development to attain a specified technological frontier. The effect of financial development in terms of banking institutions may have similar implications in
different states in India where bank credit is one of the most important financial instruments. Although there is a vast literature on convergence or divergence of Indian states regarding the growth of their per capita incomes, not much work has been done on convergence with respect to credit variables in the context of the Indian economy. Misra (already cited) has observed that there is considerable degree of disparity among the 23 Indian states with respect to the aggregate credit taken from the scheduled commercial banks. In another study Bhattacharya and Bhowmick (already cited) have identified inter-regional disparity among different districts of the state of West Bengal. The study has revealed the fact that there is growing concentration of banking activities in top centers and regions of the state.

In our present study we have tried to explore whether there is any sort of convergence or divergence among 16 major states so far as credit variable is concerned. We have tried to examine the β Convergence analysis with respect to the aggregate and per capita credit allocation of all the states. Following Subrahmanyam we consider here the single period value (that is of 1972 value) as well as the average of first five years’ value of aggregate and per capita credit as base values to avoid the problem of base period bias. After doing it we will try to extend the analysis to sectoral levels to identify the sources of convergence or divergence. Our particular objective is to analyze the hypothesis whether the Indian states are converging in terms of allocation of bank credit. For that purpose, we classify our total period of study into three phases- entire phase (1972-08), pre-reform phase (1972-92) and post-reform phase (1993-08). The first five-year average value of credit is taken for the entire and pre-reform phases only. In the following steps we will focus on the application of the theory of σ Convergence.

Taking the year 1972 as the base period’s value of PCC we have calculated annual average growth of PCC for each state for the entire period of study and plotted them in a scatter diagram. Adding a trend line to these scattered points we observe that there is a slight positive degree of correlation between the initial PCC and growth of PCC (Table 6.1, Figure 6.4 and Figure 6.5). The upward rising trend line becomes relatively more prominent when the first five year average value of PCC is considered as base value.
The degree of association between the states’ growth rate and initial value of PCC rises compared to the previous case. Hence it can be asserted that there is a considerable degree of divergence among the states for the entire period of our study. There are certain outlier states like Delhi, Haryana, Maharashtra and Bihar out of which the first three have presented high initial values associated with high growth rates and Bihar has low growth rate accompanied with low base value of PCC.

Doing the same analysis for the pre-reform phase we observe that leaving out Delhi and Maharashtra as the outlier states there is a low degree of convergence with respect to the 1972 value. The correlation coefficient takes the value of $-0.028$. Taking five year average as base value the situation is observed as reverse and there is some degree of divergence among the states (Figure 6.6 and Figure 6.7). The outlier states are Delhi, Haryana and Punjab. But the observation of the same analysis of the post-reform scenario gives us a positive and high degree of correlation between the two for the selected states and the trend line is upward rising (Figure 6.8). Here the outlier states are Delhi and Maharashtra in the upper stratum and Bihar and UP at the lower stratum. We can say that there may be conditional convergence for the upstairs states as well as down stair states.
Therefore we can conclude that there is a clear diverging tendency of credit allocation of the states of India. Similar results are derived for the convergence analysis with respect to
the aggregate credit levels. The only difference observed that there are signs of convergence in aggregate credit during the entire period but signs of divergence in PCC in either of the base values (Figure 6.9 to Figure 6.13).

**Figure-6.9**

![Beta Convergence of Credit Levels(1972-08)](image)

**Figure-6.10**

![Beta Convergence of Credit Levels(1972-08)](image)

**Figure-6.11**

![Beta Convergence of Credit Levels(1972-92)](image)

**Figure-6.12**

![Beta Convergence of Credit Levels(1972-92)](image)
Although the results of correlation coefficients from the scatter points represent signs of convergence during the pre-reform period and divergence during post-reform period in terms of PCC and aggregate credit, they are not significant always. Table 6.1 shows that the states are significantly converging in terms of aggregate credit during the pre-reform and diverging with respect to PCC during the post-reform period.

Table 6.1: Correlation Coefficient between Growth and Base Values of Credit (16 states)

<table>
<thead>
<tr>
<th></th>
<th>Pre-reform (1972-92)</th>
<th>Post-reform (1993-08)</th>
<th>Total (1972-08)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1972 Base 5 Yr Avg Base</td>
<td>1993 Base 5 Yr Avg Base</td>
<td>1972 Base 5 Yr Avg Base</td>
</tr>
<tr>
<td>PCC Credit Levels</td>
<td>-0.028 0.142</td>
<td>0.506 0.181</td>
<td>0.334</td>
</tr>
<tr>
<td>Agri Credit Levels</td>
<td>-0.543 -0.416</td>
<td>0.212 -0.336</td>
<td>-0.202</td>
</tr>
<tr>
<td>Indus Credit Levels</td>
<td>-0.464 -0.378</td>
<td>-0.367 -0.435</td>
<td>-0.349</td>
</tr>
<tr>
<td>Serv Credit Levels</td>
<td>-0.4 -0.346</td>
<td>0.00015 -0.403</td>
<td>-0.334</td>
</tr>
</tbody>
</table>

During the pre-reform phase Delhi is the outlier state with high values of base as well as high rate of growth of credit. Omitting the state from the list makes significantly converging nature of PCC. At the same time, omission of the state leads to signs of
convergence instead of divergence in PCC when first five years averages of credits are considered as base credit. No sign of negative correlation is observed between the ranking of the 1972 values and five year average values of PCC of the state.

Let us consider the other version of convergence that is \( \sigma \) convergence. Here we have calculated the coefficient of variation on the basis of share of credit of an individual state out of the total credit of the club of 16 states. Total credit is obtained by clubbing the credit of all the 16 selected states from the year 1972 through 2008.

\[ \text{Figure- 6.14} \]

Taking the average of such share and obtaining their respective differences of credit shares from the mean share of credit we compute the value of coefficient of variation. Plotting the log values of CVs in a time series diagram we observe that, up to 1992, there was some where ups and downs in the relative variation of the states but unquestionably there is an upward rising trend of the series during the post-reform period (Figure 6.14). Testing the phase-wise significance of \( \sigma \) convergence it is observed that during the pre-reform phase there was significant \( \sigma \) convergence and during post-reform there was \( \sigma \) divergence in allocation of credit (Table 6.2).
Table 6.2: Test of Significance of Convergence

<table>
<thead>
<tr>
<th></th>
<th>1972-08</th>
<th>1972-92</th>
<th>1993-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(C.V) = 4.4 + 0.005t</td>
<td>Log(C.V) = 4.54 - 0.01t</td>
<td>Log(C.V) = 4.25 + 0.01t</td>
<td></td>
</tr>
<tr>
<td>t</td>
<td>3.14</td>
<td>124.9 -3.58</td>
<td>51.37 3.91</td>
</tr>
<tr>
<td>R²</td>
<td>0.21</td>
<td>0.40</td>
<td>0.488</td>
</tr>
<tr>
<td>Note: All the results are at 95% significance levels</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If we go through the sector-wise allocation of credit we can explore the source of such a divergence in the distribution of aggregate bank credit. It is observed from the analysis of three prime sectors that the agriculture and industrial sectors (Figure 6.15 to Figure 6.26) of the selected states were converging, rather diverging during the pre-reform era, to a single steady state path at both the criteria of base values. The service sector is converging with respect to 1972 base but diverging at a higher rate at the 5 year average base during the pre-reform period. The sector presents a jump from the scenario of convergence to the scenario of divergence because of Delhi as the outlier state. Delhi’s five year average values jumped up because of high base value and high growth rate in the year 1976. The values of correlation coefficients become negative and improve as the base period of 1972 values get replaced by the average value of first five year periods (Table 6.1). But during the post-reform regime, the states in the industrial sector are diverging rather converging.

Figure 6.15

Figure 6.16
Therefore, the agriculture sector cannot be blamed for the occurrence of persistent diverging paths in aggregate credit distribution. Although the study of Dasgupta et al
(cited earlier) has shown the degree of divergence among agriculture and manufacturing sectors that ultimately explained the divergence in the aggregate income growth levels of the Indian states.
The source of divergence in the inter-state credit distribution originates from the distributional inequality in the industrial as well as service sector credit, particularly during the post-reform era. There has been considerable growth in the service sector during the post-reform regime that is mostly influenced by the high degree of growth of service sector credit. The growth in this sector has not been uniform over all regions of the country. The states in this respect have diverged from each other. The correlation coefficient takes positive values in both the base periods’ criteria and improves during the post-reform period. The outlier states in the service sector are Maharashtra, Delhi and Tamil Nadu in the upper stratum and Assam and Bihar in the lower stratum. The upper states have high value of both initial period credit and growth rate of service sector credits whereas the lower states have low value of initial credit as well as low growth rate of credit allocation of the sector. Ignoring these outlier states from the selection of 16 states can lead the service sector into the state of convergence and so the states may converge in terms of distribution of aggregate credit. No sector is significantly converging except the agriculture during the pre-reform phase; all the divergence results during the post-reform phase are insignificant. The divergent path of service sector credit
during the post-reform regime is analogous to the observation made by Misra in his study on allocational efficiency of commercial banks operated in different parts of India.

Now consider the degree of convergence or divergence of the PCC in terms of the function fitted by the scattered points. Here the sign and magnitudes of $\beta$ are determined optimally. Following the estimated growth equation

$$\log(k_{it}) = \alpha + (1-\beta) \log(k_{i,t-1}) + u_{it}$$

It can be rewritten as

$$\log(k_{it} / k_{i,t-1}) = \alpha - \beta \log(k_{i,t-1}) + u_{it}$$

Or Average growth of credit ($AVGCRGW$) = $\alpha - \beta \log$ (Base credit) + $u_{it}$

Figure 6.27 shows the credit in India converges during 1972 -2008. It suggests that $\beta$ convergence of credit in India exists during 1972 -2008. Table 6.3 shows the statistical validity of the $\beta$ convergence of credit in India during 1972 -2008. It shows that the coefficient is negative but statistically insignificant. Hence we can't reject the null hypothesis of no convergence. It will be clearer if we consider the analysis for the pre and post-reform periods separately. Figure 6.28 and Figure 6.29 show the pre-reform period and post-reform period respectively. Figure 6.28 shows clearly a convergence but Figure 6.29 shows the divergence. Table 6.4 and Table 6.5 provide the statistically significant results.

**Figure-6.27: Convergence of Credit during 1972 – 2008**
Figure-6.28: Convergence of Credit during Pre-reform Period

Average credit growth rate 72-91

Figure-6.29: Convergence of Credit during Post-reform Period

Average credit growth rate 92-08

Note: Horizontal axes of the above three figures measure log values of base credit and the vertical axes measures the average growth of credit.

Table 6.3: β Convergence of Credit in India during the entire Period

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(CreditBASE1972)</td>
<td>-0.003703</td>
<td>0.003741</td>
<td>-0.989901</td>
<td>0.3390</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.164885</td>
<td>0.016803</td>
<td>9.812609</td>
<td>0.0000</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.065415</td>
<td>Mean dependent var</td>
<td>0.148604</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>-0.001342</td>
<td>S.D. dependent var</td>
<td>0.013769</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.013778</td>
<td>Akaike info criterion</td>
<td>-5.614959</td>
<td></td>
</tr>
<tr>
<td>Sum squared residual</td>
<td>0.002658</td>
<td>Schwarz criterion</td>
<td>-5.518385</td>
<td></td>
</tr>
<tr>
<td>Log likelihood Ratio</td>
<td>46.91967</td>
<td>F-statistic</td>
<td>0.979904</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>1.574495</td>
<td>Prob(F-statistic)</td>
<td>0.339024</td>
<td></td>
</tr>
</tbody>
</table>

Note: * and ** denote the significance level at 5% and 1%, respectively.
Table 6.4: β Convergence of Credit in India during Pre-reform Period

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(CreditBASE1972)</td>
<td>-0.01304**</td>
<td>0.004187</td>
<td>-3.114746</td>
<td>0.0076</td>
</tr>
<tr>
<td>Constant</td>
<td>0.207087</td>
<td>0.018806</td>
<td>11.01184</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared                      0.409324 Mean dependent var 0.149756
Adjusted R-squared             0.367132 S.D. dependent var 0.019384
S.E. of regression             0.015420 Akaike info criterion -5.389777
Sum squared residual           0.003329 Schwarz criterion -5.293204
Log likelihood Ratio           45.11822 F-statistic 9.701643
Durbin-Watson stat             1.668393 Prob(F-statistic) 0.007606

Note: * and ** denote the significance level at 5% and 1%, respectively.

Table 6.5: β Convergence of Credit in India during Post-reform Period

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(CreditBASE1991)</td>
<td>0.011604*</td>
<td>0.005029</td>
<td>2.307348</td>
<td>0.0368</td>
</tr>
<tr>
<td>Constant</td>
<td>0.063285</td>
<td>0.036612</td>
<td>1.728538</td>
<td>0.1059</td>
</tr>
</tbody>
</table>

R-squared                      0.275507 Mean dependent var 0.147318
Adjusted R-squared             0.223757 S.D. dependent var 0.017008
S.E. of regression             0.014984 Akaike info criterion -5.447144
Sum squared residual           0.003143 Schwarz criterion -5.350571
Log likelihood Ratio           45.57715 F-statistic 5.323856
Durbin-Watson stat             2.031434 Prob(F-statistic) 0.036833

Note: * and ** denote the significance level at 5% and 1%, respectively.

The β convergence is statistically significant only in pre-reform period. In the post-reform period it diverges significantly. But for the entire period, the result of β convergence is statistically insignificant.

6.4 Summary

In brief we can conclude that there is a clear diverging tendency of credit allocation of the states of India so far as the theory of Absolute β Convergence is concerned. Again, in terms of the framework of σ convergence we observed that all phases of Indian economy had produced converging paths of inter-state credit allocation, and the path became divergent during the post-reform phase. Going through the sector-wise allocation of
credit we explored that the states in the industrial and service sector credit allocation were diverging rather than converging during the post-reform regime. Therefore, the agriculture sector could not be blamed for the persistent divergence in aggregate credit distribution. The source of divergence in the inter-state credit distribution originated from the distributional inequality in the industrial as well as service sector credit, particularly during the post-reform era. Therefore the persistence of divergence in income during the early phase of the major reform may be due to the persistence of divergence in the allocation of bank credit.