

# Impact of Financial and Economic Reforms on Capital Market Development In India: Back to Basics

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**Abstract-**Indian economy has been somewhat resilient to the Global Financial Crisis 2008-09, the pandemic 2019, the ongoing financial, economic & political turmoil with disturbed oil routes accompanied with a war in Russia- Ukraine. This can be traced to the strong backbone of the Indian Economy after it was hit by Financial & Economic crisis in early 1990's and major Economic and Financial reforms followed which had a phenomenal positive impact on the capital market and economic development and thereby the development path of both had been laid down by the reforms and institutional changes. The opening up of Indian Economy created financial linkages to the world with interdependence of major economic giants on India thereby improving the financial health of the country. This paper aims to study how the reforms of 1990's have been instrumental in the capital market development for which authors have constructed an improvised quantitative and qualitative indices of capital market development by analyzing the trend behavior of the capital market for the decade of economic reforms. Through regression analysis, it is concluded that the financial and economic reforms have led to overall improvements and development of India's Capital market. The paper is of eminent importance to academia, researchers, government policy makers, reform committee's, international organizations; Financial institutions and public at large to move ahead with opening up of the economy and not be fearful of the same. Researchers can further extend this work and gauge into the improvement of the indices development after dynamic steps taken in the country, to name a few: introduction of GST, Demonetization, change of political power, adoption of digitalization, stress on financial inclusion by opening of 'Jan Dhan' accounts and various other breakthroughs.

**Keywords-** Financial Reforms, Capital Market Development Index, Economic Reforms, Principal Component Analysis, Indian Financial Markets

## INTRODUCTION

The year 2008-09 experienced global economic turmoil owing to the cascading effect caused by the failure of Lehman Brothers that caused the cascading effect on the financial markets worldwide. Many advanced economies suffered long run depression, India on the other hand was initially insulated to the economic and financial contagion. Later in 2019, COVID-19 pandemic has had a major impact on the global economy, resulting in an unprecedented level of risk. This impact is reflected in the drastic reduction in oil

prices and the triggering of the US and the Indian stock market causing significant losses for investors in a short period of time. The COVID-19 pandemic has resulted in greater volatility in the oil and stock markets than was experienced during the 2008 global financial crisis, and its effects continue to be felt. The effect of the ongoing war between Russia-Ukraine has been felt on the global financial market as financial market is sensitive to extreme events. The developed countries experienced more negative price reactions than emerging countries. [14][17]. While

the benefits of globalization are enormous it may also cause the crisis to spread destabilizing the linked economies. Therefore it is imperative to dive into the basics of how India after facing deep crisis of 1990's opened up the economy, with major economic reforms leading to institutional changes and capital market development.

This paper attempts to critically examine the impact of economic liberalization on financial markets, particularly capital market in India. The central feature that characterizes India's financial market reforms is rapid institutional change. Market mechanisms in India that existed as of 1990's or so had many structural weaknesses, and the development of the financial markets has hinged upon improvements in these market mechanisms [19]. The key feature which characterizes a well-functioning financial market is high liquidity, which is a prerequisite for it ensures a good resource allocation for the economy. The capital market has undergone transformation in 1990's due to economic reforms, macro economic changes and the regulations for securities market, showing a spectacular growth, improvements and developments during the decade. The transformation consists of qualitative and quantitative changes experienced by Indian capital market during the decade of 1990's. The Indian capital market has experienced momentous institutional evolution like : open electronic limit order book market, nationwide integrated markets, establishment of clearing corporation that guarantees trade, establishment of Depository, indexation, derivative trading, the IPO market, the debt market trading and the foreign portfolio inflows etc. The institutional changes have increased liquidity, decreased transactions cost and increased in market efficiency and have contributed to overall improvements and developments of India's capital market during the decade of 1990's. The capital market development index or the stock market development index is primarily affected by the development of the equity market in India as In the organised sector of the capital market debt market trading volumes are low in India and the most active segment here is the equity market. Thus equity market in India has a major impact on the development of Indian capital market and by and large equity / stock market development will act as proxy to capital market development. Thus we use the terms capital

market development index / stock market development index / equity market development index interchangeably in the case of Indian capital market for our paper. Similarly the terms indicators of capital market development and the term indicators of stock market development are used interchangeably by us in this paper. The question is what is the index to measure capital market development. Different indicators of stock market development are stock market size, liquidity, integration with world capital markets, volatility concentration and features of the regulatory system. Thus capital market development is a multifaceted concept.

With respect to capital market development index work has been done by Pagano, Demirguc-Kunt Asli [13] and Levine Ross and the same has been used by Levine Ross and Zervos Sara [8][9][10][11] and Demirguc-Kunt Asli and Maksimovic Vojislav [1][2] and Samal C. Kishor [7] in their studies. Few studies have been conducted in the case of Indian capital market to construct such an index of capital market development and study its trend and analyse it for the period of economic reforms from 1991-2000. Samal C. Kishor has constructed the index of equity/capital market development (as devised by Kunt and Levine (1996) for Indian capital market for period 1992-93 to 1995-96 and he has regressed it on GDP and FII's investment for that period. The European Bank for Reconstruction and Development in the year 2021-22 has made an attempt to develop The Financial Market Development Index (FMDI) that has two equally weighted subindices including (a) the conditions necessary for sustainable market development and (b) asset class-specific indicators that reflect extent of development [4]. Thus having understood that there is very scanty literature available for the field of construction of capital market development index and its trend behaviour to be analysed for the Indian capital market, we attempt to construct improvised quantitative indices of capital market development and also construct qualitative index of capital market development by method of scaling and benchmarking method and analyse its trend behaviour for the Indian capital market for the decade of economic reforms from 1991-2000.

The very objective of this paper is to examine critically the qualitative and quantitative changes on India's capital market in post reform era.

Therefore, the institutional changes as well as the changes in aggregates of various parameters will be examined. Improvised quantitative indices of capital market development will be constructed and its movement will be studied for the decade of 1990's. A qualitative index of capital market development with the help of scaling and benchmarking method will also be constructed. The authors further plan to study in this paper, how the basic backbone reforms of 1990's have been reflected in the capital market development through regression models and analysis. This also requires construction of an index of capital market development.

### DATA

The period of study is from 1990-91 to 1999-2000 to concentrate back on the reforms decade on 1990's. Secondary Data on stock exchange (1989-2000) Indices, Market Capitalization, Value of Shares traded has been taken from BSE & NSE being the largest stock exchanges in India. The data on various economic aggregates has been taken from Economic survey, Report on currency and finance RBI, Centre for Monitoring of Indian Economy (CMIE) annual reports and Database, IMF papers and Bombay Stock Exchange and National Stock Exchange.

### METHODOLOGY

To test the hypothesis and to achieve the objectives, this paper shall be using statistical methods to (I) Construct Index (II) Regression analysis.

#### I. Construction of Capital Market Development Indices

- a) The Capital Market Development Index namely 'ANANDEX' on the basis of Principal Components Method, has been developed by the authors. Since the Components used in the indices namely the Market Capitalization Ratio (M), Value of shares traded ratio (V), Turnover Ratio (T) at the stock exchanges are highly inter related and effect each other, the principal component method gives the optimal weights to the components [21].
- b) To improve the above index construction further and to average out the boom/ bearish phases of markets neutralization has been done through the upturn factor and improved index called 'CAPDEX' has been developed. This is particularly relevant for volatile markets.
- c)

Further the index of Capital Market Development, named QUALIDEX has been developed and constructed by the help of scaling and benchmarking method where ranks are given for the decade 1990's for various institutional reforms/developments in the capital market which are discussed in details in the section of QUALIDEX.

#### (I)(a) Principal components (PC) analysis used for Construction of 'ANANDEX'

Principal components (PC) analysis is concerned with explaining the variance-covariance structure through a few linear combinations of the original variables. Although as many components as the number of original variables are required to produce the total system variability, often much of this variability can be explained by a smaller number of principal components say 'k'. The 'k' PCs can then replace the initial 'p' variables and the original data set consisting of 'n' measurements on 'p' variables is reduced to one consisting of 'n' measurements on 'k' PCs.

Principal components are particular linear combinations of 'p' random variables  $X_1, X_2, \dots, X_p$ . Geometrically, these linear combinations represent the selection of a new coordinate system by rotating the original system with  $X_1, X_2, \dots, X_p$  as the coordinate axes.

Suppose that the vector or random variables  $X = (X_1, \dots, X_p)$  of interest have a certain multivariate distribution with mean vector  $\mu$  and covariance matrix  $\Sigma$ . From the population, a sample of 'n' independent observations vector has been drawn. The observations can be represented as  $X_{ij}$  where  $i = 1, 2, \dots, n$  and  $j = 1, 2, \dots, p$ . Let  $z = \frac{X_{ij} - \bar{X}_j}{S_j}$  where  $i = 1, 2, \dots, n$  and  $j = 1, 2, \dots, p$  be the standardized score where  $\bar{X}_j$  and  $S_j$  are the sample mean and the standard deviation respectively for the variable 'j'. Let 'R' be the  $p \times p$  sample correlation matrix.

The first component of the variable  $X_j$  is the linear compound :

$$Y_1 = a_{11} z_1 + a_{21} z_2 + \dots + a_{p1} z_p = a_1' z$$

Of the standardized variable ( $z_j$ ) whose sample variance  $\text{var}(Y) = \sum \sum a_{ij} a_{ji} r_{ij}$   
 $= a_1' R a_1$  is the greatest for all coefficient vectors normalized so that  $a_1' a_1 = 1$

Constrained maximization implies the 'p' simultaneous linear equations

$$(r - I_1)I = 0$$

where  $I_1$  is lagrangean multiplier. The value of  $I_1$  must be chosen so that :

$$|r - I_1 I| = 0$$

$I_1$  is thus a characteristic root of the correlation matrix 'R' and  $a_1$  is the associated characteristic (eigen) vector. Given that  $a_1' a_1 = I$  it follows that :

$$I_1 = a_1' R a_1 = \text{Var}(y_1)$$

Since  $\text{Var}(y_1)$  is being maximized,  $I_1$  must be the largest characteristic root of 'R'.

The  $a$ 's, called loadings are chosen so that:

- (i) The PCs are uncorrelated (orthogonal)
- (ii) The first PC absorbs and accounts for the maximum possible proportion of the total variation in the set of all Xs, the second PC absorbs the maximum of the remaining variation in Xs and so on,

The ratio  $I_1/p$  measures the proportion of the total 'variance' in the 'p' variables  $X = X_1, \dots, X_p$  attributable to the first principal component ( $y_1$ ). The algebraic sign and magnitude of  $a_{11}$  indicates the direction and importance of the contribution of the first principal component,  $y_1$ .  $a_{11}/I_1$  is the correlation between  $X_1$  and  $y_1$ . Second, third, etc, principal components can also be constructed. The process can be summarised in the following definition:

$$Y = a_{1j} z_1 + \dots + a_{pj} z_p$$

Whose coefficients are the elements of the characteristic vector of the sample covariance matrix 'R' corresponding to the  $j^{\text{th}}$  largest characteristic root  $I_j$ . The importance of the  $j^{\text{th}}$  component in a more parsimonious description of the data is measured by  $I_j/p$ .  $a_j$  is the Eigen vector corresponding to  $I_j$ . The sign and magnitude of  $a_{ij}$  indicate the direction and importance of the  $i^{\text{th}}$  variable ( $x_i$ ) to the  $j^{\text{th}}$  component.

The method of principal components has wide applications in the social and biological sciences. In econometrics, it has been suggested that this method is appropriate in two cases : Firstly, when the number of explanatory variables which should, on priority grounds in a function, is very large relative of the size of sample, If the number of

variables is larger than the number of observations, the coefficients of the estimated. Even with a large sample, if the number of explanatory are great the computations become difficult, and the reliability of the estimates may not be possible to Xs sensibly due to the loss of degrees of freedom and of inter-correlation of the Xs. Secondly, the method of principal components has been suggested as a solution to the problem of multicollinearity.

The method is also being used in the field of index numbers in order to assess the reliability of such indices. Tintner' has suggested that with the application of principal components, one may tentatively answer questions such as : how good is the representation of all the various prices by a general price index? What proportion of the total variation of the various quantities produced in the different industries is accounted for by an index of industrial output", etc [21].

## **(II) Regression Analysis**

With the help of Eviews and SPSS we plan to find correlation between the above quantitative indices of capital market development and various macro-economic factors affecting them. We plan to study their relationships in details and run regressions and with the help of 't' test and 'F' test we would find out which of these factors are statistically significant in explaining variations in indices of capital market development. We have checked the stationarity of various dependent and explanatory variables. We have applied Dickey Fuller Unit root tests and Phillips Perron unit root tests [3][15] for stationarity of above series. The series are I(1). Thus we shall use simple OLS to run the regressions and find their significance. We can first-regress the quantitative indices on various individual macro-economic variables separately and choose the one which gives the highest coefficient of determination and then add the next variable and so on. We shall look at the problem of multicollinearity by visualizing correlation coefficient matrix of explanatory variables and by looking at, VIP (Variance inflating factor).

### **Assumptions**

We have assumed multiple linear regression model and we hypothesise:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m + u$$

Where, m is the number of explanatory variables

We further assume that:

- (1) Error terms are randomly normally distributed. i.e.  $E(u_i) = 0$  for all  $i$
- (2) Common Variance i.e.  $V(u_i) = \sigma^2$  for all  $i$
- (3) Independence i.e.  $u_i$  and  $u_j$  are independent for any  $i$  and  $j$  ( $i \neq j$ )
- (4) Independence of  $X_j$  that is  $u_i$  and  $X_j$  are independent for all  $i$  and  $j$
- (5) Normality: In conjunction with assumption 1, 2, and 3, this implies that  $u_i \sim (0, \sigma^2)$  (See Madalla. G.S. Econometrics)

Under these assumption, it can be shown that the least-squares estimators of  $\alpha$  and  $\beta$  are minimum-variance unbiased linear estimators. This property is often denoted as BLUE (best linear unbiased estimator). That is, if we confine ourselves to the class of linear estimators that are also unbiased, the least square estimators have minimum variance.

The capital market development indices have grown steadily especially in late 1990'S on account of the economic reforms: Such a development of India's capital market will be shown through the regression analysis. The economic reforms itself is not a quantifiable parameter. The leading quantifiable proxy parameters for economic reforms affecting the capital market development Include the following eight factors (i) index of industrial production (IIP). (ii) Bank Rate, (iii) cash reserve ratio (CRR) (iv) GDP, (v) cumulative net FII's investment, (vi) cumulative (GDRs + ECBs + ADRs), (vii) cumulative PSU disinvestment, and (viii) financial depth (proxy by : M3/GDP). The other explanatory variables are (ix) inflation rate measured on whole sale price index, (x) reserves of foreign exchange, (xi) movement of Sensex, (xii) gross domestic savings ratio, and (xiii) rupee-dollar exchange rates. After running suitable regressions we arrive at the best fitted models and their statistical inferences are drawn.

## **RESULTS**

### **Construction of Capital Market Development Index**

Various indicators of equity market development are Market Capitalisation Ratio (M), Value Traded

Ratio (V), Turnover Ratio (T), etc. Market capitalisation ratio is a measure of the ability of equity market to allocate capital to investment project and to provide significant opportunities for risk diversification for investors. 'Value traded ratio' is an indicator of market liquidity or the ability to buy or sell shares easily. It complements the market capitalisation ratio. Turnover ratio is another indicator of market liquidity and complements both market capitalisation ratio and value traded ratio. Other indicators of capital equity market development are (i) concentration ratio which is the ratio of market capitalisation of "top" ten shares. (ii) number of listed companies, (iii) volatility, (iv) asset pricing or mispricing which is a measure of integration with global market, and (v) regulatory and institutional factors such as existence of security and exchange commission, accounting standards, publication of price earning ratios and so on. Although many of these equity market indicators are correlated, the single indicator may show different level of development.

Demirguc Kunt and Levine (1996) have combined the three indicators the market capitalisation to GDP ratio (M), value of shares traded to GDP ratio (V), the turnover ratio ( $T = V/M$ ) defined as value of shares traded to GDP divided by the market capitalisation to GDP ratio in equal weights and it is an index of capital/equity market development. This index of capital market development has been used by Demirguc Kunt and Maksimovic [17], Samal C. Kishor also uses this index and calls it as Sindex and he regressed Sindex on GDP and FII's investment from 1992-93 to 1995-96 for the Indian economy [7]. Quantitative capital market development index is defined as:

$$(i) \text{ Sindex} = (M+V+T)/3$$

where  $M$  = Market capitalisation at BSE/GDP,  $V$  = value of shares traded at BSE + NSE / GDP and Turnover Ratio ( $T$ ) =  $V / M$  . The data on  $M$  represents market capitalisation at BSE and is also almost common with NSE. The data on  $V$  is the sum of value traded on BSE and NSE (the two major stock exchanges of India)

**Table 1 : Construction And Computation of Sindex is given for the decade of 1990' s. The Sindex values are computed for the decade by normalising them for the base year 1990-91 = 1000.**

Year	M	V	V/M = T	M+V+T	M+V+T/3	Sindex, Base 1990-91=1000	Rate of Growth of Sindex Per annum (%)	
1989-90	.1596	.0719	.4504	.6819	.2273	1030.3	annum (%)	The compound average growth rate of Sindex for 1990-91 to 2000 is 16.5% per annum
1990-91	.1901	.0753	.3964	.6618	.2206	1000	-2.94	
1991-92	.5849	.1298	.2220	9367	3122	1415.2	41.52	
1992-93	.3344	.0724	2166	.6234	2078	941.9	-33.44	
1993-94	.5099	.1082	2122	.8303	2767	1254.3	33.167	
1994-95	.5128	.0741	.1445	.7314	.2438	1105.1	-11.895	
1995-96	5282	.1108	2098	.8488	.2829	1282.4	16.043	
1996-97	.4082	.3385	8290	1.5757	.5252	2380.7	85.644	
1997-98	.4552	.4170	9160	1.7882	.5960	2701.7	13.483	
1998-99	3842	.4498	1.1706	2.0046	.6682	3029.0	12.114	
1999-2000	5150	.8599	1.6696	3.0447	1.0149	4600.6	51.885	
M = Market Capitalization to GDP Ratio (at BSE), V = Value of Shares Traded to GDP Ratio (at BSE+NSE), T = Turnover Ratio = V/M								

**The market capitalisation** increased at an average compound growth rate of 27% per annum from 1991 to 1999. The ratio of market capitalisation to GDP from 1991 to 2000 increased at an average compound growth rate of 5% per annum. **The turnover ratio (T)** at BSE defined as value of shared traded divided by market capitalisation grew at an average rate of 15.5% per annum between 1990-91 to 1999-2000. In 1999-2000 the market capitalisation to GDP ratio (**M**) stood at .51 the value of shares traded to GDP ratio (**V**) stood at 0.85. The turnover ratio (**T**) as defined above stood at 1.66. These show a considerable expansion of market size, widening of stock markets and increase in liquidity of shares compared to the GDP and compared to the market size. There was financial deepening of the stock markets in the later half of 1990's.

We construct two improvised quantitative indices of capital market development. These improvised indices are 'Anandex' and 'Capdex' whose construction is described as ANANDEX : We observe that there is a high degree of correlation between value of shares traded and the turnover ratio and the coefficient of correlation is 0.940 and is highly significant at 0.01 level of significance. The three indicators M, V, T are positively

correlated with each other and market capitalization does have an effect on value of shares traded. The turnover ratio is of course dependent on market capitalization and value of shares traded. Generally higher is the market capitalization higher is the value of shares traded to GDP ratio and higher the value of shares traded ratio higher will be the turnover. Thus market size and liquidity of stock market with respect to economy and liquidity of stock with respect to market size have effects on each other and they reinforce each other. The data clearly shows that the value of shares traded ratio has increased significantly since 1996-97 and the turnover ratio has also increased, whereas the market capitalization has been around 0.4 to 0.5 from 1993-94 onwards. The relationship between these indicators seem to be that as capital market reforms and economic reforms have taken place in Indian economy the value of the shares traded ratio and the turnover ratio increased tremendously and are in strong positive correlation with each other. The market capitalization ratio though positively correlated with other two liquidity variables does effect them and get effected by them. Greater is the trading in the capital market, the greater will be the liquidity and larger number of companies can

expect there public issues to be subscribed as investors have sufficient liquidity for the existing stocks in the stock exchanges. This is to state that larger is the secondary market trading in the stock exchanges the greater will be the fresh capital issues (secondary market affecting primary market) thereby increasing the size of the market by getting listed on the stock exchanges. The more the number of companies listed the larger is the market capitalization, the greater will be the liquidity, more will be the volume of shares traded and higher will be the turnover ratio and in tum market size will increase only if liquidity is higher, returns on stocks are sufficient.

Thus the indicators M, V, and T are positively correlated with each other. We use standard

method of principal components to aggregate the three indicators together to form an improvised index of capital market development, named 'Anandex' by us. Through the method of principal components we are able to explain the largest proportion of variations in the aggregate of three indicators M, V and T thereby deriving an improvised index of capital market development called 'Anandex' by us.. The method of principal components has wide applications. This method is appropriate to be used when the variables to be combined show high degree of correlation. The method is also used in the field of index numbers, to develop a reliable index (see G . Tintner Econometrics, 1965, Chapter VI). Using the methods of principal component we have the following results below:

**Table 2 : Eigen Values Using the Methods Of Principal Component**

Components	Eigen Value	Proportions Explained
1	2.011	.6706
2	.98088	.3270
3	.00730	.0024

*Source: Author's Computations*

The component 1 has an Eigen value of more than 1 and it explains 67.06% of proportions of the index Anandex accounted by the 3 indicators. By rule of thumb we select those components which have Eigen values of greater than 1 and hence we

select the first component. The factor loadings corresponding to the first component are as follows :

$$(1) M = 0.13, \quad (2) V = 0.44 \quad (3) \quad T = M / V = 0.43$$

**Table 3 : Construction and Computation of Capital Market Development Index : 'ANANDEX'**

Year	M*0.13	V*0.44	$V/M*0.43 = T$	$0.13M + 0.44V + 0.43T$	Anandex Base 1990-91 = 1000	Growth of Anandex per Annum (%)	The Compound average annual growth rate from 1990 to 2000 is 17.7% per annum
1989-90	.0207	.0316	.1936	2459	1077.56	-	
1990-91	.0247	.0331	.1704	2282	1000	-7.197	
1991-92	.0760	.0571	.0954	.2285	1001.31	.13	
1992-93	.0434	.0318	.0931	.1683	737.51	-26.345	
1993-94	0.662	.0476	.0913	.205	898.33	21.805	
1994-95	.0666	.0326	.0621	.1613	708.15	-21.17	

1995-96	.0686	.0487	.0902	.2075	909.29	28.40
1996-97	.0530	.1489	.3564	.5583	2446.5	169.056
1997-98	.0591	.1834	.3938	.6363	2788.34	13.972
1998-99	.0499	.1979	.5033	.7511	3291.4	18.041
1999-2000	.0669	.3783	0.7179	1.1631	5096.84	54.853
M = Market Capitalization to GDP Ratio (at BSE), V = Value of Shares Traded to GDP Ratio (at BSE+NSE), T = Turnover Ratio = V/M						
Source : B. S. E. (Asst. G. M. B.S.E; Mr. Gopalakrishnan), NSE and author's calculations)						

Thus 'Anandex' gives large weightage to two measures of liquidity than market capitalisation ratio. Greater is the liquidity low will be the transactions cost and more efficient will be the capital market. Hence, improvement of Anandex shows efficient capital market. Thus by using the principal components method we have constructed a reliable and an improvised index of capital market development over 'Sindex'. The calculations for Anandex as a measure of capital market development which explains the largest variations in it caused by M, V and T on each other are shown in the Table 3 and the factor loadings are multiplied by the corresponding variables and the three variables summed up together with factor loading as their weights give us Anandex. This is normalized for the base year 1990-91 = 1000 and the corresponding figures for the other years are calculated using this methodology.

CAPDEX : During boom phases, when the price index in the stock market is high there is an over statement of the market capitalization and also even if the volume of shares traded does not

increase the value of shares traded will automatically increase because of higher prices and there will be over statement on this account also . The reverse occurs during the bearish phase when the price index of securities go down . For the same structure of market capitalization and volume of shares traded, the measure of these variables in the nominal terms will go down and hence, Sindex will overstate itself during stock market boom phases and under state itself during stock market bearish phase, thus, we need a correction on this account. The turnover ratio may not be affected by such booms and bearish phases as  $T = V/M$  and the price increases / decreases of securities will get neutralized for the above ratio as they occur both in numerator and denominator. To correct this bias we construct an alternative improvised index of capital market development over Sindex. called ' Capdex' by us. Capdex is an improvement over Sindex for over statement and under statement of Sindex during boom and bearish phases. Following steps give the construction procedure of improvised capital market development index - Capdex :

**Table 4 : Construction and Computation of Capital Market Development Index : 'CAPDEX'**

Year	Average Value of Sensex	Yearly High of Sensex	Yearly Low of Sensex	Upturn/ Downturn	M Adjusted for upturn factors =.6	V Adjusted for upturn factors =.6	T	M+V+T	Captex Base 1990-91=1000	Rate of Growth of Capdex per annum (%)
1989-90	729.49	798.01	659.36	-	-0.0719	0.0719	0.04504	0.6818	1030.3	
1990-91	1049.53	748.79	1559.43	-	.1901	.0753	.3964	6618	1000	-2.94
1991-92	1879.51	1193.61	4285	-	.5849	.1298	.2220	.9367	1415.2	41.52



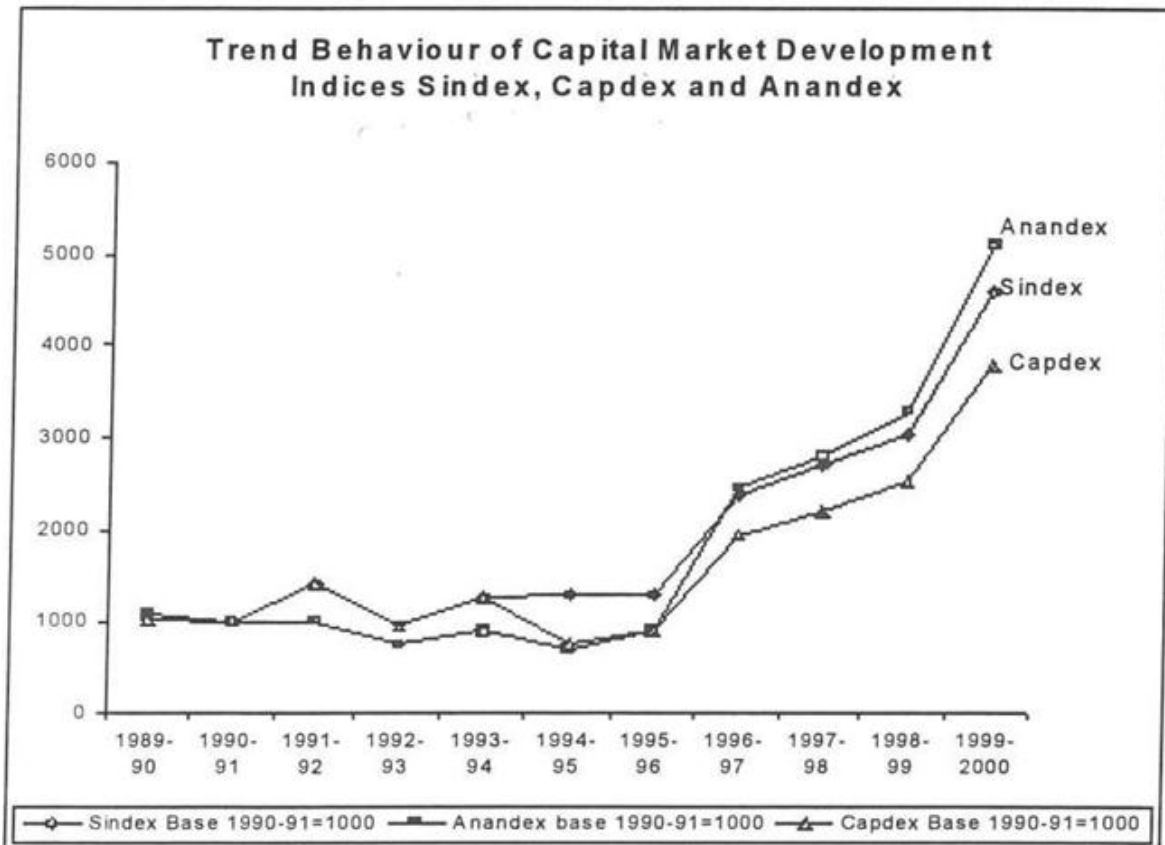
1992-93	2895.67	4467.32	2225.08	-	.3344	.0724	2166	.6234	941.90	-33.44
1993-94	2898.69	2036.81	4286.2	-	.5099	.1082	.2122	.8303	1254.3	33.167
1994-95	3974.91	3233.31	4630.54	+	.3076	.0446	.1445	.4965	750.22	-41.188
1995-96	3288.68	2826.08	3598.37	+	.3169	.06648	.2098	5931	896.19	19,456
1996-97	3469.24	4069.26	2745.06	+	.2449	.2031	.8290	1.2770	1929.58	115,309
1997-98	3812.04	3209.55	4548.02	+	2731	2505	.9160	1.4393	2174.80	12.708
1998-99	3294.78	2964.16	4280.96	+	.2305	.26988	1.1706	1.6709	2524.7	16.08
1999-00	4658.63	5933.56	3245.27	+	.3090	.5159	1.6696	2.4945	3769.26	49.29
The compound average growth rate from 1990-91 to 2000 is 14.2% per annum.										
M = Market Capitalisation to GDP Ratio (at BSE), V = Value of Shares Traded to GDP Ratio (at BSE+NSE), T = Turnover Ratio = V/M										
Source : B. S. E. (Asst. G. M. B.S.E; Mr. Gopalakrishnan), NSE and author's calculations)										

We have data of the average value of sensx, the high and the low from the year 1989-90 to 1999-2000. We take the average of these observations of the average value of sensx from 1989-90 to 1999-2000 which is 2904. The years which correspond to average value of sensx more than 2904 are called the years of upturns denoted by '+' and the years which correspond to average value of sensx less than 2904 are called years of down turns denoted by '-' sign. The upturns and downturns years are labelled by corresponding signs in the table for calculation of Capdex. We take the average of high and low of sensx for the years of down turns and find their grand average which is 2225.6 for the years 1989-90 to 1993-94, the years of down turns. We take the average of the high and the low of sensx for the years of upturns and find out the grand mean for the years of upturns from 1994-95 to 1999-2000 which is 3733.3. To neutralize the upturn values from 1994-95 to 1999-2000 the upturn factor is  $2225.6/3733.33 = .59614$

which is approximately = 0.60. We multiply each observation of M and V from 1994-95 to 1999-2000 the years of upturns by the upturn factor of 0.6 to neutralize the price effects. Other observations from 1989-90 and 1993-94 on M and V remain same. The observations of T are unaffected as explained earlier. Now giving equal weights to all the observations of M, V and corrected M, V and T we construct an improvised index of capital market development labelled as Capdex by us. This is again normalised for the base year 1990-91 = 1000 and for other years Capdex values can be computed accordingly. The Table 4 shows the construction and computations of Capdex trend values from 1989-90 to 1999-2000. Capdex is thus an improvement over Sindex as it neutralises price increase of stock markets in our statements of M and V.

#### **Trend Analysis Of Capital Market Development Indices And Their Correlation With Each Other**

**Figure 1 :** The compound average annual growth rate of capital market development indices Capdex, Sindex and Anandex from 1990-91 to 1999-2000 has been 14.2%, 16.5% and 17.7% p.a. respectively



Source : Author's Computations

All the three indices of capital market development i.e. Sindex, Anandex and Capdex show that there has not been a significant capital market development till 1994-95 due to scam and its effects, but from 1995-96 the effects of capital market reforms and economic reforms were realised in the economy and it led to steady development and improvements of the capital market thereafter. The capital market development index, Capdex shows rise from the year 1995-96 onwards but less than the rises shown by Sindex whereas Anandex shows rise greater than the Sindex for the same period. Thus Anandex is stated to have an upper bias for the periods of capital market development as compared to

Sindex. This has occurred because Anandex gives unduly high weightage to liquidity measures V and T as compared to market capitalisation ratio M. Incidentally with improvements in capital market the measures of V and T have grown faster in the latter half of 1990's in Indian capital market as a result of economic and capital market reforms. Thus the upper bias of Anandex is explained. Thus Anandex stresses that capital market development is faster the more liquid are the markets whereas Sindex and Capdex gives equal weightage to M, V and T. In general Capdex is an improvement over Sindex as it corrects the over statement of Sindex during the phase of boom of stock markets.

**Table 5 : Karl Pearson's Correlation Coefficients between Sindex, Anandex and Capdex**

	Sindex	Anandex	Capdex
Sindex	1	0.992	0.988
Anandex	0.992	1	0.986
Capdex	0.988	0.986	1

*Source : Author's Calculations.*

The above Karl Pearson's correlation matrix show that all the three capital market development indices are highly positively correlated and all coefficients of correlation are highly significant at 0.01 level of significance. The graph of the three indices show that they all move together in the same direction, if we compare yearwise movement they all move to the crests and trough positions together in various years and they do not move in contradiction to each other. Thus in making trend analysis and comparison of capital market development overtime, if there are abnormal boom or depression phases of stock market, Capdex should be preferred over Sindex. If we value liquidity highly, which reduces transactions cost and improves market efficiency, the measure Anandex should be preferred. Since Anandex is constructed by the method of principal components large proportion of variations in it are explained by variations in M, V and T. Hence Capdex and Anandex are improvised indices of capital market development.

Thus all the three indices of capital market development Sindex, Anandex and Capdex show fluctuations in the trend till the middle of the decade of 1990's may be due to ill effects of scam experienced in 1992. It is in the latter half of the decade that all three indices moved in the same direction and they show improvement and positive development in capital market, as a result of economic reforms and structural and institutional changes brought about by capital market reforms in the latter half of the decade. Therefore looking at all the three indices, it is clear that there has

been positive development of capital market during the decade and more significantly in the latter half of decade.

### **Construction of Qualitative Index of Capital Market Development.**

An alternative qualitative index of capital market development named 'Qualidex' has been developed and constructed by us with the help of scaling and bench marking method. We give ranks in increasing order starting from 1 except where stated otherwise to the following seven parameters used for construction of Qualidex. The parameters are: (a) Number of companies listed at B.SE (measure of the size of market positively correlated to capital market development). (b) Fresh issues in the capital market (measure of the size of market is positively correlated to capital market development). (c) Measure of volatility (higher is the volatility lower is the development of capital market so rank 1 is given to that year which shows the highest volatility). Volatility is negatively correlated to Capital market development. (d) Returns on equity the price index (larger is the return the better is the development of the capital market and larger returns attract more funds towards the market). (e) Regulatory and institutional development indicator (positively related to capital market development). (f) Cumulative net investment by FII's (positively related to capital market development). (g) Cumulative GDR + ECB + ADR (positively related to capital market development).

**Table 6 : Ranks of Parameters, Construction & Computation of Qualidex**

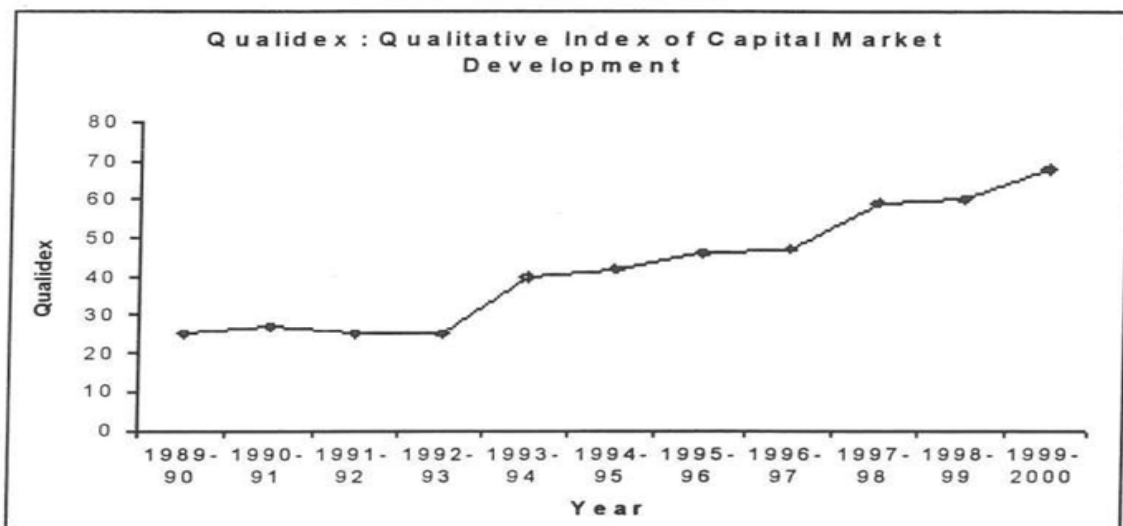
Year	No. of Companies listed in BSE	Rank Sensex Volatility	Regulatory & Institutional Development Indicator	Annual Returns on CMIE Index	Cumulative net Investments by FII	Cumulative GDR + ECB + ADR	Fresh Issues in Capital Market	Qualidex
1989-90	1	11	1	7	2	2	1	25
1990-91	2	9	2	8	2	2	2	27
1991-92	3	1	3	11	2	2	3	25
1992-93	4	4	4	1	4	4	4	25
1993-94	5	3	5	10	5	5	7	40
1994-95	6	5	6	4	6	6	9	42
1995-96	7	10	7	2	7	7	6	46
1996-97	8	7	8	3	8	8	5	47
1997-98	9	6	9	6	10	9	10	59
1998-99	10	8	10	5	9	10	8	60
1999-00	11	2	11	9	11	11	11	66

Source : B. S. E. (Asst. G. M. B.S.E; Mr. Gopalakrishnan), NSE and author's calculations)

All the variables except the volatility are positively correlated to capital market development and hence for the period of 1989-90 to 1999-2000 lowest rank 1 is given to each of these parameters for their lowest values in the years of their occurrence and highest value 11 is given to each of these parameters for the years which have the largest values for these parameters and the reverse is done for the indicator volatility. In regard to regulatory and institutional development indicator it measures (a) whether the firms listed in stock market publish price earning ratios (b) accounting

standards (c) quality of investor protection laws implemented (d) whether there exist exchange commission. These measure have answer in affirmative for Indian capital market, but it is difficult to quantify these year wise. Thus for simplicity we presume that with each passing year in 1990's all the above measures are implemented better in capital market. Thus we give lowest rank 1 to year 1989-90 and highest rank 11 to year 1999-2000. The ranks for each of the years for these seven parameters are added and this shows a qualitative capital market development index called Qualidex.

**Figure 2 : Trend in Qualitative Index of Capital Market Development : Qualidex**



Source : Author's Computation

The movement in Qualidex is that of stagnancy with minor fluctuations till the year 1993 due to the effects of stock market scams and there after it reaches to a higher level in 1993-94 and increases slightly till 1996-97 and increases steadily from 1997-98 onwards confirming that capital market development is due to economic reforms,

structural changes and institutional changes specific to capital market. The trend exhibited by this index is similar to those of quantitative indices of capital market development. The above seven parameters listed are important contributory factors to the capital market development.

**Table 7 : Coefficient of Correlation between Indices**

Coefficient of Correlation				
	Sindex	Capdex	Anandex	
Qualidex	.872**	.804**	.843*	Karl Pearson's Coefficient of Correlation
Qualidex	.835**	.606*	.633*	Spearman's Coefficient of Correlation
** Significant at .01 level (2 tailed)				
* Significant at .05 level (2 tailed)				

The Table 7 suggests that Qualidex is highly positively correlated to quantitative indices of capital market development and the coefficient of correlations are significant. In fact all the four indices are significantly correlated to each other and denote capital market development.

**(II) Regression Analysis**

***Forces of Transformation and Leading Factors Affecting Capital Market Development***

Economic Reforms, Regulation for Securities Market, Macro Economic Changes were the three main factors responsible for transformation (qualitative and quantitative changes) in Indian capital market during 1990's :

**Economic Reforms**

India faced serious balance of payments crisis, unsustainable fiscal and current account deficit and accelerating inflation. In mid 1991, India adopted some stabilisation and structural reform measures. The major components of reforms process included : Stabilization of economy so that balance of payments and inflationary pressures could be kept under control. Deregulation of the real and financial sectors and removal of licence and permit system that was prevalent in almost all spheres of production and domestic trade to promote domestic competition and remove opportunities for rent seeking and its consequent distortions and inefficiencies. Liberalization of International trade in various sectors to promote competition and efficiency by removing high degree of protection enjoyed by the domestic

industry and Globalization to attract International Capital and modern technology and take advantage of global division of labour leading to Industrial sector, External sector and Financial sector reforms. Both internal and external liberalisation measures, undertaken as a part of economic and financial sector reforms, and the more liberal general economic ethos created by the reform process, resulted in the freedom for private enterprise and competition. These contributed to the transformation of the market. The internal liberalisation measures included the repeal of the CCI Act 1947, the abolition of the office of the CCI and allowed companies to freely access the capital market; the external liberalisation allowed foreign institutional investors to invest in the stock markets and Indian companies to raise capital abroad.

**SEBI and the Regulations for the Securities Market**

Liberalisation also occurred with fresh regulations for the securities market. The flagship of the government's regulatory reforms for the securities market was the SEBI Act, which came into force in 1992. It established SEBI as the apex, statutory regulatory body for the securities market, with the express mandate of investor protection, development and market regulations. This was important for two reasons. First, SEBI was able to put in place in a very short period of time, a credible regulatory structure for the securities market. Second, SEBI itself became the primary catalyst for market development bringing about far reaching changes in market practices, introducing

international best practices and procedures and modernising the market infrastructure taking advantage of technology and enforcing regulations. The major part of the reforms for the securities market, which were to fundamentally alter its character, and be responsible for enduring quantitative and qualitative changes in the market were initiated from 1990. Some of the key measures initiated by SEBI in 1990's are : (i) Introduction of the initial and continuing disclosures norms for issuers, (ii) Strict entry point criteria for the public offers to improve the quality of paper and address the excesses in public issues which took place after free pricing of issues, raising of standards of financial disclosures, (iii) Automation of all the stock exchanges, spread of trading terminals of the major stock exchanges across the country, use of technology by the stock exchanges, (iv) Modernisation of market microstructure, (v) Establishment of the settlement guarantee funds in the stock exchanges to ensure smooth and timely settlement of trades, (vi) Introduction of strict margining norms for stock transactions and on line monitoring, (vii) Shortening of the settlement cycles of the stock

exchanges, (viii) Increase the efficiency of the clearing and settlement mechanism, (ix) Setting up of the depositories and ensuring electronic book entry transfer, (x) Modernising and strengthening of the surveillance systems in the stock exchanges and SEBI, (xi) Rapid growth of mutual funds, (xii) Liberalisation of FII policy and simplification of the investment procedures by the FIIs, (xiii) Strengthening of the regulations for takeovers to encourage takeovers in a fair and transparent manner and protect the investors and (xiv) Indexation and derivatives trading. All these institutional changes have improved liquidity, lowered transactions costs and made the capital market efficient leading to significant improvements growth and development of Indian capital market.

Macro Economic Factors:

Table 8 summaries the effects of various macro economic and other indicators of the capital market development. The anticipated correlation between capital market development and the indicator are presented.

**Table 8 : Anticipated Signs of Coefficient of Correlation between Capital Market Development Index & Various Economic Indicators**

Indicator	Anticipated Signs
GDP	positive
Industrial Production	Positive
Monsoon & Agricultural Production	Positive
Inflation	Negative
Domestic Savings	Positive
Interest rates	Negative
Cash Reserve Ratio (CRR)	Negative
Foreign Exchange Reserves	Positive
Balance of Trade	Positive
Foreign Exchange Rates	Positive
Foreign Direct Investments	Positive
Global Depository Receipts	Positive
Foreign Institutional Investment	Positive
Deficit Financing	Negative
Foreign Debt	Negative
Public Debt	Negative
Disinvestment in Public Sector	Positive
Employment & Number of investors	Positive
Tax Rates	Negative
Infrastructure	Positive
Financial Depth	Positive
Favourable Government Policy	Positive
Stable Political Situation	Positive

One of the objectives of this paper is to test that the economic reform programmes have been instrumental in over all improvements and development of India's capital market. We regress the dependent variables, (a) Sindex ( $Y_1$ ), (b)

Capdex ( $Y_2$ ) and (c) Anandex ( $Y_3$ ) the three quantitative capital market development indices constructed by us for the period 1990 to 1999 on the various explanatory variables.

**Table 9 : Zero Order Correlation with Capital Market Development Indices and Various Economic Indicators**

Independent Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
Dependent Variable	Industrial Production	Bank Rate	Cumulative net Foreign Institutional Investment	GDP	CRR	Financial Dept h	PSU Disinvestments	Cumulative GDR +ECB + ADR	Inflation of WPI	Forex Reserves	Sensex Movement	Gross Domestic Savings Ratio	Rupee Dollar Exchange Rate
Sindex	0.899	-0.504	0.905	.901	-.823	.813	0.796	0.84	-.679	.782	.493	.276	.763
	(.000)	-0.138	0	(.000)	(.001)	(.002)	-0.003	-0.031	(.031)	(.007)	(.147)	(.440)	(.010)
Capdex	.831	-0.553	0.781	.839	-.811	.790	0.706	0.766	-.595	.643	.333	.184	.654
	(.000)	-0.097	-0.008	(.001)	(.001)	(.004)	-0.006	-0.015	(.069)	(.045)	(.346)	(.610)	(.040)
Anandex	0.874	-0.616	0.865	.874	-.883	.799	0.802	0.763	-.708	.697	.374	.162	.669
	(.000)	-0.058	-0.001	(.000)	(.001)	(.003)	-0.006	-0.003	(.022)	(.025)	(.287)	(.655)	(.034)

**Table 10 : Zero Order Correlation Matrix with t - values**

Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>9</sub>	X <sub>10</sub>	X <sub>12</sub>	X <sub>11</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>13</sub>	
Y	1	.899** .000	-.504 .138	.905** .000	-.679* .031	.782** .007	.276 .440	.493 .147	.901** .000	-.823** .003	.813** .002	.840** .001	.796** .003	.763* .010
X <sub>1</sub>		1	-.316 .374	.987** .000	-.761* .011	.934** .000	.378 .281	.744* .014	.944** .000	-.666* .035	.732* .010	.960** .000	.964** .000	.906** .000
X <sub>2</sub>			1	.322 .365	.321 .366	-.151 .676	.319 .369	.246 .493	-.330 .351	-.700* .024	-.425 .220	-.240 .504	-.189 .602	-.094 .797
X <sub>3</sub>				1	-.811** .004	.918** .000	.393 .261	.707* .022	.973** .000	-.731* .016	+546 .103	.902** .000	.972** .000	.860** .001
X <sub>9</sub>					1	-.660* .038	-.238 .509	-.467 .173	-.783* .015	.729* .017	-.229 .525	-.600 .067	-.767** .010	-.620 .056
X <sub>10</sub>						1	.495 .146	.879** .001	.956** .000	-.516 .127	.562 .091	.956** .000	.967** .000	.947** .000
X <sub>12</sub>							1	.606 .063	.419 .228	-.267 .456	.408 .242	.516 .127	.459 .182	.549 .100
X <sub>11</sub>								1	.770** .009	-.158 .662	.521 .123	.840** .002	.805** .005	.893** .001
X <sub>4</sub>									1	-.607* .034	.760** .007	.977** .000	.960** .000	.939** .000
X <sub>5</sub>										1	-.504 .137	-.551 .099	-.614 .059	-.460 .181
X <sub>6</sub>											1	.793** .004	.611* .046	.613 .059
X <sub>7</sub>												1	.936** .000	.955** .000
X <sub>8</sub>													1	.890* .000
X <sub>13</sub>														1

\*\* Significant at .01 level of significance.

\* Significant at .05 level of significance

Note in each square the upper figure shows the coefficient of correlation and the lower figure shows the 't' significance level.

- Y Sindex
- X<sub>1</sub> IIP
- X<sub>2</sub> Bank Rate (%)
- X<sub>3</sub> Cumulative net FII (US\$ million)
- X<sub>9</sub> Inflation rate measured by WPI
- X<sub>10</sub> Reserves of Foreign Exchange
- X<sub>12</sub> GDS/GDP<sub>PC</sub> (%)
- X<sub>11</sub> Sensex Avg
- X<sub>4</sub> GDP<sub>PC</sub> Rs. 1000 cr.
- X<sub>5</sub> CRR (%)
- X<sub>6</sub> M<sub>3</sub>/GDP
- X<sub>7</sub> Cumulative disinvestment PSU Rs 100Cr.
- X<sub>8</sub> Cumulative ECB + GDR + ADR \$ million
- X<sub>13</sub> Rs. Vs Dollar

The cross correlation table shows the explanatory variables have high zero order coefficients of correlation suggesting that the explanatory variables exhibit high degree of multicollinearity. Using standard econometric techniques, we have excluded the unimportant variables and retained eight important explanatory variables for our regression. The dependent variables Sindex,

Capdex and Anandex are significantly correlated to these eight explanatory variables and the coefficients of correlation display the anticipated signs and are significant. These eight explanatory variable chosen by using econometric techniques are given in Table 11 with their expected Correlation signs:

**Table 11 : Explanatory Variable with their expected Correlation signs**

Explanatory Variables	Sign
X <sub>1</sub> : Index of industrial production (IIP)	positive
X <sub>2</sub> : Bank Rate (%)	negative
X <sub>3</sub> : Cumulative net FII's investment (US \$ million)	positive
X <sub>4</sub> : Gross Domestic Product at factor Cost current prices Rs. 1000 crores	positive
X <sub>5</sub> : Cash Reserve Ration (CRR) (%)	negative
X <sub>6</sub> : Financial Depth = M <sub>3</sub> /GDP	positive
X <sub>7</sub> : Cumulative PSU disinvestment Rs. 100 crores	positive
X <sub>8</sub> : Cumulative GDR + ECB + ADR (US \$ million)	positive

**Table 12 : Linear Multiple Regression Models with Eight Explanatory Variables**

**Regression I**

$$\begin{aligned} \text{SINDEX:} & \quad 84073.417 & -622.767X_1 & -491.51X_2 & +4.210X_3 & +5.298X_4 \\ \text{t=} & \quad (6.898) & (-7.327) & (-5.947) & (7.282) & (6.838) \\ & +829.358X_5 & -65576.3X_6 & +86.636X_7 & -2.175X_8 & \\ \text{t} = & \quad (6.490) & (-6.339) & (5.964) & (-7.611) & \end{aligned}$$

$$\bar{R}^2 = .991, \text{ SEE} = 72.3616, d = 2.51, F_{8,1} = 130.705, \text{ Sig. Level} = 0.068$$

**Regression II**

$$\begin{aligned} \text{CAPDEX} = & \quad 82132.907 & -612.252X_1 & -447.150X_2 & +4.001X_3 & +6.836 X_4 \\ \text{t} = & \quad (6.118) & (-6.540) & (-4.912) & (6.283) & (8.012) \\ & +786.967X_5 & -64783.4X_6 & +79.008X_7 & -2.156X_8 & \\ \text{t} = & \quad (5.591) & (-5.686) & (4.939) & (-6.850) & \end{aligned}$$

$$\bar{R}^2 = .983, \text{ SEE} = 79.699, d = 2.51, F_{8,1} = 65.78 \text{ Significance level} = .095$$

**Regression III**

$$\begin{aligned} \text{ANANDEX} = & \quad 92202.275 & -671.674X_1 & -595.012X_2 & +4.518X_3 & +6.210X_4 \\ \text{t} = & \quad (2.823) & (-2.951) & (-2.739) & (2.959) & (2.912) \\ & +850.611X_5 & -71804.7X_6 & +89.361X_7 & -2.331X_8 & \\ & \quad (2.507) & (-2.572) & (2.339) & (-3.087) & \end{aligned}$$

$$\bar{R}^2 = .958, \text{ SEE} = 196.82, d = 2.51, F_{8,1} = 26.846, \text{ Significance level} = 0.148$$

- Where X<sub>1</sub> = IIP  
 X<sub>2</sub> = Bank Rate (%)  
 X<sub>3</sub> = Cumulative FII's net Investment (US\$ million)  
 X<sub>4</sub> = GDP<sub>FC</sub> Rs. 1000 crores  
 X<sub>5</sub> = CRR (Percentage)  
 X<sub>6</sub> = Financial depth (M3/GDP)  
 X<sub>7</sub> = Cumulative disinvestment by PSU Rs.100 crores  
 X<sub>8</sub> = Cumulative ECB + GDR + ADR Rs. million



## CONCLUSIONS

The analysis of the trend of the alternative quantitative indices of capital market development constructed namely Sindex, Capdex and Anandex have shown capital market development and improvements during the decade of economic reforms in 1990's and more significantly in the latter half of the decade. What are the economic factors which have been instrumental in the development of the capital market?

We conclude from the three general regressions of Sindex, Capdex and Anandex on eight explanatory variables, (Called General Regression Equation I, II, and III respectively given in Table 12) that it is the index of industrial production, the bank rate, the net cumulative FII's investment, the gross domestic product, the cash reserve ratios, the financial depth defined by  $M_3/GDP$ , the cumulative disinvestment by public sector units and commulative ECB + GDR + ADR, these eight factors together have been able to explain 99.1 % of the variations in Sindex, 98 .3% of the variations in Capdex and 95 .8 % of the variations in the capital market development index Anandex. The three regressions show high degree of goodness of fit. In the above regressions the eight explanatory variables exhibit high degree of multicollinearity amongst themselves, so some of the  $\beta$  parameters may not display the anticipated signs but since we do not attempt to measure the individual  $\beta$  coefficients in the model our conclusion above remains unaffected by multicollinearity. It should be remembered that the prediction power of the model is unaffected by multicollinearity and it predicts very well for high degree, goodness of fit i.e. high  $\bar{R}^2$ . Our general regression have high  $\bar{R}^2$  all above 0.95 . Thus it is all the eight explanatory variables together explain very well the variations and the movement of the dependent variables Sindex, Capdex and Anandex.

### **Correlation, Significance and Effects of Explanatory Variables on Capital Market Development Indices.**

(i) CRR: The fall in CRR releases large funds for the banks and are used for investments. This increase the value of shares traded and contribute to greater liquidity. Thus fall in CRR contributes to the development of capital market. The coefficient of correlation between the capital market

development indices Sindex, Capdex, Anandex with CRR are -0.823, -0.811 and -0.883 respectively and all are highly significant at .01 level of significance. We take CRR as one of the proxy measures for financial sector reforms .

(ii) Bank Rate: A fall in bank rate would decrease returns on the various bank deposits etc and the funds would be invested in the equity market creating larger market capitalisation and value of shares traded increase and this contributes to capital market development. (It should be remembered that higher interest rates attract capital funds from abroad and has positive effect on BOP). The coefficient of correlation between the capital market development indices Sindex, Capdex, Anandex with the Bank rate are -.504, -.553 and -.616 respectively and are significant at 0.15, 0.10 and 0.10 level of significance we take Bank Rate as one of the proxy measures for interest deregulations financial sector reform.

(iii) IIP: The index of industrial production shows high degree positive correlation with capital market development indices. A high growth in industrial production with sufficient demand implies larger profits for industries and larger dividends and accumulated reserves. This encourages larger investments in industrial shares by investors, the existing industries would further expand their capacities or go for larger diversifications. Hence IIP is positively correlated to capital market development. The coefficient of correlation between the capital market development indices Sindex, Capdex, Anandex with IIP are 0.899, 0.831 and 0.874 respectively and are highly significant at .01 level of significance for the two tailed 't'test. We takes IIP as one of the proxy measure for industrial sector reforms

(iv) GDP: High growth in GDP not only leads in economic prosperity but it also has a positive impact an capital market development. Higher GDP for country would imply higher savings and larger funds available for investment purposes. Higher growth of GDP leads to business optimism and this leads to larger capitalisation of companies as they plan to expand, there by increasing the size of market. Higher profits and larger capitalisation lead to larger trading in the stock exchanges there by increasing the liquidity also. Higher growth rate of GDP experienced from 6.5% to 7% was realised in 1990's as an effect of economic reform process

as compared to their average growth rate of 4% to 4.5% p.a. from independence till 1990. Thus GDP is an important proxy determinant of economic reforms process and is positively correlated to the capital market development. The correlation coefficient between Sindex, Capdex, Anandex and GDP are 0.901, 0.839 and 0.874 respectively and are highly significant at .01 level of significance. We take GDP as a proxy measure for over all economic reforms.

(v) Cumulative FII net investment & (vi) Cumulative ECB + GDR + ADR: Cumulative FII's net investment and cumulative ECB + GDR + ADR investments in India have been due to liberal attitude towards foreign investors as a result of economic reforms, globalisation and liberalisation measures undertaken in 1990's. FII's, ECB + GDR + ADR funds have led to more investments in capital market creating larger volume of trade adding to liquidity and increases in the size of the market. Thus capital market development is positively correlated to cumulative FII's investment and cumulative ECB + GDR + ADR. It is also an important indicator and act as proxy to measure the economic reforms depicting liberalisation or globalisation measures in the external sector. The coefficient correlation of between Sindex, Capdex, Anandex with cumulative FIT's net investment are .905, .781 and .865 respectively and are all highly significant at .01 level of significance. The coefficients of correlation between Sindex, Capdex, Anandex with cumulative ECB + GDR + ADR are 0.796, 0.706 and 0.763 and are significant at .01, .05 and .01 level of significance respectively.

(vii) Cumulative Public Sector Unit Disinvestment (PSU): The PSU disinvestment has taken place from 1991-92 onwards to meet budgetary deficits and it is a move towards privatization. Therefore it is an important factor of to proxy economic reforms towards privatisation. With PSU disinvestments the shares of public sectors are traded in stock markets thereby increasing its liquidity and increasing the size of the market by getting these shares listed in the stock exchanges. Therefore capital market development is positively correlated with cumulative PSU disinvestment. The coefficients of correlation between Sindex, Capdex, Anandex with cumulative PSU disinvestment are .840, .766 and .802 respectively and are highly significant at

.01 level of significance. We take cumulative PSU disinvestment as one of the proxy measures for move towards privatisation economic reform.

(viii) Financial Depth: The measure of financial depth  $M3/GDP$  (King and Levine 1993) is an indicator of intermediary services provided by the banking system. This measure will have a positive effect on the development of the capital market. It acts as an important measure of banking sector reforms determining intermediary banking services. The coefficient of correlation between Sindex, Capdex, Anandex with Financial depth is +.813, +.790 and +.799 respectively and all are significant at .01 level of significance.

There are other factors also like the inflation rate of wholesale price index which is negatively correlated with the development of capital market. The reserves of foreign exchange, has a positive correlation with the development of capital market. The movement of sensex show low positive correlation with the development of the capital market and is found to be statistically insignificant. The gross domestic savings ratio is positively correlated with the capital market development. The rupee-dollar exchange rate is also a variable effecting development of markets. These 5 variables do effect capital market development but they have not found place in our regression analysis for the reasons of multicollinearity problem and/or for insignificant 't' ratios or for their insignificant contributors to the overall explanatory power of the regression. This is due to multicollinearity and their job is done by other retained eight explanatory variables with which they are highly correlated.

In this paper we stress that the capital market was transformed during 1990's. The development trend of capital market was more significant during the latter half of 1990's and same is exhibited by quantitative capital market development indices Sindex, Capdex and Anandex and the qualitative index Qualidex constructed by us. There were quantitative and qualitative changes with institutional evolution in the Indian capital market. The foreign institutional investors were welcomed and with liberalisation and globalisation the FII's investment, GDR and ECB investment brought with it not only slew of opportunities but at the same time the volatility in the equity market and forex market increased. It is economic reform programmes, macro-economic changes,

institutional changes and regulation of securities market which have been instrumental in over all improvements and development of India's capital market. Above results have been arrived by the regression of capital market development indices Sindex, Capdex and Anandex on various explanatory variables of which IIP, CRR, GDP, Bank Rate, Cumulative FII's investment, Cumulative ECB + GDR + ADR's, Cumulative PSU dis-investment and financial depth, the eight explanatory variables explained about 99.1%, 98.3% and 95.8% of variations in capital market development indices, Sindex, Capdex and Anandex respectively. These eight explanatory variables act as a proxy to measure the package of economic reforms. Thus, we conclude that it is economic reform programmes, macro economic changes, institutional changes and regulation of securities market have been instrumental, in overall improvements and development of India's capital market during the decade of 1990's.

#### **Policy Recommendations and Scope For Future Study**

The economic and financial reforms and institutional changes initiated in the economy in 1990's had a positive impact on the development of the capital markets that tremendously increased market capitalization and the turnover in the stock exchanges and led to investments in the secondary sectors as well growth of service sector by the inflow of FII's and investment by general public in the areas that were earlier closed. All these dividends had a multiplier effect in the growth of the economy more in the decade and thereafter. This bold step can be regarded as the backbone of the Indian Economy which is evident even today as Indian economy was somewhat resilient to the Global Financial Crisis 2008-09, the pandemic 2019 and the ongoing economic political turmoil with disturbed oil routes accompanied with a war in Eurasia. The paper is of eminent importance to academia, researchers, government policy makers, reform committee's, international organizations, Financial institutions and public at large. The paper by the construction of capital market development index, empirically points out the economic benefits reaped of the major reform in economic, financial, capital market and institutional setup of the country. This paper encourages governments and other policy makers to move ahead with opening up of the economies.

To public at large this gives evidence on how not to fear from major changes in the economic setup of the country. While, for academia and researchers it has opened up a wide scope of study including in depth analysis using specific identified variables in the study. Researchers can also extend this work and gauge into the improvement of the indices development after dynamic steps taken in the country, to name a few: introduction of GST, Demonitization, change of political power, adoption of digitalization, stress on financial inclusion by opening of 'jan dhan' accounts and various other breakthroughs.

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