RESERVE BANK OF INDIA

OCCASIONAL PAPERS

Vol. 29 - No. 1

ISSN 0972 - 7493
SUMMER 2008

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RESERVE BANK OF INDIA OCCASIONAL PAPERS Vol. 29 2008

Regd. No. "R.N. 37535/80"

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Published by Ganpat Singh Bhati for the Reserve Bank of India and printed by him at Jayant Printery, 352/54, Girgaum Road, Murlidhar Compound, Near Thakurdwar Post Office, Mumbai-400 002.

Reserve Bank of India Occasional Papers
Vol. 29, No. 1, Summer 2008

Can an Inter-temporal Model Explain India's Current Account Balance?

J. K. Khundrakpam and Rajiv Ranjan*

Employing an inter-temporal model on a constructed private consumption series, the paper finds that the current account balance in India during 1950-51 to 2005-06 is inter-temporally solvent. This is primarily a reflection of the developments that have taken place during the post-reform period, when restrictions on capital flows have been significantly liberalised. We do find some evidence of asymmetry between capital flows, which is on expected lines as restrictions on capital outflows from India are more than those on inflows to India. The study finds that the optimal current account balance has been larger than the actual current account balance. This is intuitively appealing as there were severe foreign exchange restrictions in the pre-reform period which restricted the smoothing of private consumption up to the optimal level. With further liberalisation of capital flows, both inflows and outflows, it would be possible for agents to further smoothen their consumption to desired optimal level, allowing scope for higher current account deficit to attain potentially higher growth.

JEL Classifications : E21, F32, F41
Keywords : Current account, Consumption-smoothing, Inter-temporal

Introduction

The last two to three decades have seen a shift in the thinking of policy makers and economists on the current account balance towards an inter-temporal model with consideration on long-term sustainability (Frenkel and Razin, 1987; Ghosh and Ostry, 1995; and Obstfeld and Rogoff, 1996). The model is based on the permanent income hypothesis where consumption expenditure of agents depends upon the expected permanent income. When the current income fluctuates, the current level of saving would also correspondingly fluctuate in order to maintain the level of consumption. Extended in the context of a small open economy, fluctuation in current income translates into borrowing or lending from the international markets *i.e.,* movement of capital, to smooth out consumption. Thus, inter-temporal consumption optimisation behavior of agents predicts the desired level of capital flows to meet the resulting current account balance. Therefore, if the saving

* The authors are Directors in the Department of Economic Analysis and Policy. These are strictly the personal views of the authors.

and investment decisions of agents are optimal, the resulting current account balance is also optimal and inter-temporally solvent, irrespective of whether it is in deficit, surplus or balanced.

This approach to analysing current account balance has a number of policy implications. First, if the current account balance is the outcome of optimising behavior of agents in the economy, it should not be a matter of concern for the policy makers since there will not be any unsustainable accumulation of foreign liabilities/assets. Second, the current account balance need not necessarily be the result of structural imbalances, but the outcome of economic agents' response to temporary change in government expenditure or investment, which may not require policy initiatives such as exchange rate variation to correct the imbalance. Third, the observed current account balance may point toward the required growth of the economy in future, indicating either a higher growth to repay borrowed foreign savings or a possible lower growth while receiving its savings lent to foreigners. Fourth, when there are controls on capital flows, the model allows testing the effectiveness of these controls and check whether there are any avoidable welfare losses and potential growth foregone due to capital controls. Fifth, technically solvent current account balance does not guarantee its sustainability as lenders perception can change and raise doubts on the debtor country's ability to meet its obligations particularly when restrictions on capital flows inhibits optimisation and there are unforeseen external shocks.

In the cross-country context, the empirical validity of inter-temporal model of current account balance, however, has been diverse and ambiguous. Otto (1992), Ghosh (1995) and Nason and Rogers (2003) rejects the validity of the model in the context of Canada. Similarly, Milbourne and Otto (1992), Guest and McDonald (1998) and Cashin and McDermott (1998a, 1998b) find that the model does not hold with Australian data.

In contrast, a number of studies have found the validity of model in several countries. They include: Otto (2003) for Australia during 1980 to 2000; Ghosh and Ostry (1995) in two-thirds of the 45 sample countries including India during 1960 to 1990; Agenor, *et al* (1999) for France during 1970 to 1996; and Kim *et al* (2002) for New Zealand during1982:2 to 1999:3. In the Indian context, Callen and Cashin (1999) find that the model is consistent with the

data during 1951 to 1999 only when asymmetry in capital flows is recognised.

In this paper, we revisit the issue for the following reasons: First, if the current account balance in India is derived as GNP less private consumption expenditure less total investment less government consumption, as conventionally done by most studies in this area, we observe large discrepancies between the current account balance so derived and the current account balance data provided in the balance of payments (BOP) statistics and also current account balance derived as the difference between saving and investment rates of the economy. It is observed that the discrepancies arise due to private consumption expenditure data reported in the National Account Data (NAS) in India, which is derived on a residual basis. In view of above, we construct and model an alternative private consumption series from the revised national accounts data for the period 1950-51 to 2005-06 (base 1999-2000). Second, we investigate whether the current account balance in India is solvent or not, and if so, is it the outcome of developments during the post-reform period? Third, as a corollary, we make an attempt to gauge the degree of capital controls in India and whether there is any asymmetry in capital inflows and outflows. In other words, we check for whether volatility of capital flows between India and the rest of the world is consistent with the expected changes in fundamentals or not.

The rest of the paper is organised as follows: Section I provides the basic analytical framework and lists out the various testable hypothesis of the model. The data, empirical estimates and analysis of the results are contained in Section II. The final section concludes the paper.

Section I
The Model

1.1 Symmetry in Capital Flows

Drawing on the literature, we first consider the standard model employed in this area. The standard model assumes a small open economy that consumes a single good and has access to the world capital markets at an exogenously given world real interest rate. The consumption behavior of the individuals in the country is alike and the consumers' preferences are separable inter-temporally.

The representative consumer maximizes the following discounted lifetime utility

$$E_t \sum_{j=0}^{\alpha} \beta^j U(C_{t+j}), \text{ where, } U' > 0, U'' < 0, \ 0 < \beta < 1 \quad (1)$$

E_t is the expectations operator, β is the subjective discount factor reflecting time preference on consumption, C_t is private consumption at time t and $U(\ )$ is the time separable utility function.

The budget constraint faced by the representative agent is captured by the current account identity:

$$CA_t \equiv B_{t+1} - B_t = Y_t + r B_t - C_t - I_t - G_t \quad (2)$$

where Y_t is GDP, B_t is the stock of net foreign assets, r is world real rate of interest, I_t is investment, G_t is government consumption expenditure and CA_t is real current account balance.

The utility function in (1) is assumed to be quadratic i.e., $U(C_t) = C_t - C_t^2/2$, which implies certainty equivalence requiring that the marginal utility of consumption remain positive. A representative consumer maximises the utility function subject to the budget constraint in (2). The first order condition for maximisation given the transversality condition (*i.e.,* no-ponzi games or inter-temporal solvency constraint) yields the solution for optimal consumption as:

$$C_t^* = r \Big/ \theta(1+r) E_t[\sum_{j=0}^{\alpha} (1+r)^{-j} Z_{t+j}] + r/\theta\beta_t \quad (3)$$

where $Z_t = Y_t - I_t - G_t$ is the national cash flow. The optimal consumption level can be decomposed into two components *viz.*, consumption-smoothing part and the consumption tilting part. The consumption-tilting component θ is estimated as the coefficient of C_t in the regression of national cash flow Z_t inclusive of interest payments, *i.e.*, $Zb_t = Y_t + rB_t - I_t - G_t$ on consumption C_t. If $\theta = 1$, there is no consumption tilting and consumption is equal to permanent national cash flow. For $\theta < 1$, the country is tilting consumption towards the present and consuming more than permanent national cash flow and vice versa for $\theta > 1$.

The consumption-smoothing component of current account is derived by removing the consumption-tilting component of consumption as,

$$CA_t^{sm} = Y_t + rB_t - I_t - G_t - \theta C_t - \alpha \quad (4)$$

From equation (3) and (4), the inter-temporal model of the current account can be derived as,

$$CA_t^{sm} = -\sum_{j=0}^{\alpha}(1+r)^{-j} E_t[\sum \Delta Z_{t+j}] \tag{5}$$

where Δ is the backward difference operator. Equation (5) says that the optimal consumption-smoothing component of the current account is identically equal to minus the present discounted value of expected changes in national cash flow.

For calibrating the expected present value of national cash flow, an unrestricted VAR in first differences of national cash flow and de-trended current account (removing the consumption tilting component of current account) is estimated. The VAR may be written as,

$$\begin{bmatrix} \Delta Z_t \\ CA_t^{sm} \end{bmatrix} = \begin{bmatrix} \Psi_1 \Psi_2 \\ \Psi_3 \Psi_4 \end{bmatrix} * \begin{bmatrix} \Delta Z_{t-1} \\ CA_{t-1}^{sm} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \tag{6}$$

Or, more compactly as,

$$X_t = \psi * X_{t-1} + e_t \tag{7}$$

From (7), the k-step ahead expectation is:

$$E(X_{t+k}) = \psi^k * X_t \tag{8}$$

so that $E_t \Delta Z_{t+k} = [1\ 0]\ \psi^k * X_t$. Therefore, equation (5) can be expressed in terms of the VAR in (6), which can be specifically expressed as,

$$\begin{aligned} CA_t^{sm*} &= -[1\ 0]\left[(1+r)^{-1} * \psi\right]\left[I - (1+r)^{-1}\psi\right]^{-1} * X_t \\ &\equiv \left|W_{\Delta Z}\ W_{ca}\right| \begin{vmatrix} \Delta Z_t \\ CA_{t-1}^{sm} \end{vmatrix} \end{aligned} \tag{9}$$

Equation (9) gives the estimator of the optimal current account and is valid as long as the infinite sum in (5) converges, which requires that ΔZ_t and CA_t^{sm} must be stationary.

1.2 Testable Hypotheses and Implications

First, the variables in the VAR system should be stationary, which also imply that Zb_t and C_t should be cointegrated. As current account balance is the difference between Zb_t and C_t, cointegration between them is a necessary and sufficient condition for satisfaction of the inter-temporal budget constraint *i.e.,* solvency (Hakkio and Rush, 1991). Second, for consumption smoothing

hypothesis to be relevant, smoothen current account balance should predict future changes in national cash flow *i.e.*, in equation (5), the coefficient of CA_t^{sm} on ΔZ_t in the VAR should be statistically significant. Third, writing explicitly, and using law of iterated expectations, it can be shown that the equation (5) holds if and only if $E_{t-1}\left[CA_t^{sm} - \Delta Z_t - (1+r)CA_{t-1}^{sm}\right] = 0$. Therefore, equality between actual and optimal current account implies $S_t \equiv CA_t^{sm} - \Delta Z_t - (1+r)CA_{t-1}^{sm}$ should be uncorrelated with the lagged values of ΔZ_t and CA_t^{sm}.[1] Fourth, the movement in actual current account should fully reflect the movement in optimal current account i.e., the estimated weights of ΔZ_t and CA_t^{sm} viz., $W_{\Delta Z}$ and W_{ca} in (9) should respectively be 0 and 1. Fifth, there should be a perfect correlation between optimal and actual current account and the variance in them should be equal.

1.3 Asymmetry in Capital flows

Asymmetry in capital flows is analysed by decomposing the consumption-smoothing component and the change in national cash flow into two components as in the following,

$$CA_t^{smh} = D_t^h \; CA_t^{sm} \text{ where } D_t^h = \begin{cases} 1 \text{ if } CA_t^{sm} > 0 \\ 0 \text{ if } CA_t^{sm} \leq 0 \end{cases}$$

$$CA_t^{sml} = D_t^l \; CA_t^{sm} \text{ where } D_t^l = \begin{cases} 1 \text{ if } CA_t^{sm} < 0 \\ 0 \text{ if } CA_t^{sm} \geq 0 \end{cases}$$

i.e., CA_t^{smh} (CA_t^{sml}) equals CA_t^{sm} when CA_t^{sm} is positive (negative) and CA_t^{smh} (CA_t^{sml}) is zero otherwise. The variables ΔZ_t^h and ΔZ_t^l are also similarly defined as,

$$\Delta Z_t^h = D_t^h \Delta Z_t = \text{ where } D_t^h \begin{cases} 1 \text{ if } \Delta Z_t > 0 \\ 0 \text{ if } \Delta Z_t \leq 0 \end{cases}$$

$$\Delta Z_t^l = D_t^l \Delta Z_t = \text{ where } D_t^l \begin{cases} 1 \text{ if } \Delta Z_t < 0 \\ 0 \text{ if } \Delta Z_t \geq 0 \end{cases}$$

If there is restriction on inflows and not on outflows, running current account surplus through capital outflow to smooth CA_t^{smh} would be possible,

but running deficit through capital inflows to smooth CA_t^{sml} would not be possible. Under such type of asymmetric control, CA_t^{smh} would Granger-cause ΔZ_t^l, but CA_t^{sml} should not Granger-cause ΔZ_t^h. The reverse causality is expected when the restriction is on outflows and not on inflows. In case, both the causalities exists at the same time or are absent, there is no asymmetry in controls on capital flows.

Thus, a four variables VAR of current and lagged changes in the two components of the national cash flow (ΔZ_t^h and ΔZ_t^l) and current and lagged of the two components of consumption-smoothing component of current account (CA_t^{smh} and CA_t^{sml}) is estimated. The VAR is of the form $X_t = \psi X_{t-1} + e_t$ where $X_t = (\Delta Z_t^h, \Delta Z_t^l, CA_t^{smh}, CA_t^{sml})$, Y is a 4 × 4 matrix of coefficients and e_t is a 4 × 1 vector of disturbance terms. Using the values of the coefficients and k-step ahead expectation in the manner described from (7) to (9), the constrained optimal consumption-smoothing component of the current account can be derived as a non-linear function of the VAR parameters as:

$$CA_t^{sm**} = -[1\ 1\ 0\ 0]\left[(1+r)^{-1} * \psi\right] \quad \left[I - (1+r)^{-1}\psi\right]^{-1} * X_t$$

$$\equiv \left| W\Delta Z^h, W\Delta Z^l, W_{ca}^h, W_{ca}^l \right| \left| \begin{matrix} \Delta Z_t^h \\ W_{ca}^l \\ CA_t^{smh} \\ CA_t^{sml} \end{matrix} \right| \qquad (10)$$

where I is 4 × 4 identity matrix. CA_t^{sm**} is the optimal current account under asymmetry in capital flows. Under optimal consumption smoothing with no asymmetry in capital flows, it would imply $W_{\Delta Z}^h = W_{\Delta Z}^l = 0$ and $W_{ca}^h = W_{ca}^l = 1$. If the restriction is only on outflows then it would imply $W_{\Delta Z}^h \neq W_{\Delta Z}^l \neq 0$ and $W_{ca}^h \neq W_{ca}^l = 1$, while restrictions only on inflows would imply $W_{\Delta Z}^h \neq W_{\Delta Z}^l \neq 0$ and $W_{ca}^h = 1 \neq W_{ca}^l$. Last but not the least, if there is no consumption smoothing it would imply $W_{\Delta Z}^h \neq W_{\Delta Z}^l \neq 0$ and $W_{ca}^h \neq W_{ca}^l \neq 1$.

Section II
Data and Estimation Results

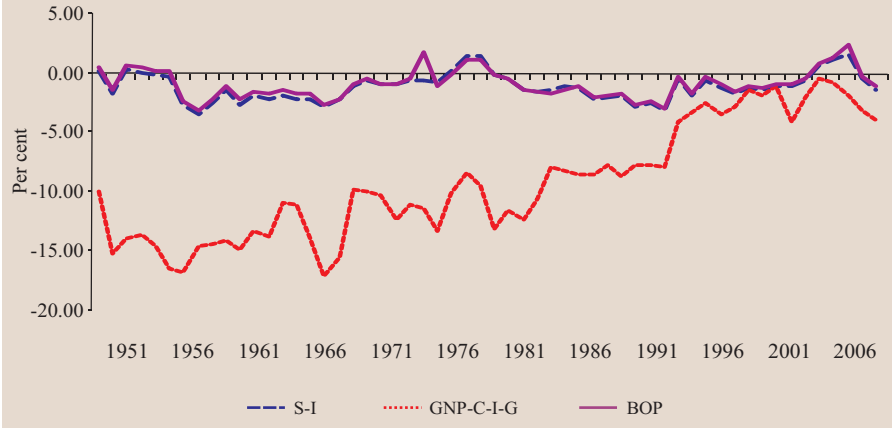
2.1 Data

The current account balance in India has been mostly in deficit, barring the surplus in the early 1950s, some years in the mid 1970s and during 2001-

02 to 2003-04. The deficit as a ratio to gross domestic product (GDP), however, remained modest and the intermittent episodes of foreign exchange shortages were mostly triggered by external shocks.[2] However, if we follow the traditional approach of inter-temporal model and derive current account balance as gross national product (GNP) less private consumption expenditure less total investment less government consumption from Indian National Account Statistics (NAS) data, a very high and persistent deficit is shown throughout. As mentioned earlier, this data is inconsistent with the BoP data as well as the deficit measured as saving and investment gap from NAS data itself, which clearly show surplus in the recent past and in some of the years mentioned above.[3] During 1950-51 to 2005-06, for which private consumption data are available, the current account balance as a ratio to GDP so derived by this traditional method range from (-) 0.4 per cent in 2001-02 to (-)17.1 per cent in 1966-67, as against the range of (+)2.31 per cent in 2003-04 and (-) 3.18 per cent in 1957-58 based on BOP data and from (+)1.64 per cent in 2003-04 to (-)3.49 per cent in 1957-58 derived from the saving and investment gap during the corresponding period. The latter two measures of current account balance are very close to each other (Chart 1).

This large discrepancy is mainly due to discrepancy in the private consumption data which is derived on residual basis in the NAS in India. Thus, we construct an alternative private consumption series. First, the current account balance is derived as the saving-investment (S-I) gap. Second, a

Chart 1 : Alternative Measures of Current Account Balance as a Ratio to GDP



private consumption expenditure is constructed as GNP (market prices) less investment less government consumption less the derived current account balance (S-I) using the revised national accounts data for the period 1950-51 to 2005-06 (base 1999-2000). All the series are converted to constant prices using the GDP deflator. As we are concerned with a representative agent, all the series are considered on per-capita basis.[4] We consider two period *viz.*, 1950-51 to 1990-91 and an extended period 1950-51 to 2005-06, in order to draw inferences by observing transformation in the relevant parameters during the post-reform period.

2.2 Estimation Results

2.2.1. Stationarity Tests

Unit root tests based on Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) for Z_t, Zb_t, and C_t are presented in table 1. For both the periods, all the series are shown to be I*(1)*.

Table 1: Unit Root Tests

Variables	Level Form		First Difference	
	ADF test	P-P test	ADF test	P-P test
1	2	3	4	5
1950-51 to 2005-06				
Z_t	2.81	3.90	-8.88*	-8.88*
Zb_t	3.47	3.94	-8.82*	-8.82*
C_t	3.10	3.76	-8.83*	-8.98*
1950-51 to 1990-91				
Z_t	-2.44	-2.36	-4.71**	-7.79*
Zb_t	-2.86	-2.80	-5.06*	-8.60*
C_t	-1.82	-1.68	-8.06*	-8.43*

Notes: A constant is included in the test and where ever statistically significant a linear trend is also included. * and ** denote rejection of unit root at 1% and 5% significance level, respectively. Lag length of ADF test was selected based on SIC criterion and PP-test is based on Newey-West using Bartlett Kernel method.

2.2.2 Consumption Tilting Component 'θ'

The estimated consumption tilting parameter 'θ' and the hypotheses tested are presented in Table 2. It is interesting to note that over the period 1950-51 to 2005-06, the coefficient is about 1 with the Wald test [2.38(0.12)] unable to reject the equality of θ to 1. In other words, on an average, an Indian has consumed about its permanent cash flow *i.e.*, maintained a balanced current

account. For the period 1950-51 to 1990-91, the coefficient, however, is estimated at 0.93 and statistically different from 1 [Wald test is 13.98(0.00)], indicating that till the initiation of reforms consumption was tilted towards the present leading to current account deficit and accumulation of foreign liabilities. The stability tests based on Hansen (1991) indicate that θ is stable at the 5 per cent critical value for the period 1950-51 to 2005-06 (test value of 0.21) but was unstable during 1950-51 to 1990-91(test value of 0.57).

Table 2: Consumption Tilting 'θ' using Phillips-Hansen's Fully Modified Model and Cointegration Tests

Time Period	Constant (t-value)	θ (t-value)	Wald Test θ=1 (p-value)	Hansen Test#	Stationarity of Residual		Johansen's Cointegration Test	
					ADF	PP	Eigenvalue	Trace
1	2	3	4	5	6	7	8	9
1950-51 to 2005-06	-148.3 (-3.15)*	1.01 (117.4)*	2.38 (0.12)	0.21	-3.40**	-3.47**	r=1 (15.2)** r=2 (7.31)	r ≥ 1(22.5)** r=2 (7.31)
1950-51 to 1990-91	223.6 (2.68)**	0.93 (50.1)*	13.98 (0.00)	0.57	-0.80	-0.86	r =1 (5.1) r =2 (0.18)	r ≥ 1 (5.2) r =2 (0.18)

* and ** denotes 1% and 5% significance level, respectively. # Asymptotic critical value at 5% for θ is 0.470. The lag length for Johansen's cointegration test was chosen based on SIC criteria and the test was performed including an intercept and no trend.

The cointegration tests between Zb_t and C_t based on stationarity of the estimated consumption-smoothing component of current account (residual of the cointegrating relationship) using ADF and PP test show that they are cointegrated during the entire period of 1950-51 to 2005-06, but not during 1950-51 to 1990-91. The Johansen's cointegration tests also suggest that there exist one cointegrating vector between them for the period 1950-51 to 2005-06, but none exist for the period 1950-51 to 1990-91 (table 2). These results thus suggest that India's current account balance was not solvent till the period leading up to the payment crisis of 1990-91, implying private consumption was beyond the available national resources. The reforms since 1990-91 has brought solvency in the current account balance.

2.2.3 VAR Estimate

The parameters estimated from VAR of ΔZ_t and CA_t^{sm} are presented in table 3.[5] It is seen that the coefficient of lagged CA_t^{sm} in the regression of ΔZ_t is negative and statistically significant at the conventional level for the period

1950-51 to 2005-06, but not for the period 1950-51 to 1990-91. The chi-square tests [4.0(0.04)] reject the hypotheses that the coefficients of lagged CA_t^{sm} are equal to zero for 1950-51 to 2005-06, but not for the period 1950-51 to 1990-91 with test value of [1.8 (0.18)]. Thus, the current account helps to forecast (Granger-cause) the future changes in national cash flow for the full period, but not till 1990-91. In other words, till the payment crisis of 1990-91, private consumption in India was not optimal and did not reflect the future change in national cash flows. This has changed since reforms and the change in current account balance reflects smoothing of private consumption.

Table 3: VAR Estimates and Orthogonality Test

Variables	1950-51 to 2005-06			1950-51 to 1990-91		
	DZ_t	CA_t^{sm}	S_t	DZ_t	CA_t^{sm}	S_t
1	2	3	4	5	6	7
Constant	113.1	1.75	-111.3	65.2	-3.98	-82.5
(t-statistics)	(3.96)*	(0.17)	(-3.7)*	(2.36)*	(-0.53)	(-2.9)*
DZ_{t-1}	-0.055	-0.032	0.023	-0.18	0.06	0.27
(t-statistics)	(-0.45)	(-0.45)	(0.17)	(-1.0)	(1.54)	(1.66)
CA_t^{sm}	-0.56	0.62	0.14	-0.53	0.78	0.44
(t-statistics)	(-2.01)**	(3.1)*	(0.51)	(-1.35)	(6.2)*	(1.25)
$\chi 2$ test for $CA_t^{sm} = 0$	4.0	9.5		1.8	38.0	
(p-value)	(0.04)	(0.00)		(0.18)	(0.00)	
Joint significance of lags						
$\chi 2$			0.27			2.97
(p-value)			(0.60)			(0.09)
$\bar{R}^2$	0.05	0.36		0.05	0.36	

2.2.4 Orthogonality Test

Similar results follow from the regression of $S_t \equiv CA_t^{sm} - \Delta Z_t - (1+r)CA_{t-1}^{sm}$ on lagged values of ΔZ_t and CA_t^{sm} presented in table 3. The t-statistics of coefficients of all the lagged variables are insignificant for the full period, but not for the period up to 1990-91.[6] The Wald tests also show that the combined coefficients of the lagged variables are jointly equal to zero for the full period but not for the period up to 1990-91.

2.2.5 Optimal Current Account[7]

The formal test for goodness of fit of the estimated optimal current account balance to the actual current account balance by estimating $w_{\Delta Z}$ and w_{ca} is presented in table 4.

Table 4: Weights, Confidence Interval and Wald Test on Weight Restrictions

Weights and Hypothesis Tested	Symmetry	Asymmetry
1	2	3
W_{DZ} and 95% Interval	0.012 [-0.22, 0.21]	
w_{ca} and 95% Interval	1.31 [0.22, 2.40]	
Wald Test, c2 (p-value)	0.47 (0.79)	
CA_t^{smh} cause DZ_t^l, c2 (p-value)		0.11 (0.74)
CA_t^{sml} cause DZ_t^h , c2 (p-value)		7.61 (0.01)
w_{Dzh} and 95% Interval		-0.015 [-0.35, 0.31]
w_{Dzl} and 95% Interval		0.07 [-0.81, 0.99]
w_{cah} and 95% Interval		-0.14 [-1.82, 1.62]
w_{cal} and 95% Interval		2.73 [0.81, 4.47]

The estimated values are $w_{\Delta Z} = 0.012$ and $w_{ca} = 1.31$. The 95% confidence intervals of the estimated weights show that the former can not be statistically distinguished from zero and the latter from one.[8] Table 4 also reports Wald test on joint restrictions of the coefficients of the VAR, which imply that $w_{\Delta Z}$ and w_{ca} cannot be distinguished from zero and unity, respectively.[9] The reported χ^2 statistics (p-value) of 0.47 (0.79) rejects the null hypothesis of no equality. In other words, we cannot statistically reject the hypothesis that $w_{\Delta Z} = 0$ and $w_{ca} = 1$ *i.e.*, $CA_t^{sm*} = CA_t^{sm}$.

2.2.6 Other Testable Implications

The correlation coefficients and equality of variance ratios between the optimal and actual current account balance are provided in table 5. The estimated correlation coefficient of 1 indicates that they perfectly move in the same direction and the turning points are well captured. The amplitude of variation, captured by the variance ratios of 1.68, however, indicates that volatility of optimum current account is more than the actual. It implies that volatility in capital flows is less than what is warranted by the fundamentals, as there are still some restrictions on capital flows.

Table 5: Correlation Coefficient and Variance Ratio

Correlation and Variance Ratio	Symmetry	Asymmetry
1	2	3
Correlation Coefficient	1.0	0.78
Variance Ratio	1.68	1.99

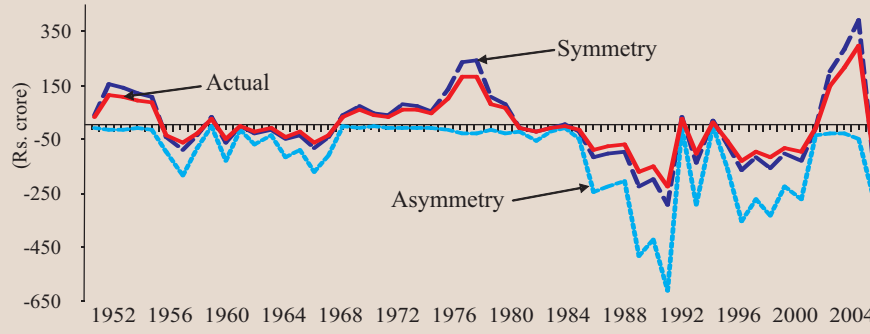
2.2.7 Results from Asymmetry

The results from asymmetry are also presented in table 4. It can be seen that CA_t^{sml} Granger-causes ΔZ_t^h can not be rejected with χ^2 (P-value) of 7.61 (0.01), while CA_t^{smh} Granger causes ΔZ_t^l is rejected with χ^2 (P-value) of 0.11 (0.74). The results imply that there is asymmetry in capital flows which is in line with our expectations, as restrictions on capital outflows are more than those on inflows.

The formal test through the estimation of weights and the 95% confidence intervals presented in table 4, however, show that $w^h_{\Delta z}$ = -0.015, $w^l_{\Delta z}$ = 0.07, w^h_{ca} = -0.14 and w^l_{ca} = 2.73. Thus, $w^h_{\Delta z}$ and $w^l_{\Delta z}$ are not far from zero and the 95% confidence intervals also show that they are not statistically different from zero. On the other hand, w^h_{ca} and w^l_{ca} diverge from one. However, the 95% confidence levels can not strictly reject that they are statistically different from one, though the interval range are very wide, and therefore, the evidence is weak. Thus, the estimated weights are more akin to absence of asymmetry in capital flows i.e., $w^h_{\Delta z} = w^l_{\Delta z} = 0$ and $w^h_{ca} = w^l_{ca} = 1$.

The correlation coefficient of 0.78 between the actual and optimum current account is much lower than symmetry model while the variance ratio of 1.99 is higher than the corresponding symmetry model. The actual and the estimated optimal current from symmetry and asymmetry models are shown in chart 2. It can be seen that the estimates from symmetry model tracks the optimum

Chart-2: Optimal and Actual Current Account Balance



more accurately than the asymmetry model and the latter is consistently biased towards deficit. Furthermore, the gap between them gets larger from the beginning of the 1990s, expectedly reflecting inappropriateness of asymmetry model in the more liberalized regime on capital flows witnessed since then.[10]

Thus, there is only a weak evidence of asymmetry in international capital flows to India. The extent of capital flows had been high enough to allow the private sector to smooth out their consumption path to a large extent. But, this behaviour is primarily attributable to the development during the post-reform period, where correction as well as a greater freedom on capital flows through liberalisation has taken place. However, the optimal current account balance has been larger than the actual current account balance. This is intuitively appealing as there was severe foreign exchange restrictions in the pre-reform period which restricted the smoothing of private consumption up to the optimal level.

Section III
Concluding Observations

Based on constructed time series data on private consumption for the period 1950-51 to 2005-06, we analyse the behavior of India's current account balance from the following standpoints. First, is the current account balance in India solvent, and if so, can it be attributed to the post-reform period? Second, are the controls on capital flows in India effective and whether there is asymmetry in the controls on capital inflows and outflows? Consequently, is the volatility of capital flows between India and the rest of the world consistent with the expected changes in fundamentals?

We find that inter-temporal model of current account balance is consistent with Indian data. The current account balance, which was inter-temporally insolvent during the pre-reform period, has turned solvent during the post-reform period. This is primarily a reflection of the developments that have taken place during the post-reform period, when restrictions on capital flows have been significantly liberalised. In other words, till the payment crisis of 1990-91, private consumption in India was not optimal and did not reflect the future change in national cash flows. This has changed with the corrections carried out since reforms and the change in current account balance reflects smoothing of private consumption.

We do find some evidence of asymmetry between capital flows, which is on expected lines as restrictions on capital outflows from India have been more than those on inflows to India. The extent of capital flows had been high enough to allow the private sector to smooth out their consumption path to a large extent. But, this behavior is primarily attributable to the development during the post-reform period, where correction as well as a greater freedom on capital flows through liberalisation has taken place. However, the optimal current account balance has been larger than the actual current account balance. This is intuitively appealing as there were severe foreign exchange restrictions in the pre-reform period which restricted the smoothing of private consumption up to the optimal level.

The policy with respect to the gradual opening of the capital account is consistent with the presumption of enabling the agents to smooth consumption to desired optimal level. With further liberalisation of capital flows, both inflows and outflows, it would be possible for agents to further smoothen their consumption to desired optimal level, allowing scope for higher current account deficit to attain potentially higher growth.

Notes:

[1] This is referred to as test for orthogonal restrictions.

[2] External shocks were in the form of war, oil price hikes and sudden reversal of remittances flows. Even in the worst year of 1991 the deficit to GDP was 3.1 per cent only, much lower than the often-prescribed threshold of 5.0 per cent of GDP. Milesi-Ferretti and Razin (1996), however, notes that a specific threshold level in itself is not sufficiently informative on sustainability and an impending crisis, and needs to be seen in conjunction with the exchange rate policy and structural factors such as degree of openness, levels of savings and investment, and the health of the financial system.

[3] Theoretically, by national income identity, the current account balance derived as gross national product less investment less government consumption expenditure less private consumption expenditure should be the same as saving minus investment.

[4] It may be noted that earlier studies on India *viz.*, that Ghosh and Ostry (1995) and Callen and Cashin (1999) do not convert the series to a per capita basis, as done by us here.

[5] The various selection criterions on the order of VAR show that the appropriate order of VAR is one.

[6] Consistent with the earlier works on inter-temporal model, we set the world real interest rate at 4%. We, however, found that world real interest rate of 5% and 6% do not make much difference in this result and the other following results.

[7] Since there is no cointegration between Zb_t and C_t and also no causality between ΔZ_t and CA_t^{sm} for the period 1950-51 to 1990-91, further analysis for this period is redundant. Thus, the rest of the results reported in this section are for the period 1950-51 to 2005-06.

[8] The confidence intervals are estimated by means of a bootstrap procedure. The procedure involves generating a new set of residuals by random sampling, with replacement, from the residuals of the original VAR model. Using this generated residuals and the original VAR coefficients, artificial data for ΔZ_t and CA_t^{sm} is generated. The VAR model for the generated data series is estimated and new weights are computed. Repeating the procedure 5,000 times generates an empirical distribution of the weights from which an interval that contains 95% of the estimates can be obtained.

[9] The tested joint restrictions on the coefficients of the VAR was $\Psi_1=\Psi_3$ and $\Psi_4 - \Psi_2 = (1 + r)$.

[10] As presence of asymmetry is weak, the model performance is thus adversely affected with decomposition of data.

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Reserve Bank of India Occasional Papers
Vol. 29 , No. 1 , Summer 2008

Determinants of WADR for Commercial Paper: An Empirical Analysis for India

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This paper uses monthly real and financial sector variables over the last five years to analyse determinants of the weighted average discount rate (WADR) after taking into account the seasonal fluctuations in the CP issuances. The empirical results indicate that there have been increases in the 'average monthly issuances of CP', the WADR and 'volatility of WADR' over the years. The WADR was found to follow a weak seasonal pattern with higher rates during January to June. In the multivariate regression, the significant factors explaining movements in WADR were the call rate, cut-off yield of 364-day T-bills, incremental bank credit and the issue amount.

JEL Classification : E44, E47, G31, G38.
Keywords : Commercial Paper, Money Market, Weighted Average Discount Rate.

Introduction

Commercial paper (CP) is an unsecured short-term promissory note issued by a corporation in the money market. The advantage with the CP is that it allows financially sound companies to meet their short-term financing needs at lower rates than that could be obtainable by borrowing directly from the banks. The main risk faced by a holder of CP is that the issuer will not be in a position to issue further paper upon maturity, but this risk kept low by the fact that most CPs are backed by the corporation's access to bank credit facilities (Pilbeam, 2005).

In India, the CP was introduced as a money market instrument in 1990. Since then, there have been several changes for rationalising and standardising the CP issuance process in line with other money market instruments. As a result of such policy decisions, the amount

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of CP outstanding has been more than double over the past three years, rising to around Rs.32,000 crore at the end of 2007-08 from Rs.14,000 crore at the end of 2004-05. This rapid growth has generated widespread interest in CP market in India. However, there have not been many studies on CP in general and analysis of weighted average discount rate (WADR) in particular. This paper attempts to fill this gap in the literature by analysing the major determinants of WADR of CP for an emerging market like India.

In absence of much heterogeneity across the CP issuing companies in terms of their rating, this study uses monthly real and financial sector variables to analyse the WADR pattern after taking into account the seasonal fluctuations in the same. The rest of this paper is organised as follows: section II discusses the relevant international experience on the CP market. Section III summarises the developments in CP market for India. The data source and the variables that are considered for the analysis are described in section IV. While the empirical findings are analysed in section V, section VI concludes the paper.

Section II
International experience

In the beginning of the 1980s, issuance of CP was confined mainly to the United States, Australia and Canada. Since then, CP markets expanded to the European countries, Japan and rapid growth was observed in several emerging market economies. The CP markets across the world have been quite concentrated in terms of issue size (15 per cent of the issues accounting for around 50 per cent of the total outstanding amount). Generally, CP is rated by the rating agencies and these agencies typically regard alternative liquidity support as an important factor in determining the rating. In the CP market, particularly in the short maturity segment, secondary market activities are typically modest. In Japan, however, the secondary market in CP is buoyant owing to its extensive use. As regards to other characteristics, CP markets differ widely in terms of average size, placement and proportion with respect to other money market instruments across the countries.

The literature has documented some evidences of cyclical and seasonal patterns in the CP market. Calomiris, *et al* (1994) examined the firm specific characteristics of the companies issuing CP and their empirical findings indicated that there was a positive relation between CP issuance and increase in firms' sales or earning. However, it also indicated that, the CP outstanding tends to increase during the economic slowdown. Downing and Oliner (2004) considered the seasonal fluctuation in CP using composite yield indexes from the actual market yields (between 1998 and 2004 for nearly all CP issued by the US corporation) and documented that term premia typically rise in the CP market at year-end, especially for lower-rated paper. Some of the plausible explanations for this year-end effect could be (a) 'window dressing' by institutional investors, who hold a substantial amount of CP, (b) a desire by issuers to insure against volatile interest rates and (c) the attendant increase in rollover risk around the year-end. Nippani and Pennathur (2004) examined the changes in the daily rates of CP over the past two decades and documented a 'day of the week' effect in its return. Their study documented a consistent and significant negative return on Wednesdays as compared to other weekdays over the sample period.

Studies have also attempted to model the CP rate using different explanatory variables. Lackman *et al* (2004) attempted to forecast the CP rates by simulating the demand generated by each institution (*e.g.*, households, life insurance companies, non-financial corporations and finance corporations) and their effect on CP rates. Covitz and Downing (2007), on the other hand, using dataset for US CP for the period 1998 to 2003 conducted regression of CP yield spreads after controleing for credit risk and liquidity. Their empirical finding indicated that while liquidity is an important determinant, the credit risk is the dominant determinant of CP credit spread.

In the Indian context, there are not many studies on CP market. Among the available literature, a study by Shirai (2004) based on the

5,000 firm-level database found that high-quality firms, defined as those that are profitable, have access to the CP market and face relatively stable profitability compared to their non-profitable counterpart. Another study by Bandyopadhyay *et al* (2005) indicated that financial decisions by firms in the capital market (like issue of commercial paper and debentures *etc.*) could act as additional signals of firm specific qualities in the product market. Their study indicated that the total sales go up by 2.4 per cent for the top 50 business group firms and by 2.5 per cent for the non-top 50 firms with one standard deviation increase in CP as a fraction of assets.

Section III
Commercial Paper Market in India

Pursuant to the recommendations of the Committee to Review the Working of the Monetary System (Chairman: Prof. Sukhamoy Chakravarty, 1985) and the Report of the Working Group on the Money Market (Chairman: Shri N. Vaghul, 1987), a number of measures were taken by the Reserve Bank of India (RBI) to widen and deepen the money market through institution building and instrument development in the late 1980s. In the process, CP as a money market instrument was introduced on January 1, 1990. Since then, CP market has grown in size and provides another window to rated companies[1] for raising funds for short term purposes.

Major changes in CP issuances in India were effected in October 2000, when the organic link with working capital (fund based) limit was severed and CP was allowed to be issued as a stand alone product. At present, CP issuers should have minimum P2 credit rating of CRISIL[2] or such equivalent rating by other agencies[3]. CP can be issued in dematerialised form through any of the depositories approved by and registered with SEBI[4]. Non-bank entities including corporates

[1] Company or Corporate means a company as defined in Section 45 I (aa) of the Reserve Bank of India Act, 1934 but does not include a company which is being wound up under any law for the time being in force.
[2] Credit Rating Information Services of India Ltd.
[3] Investment Information and Credit Rating Agency of India Ltd. (ICRA) or the Credit Analysis and Research Ltd. (CARE) or the FITCH Ratings India Pvt. Ltd. or such other credit rating agencies as may be specified by the Reserve Bank of India from time to time, for the purpose.
[4] Securities and Exchange Board of India.

may provide guarantee for CP issuance subject to some prudential guidelines.

The issuances of CP have increased in recent period following the increasing investment interests seen from mutual funds and cost effectiveness in issuances of CP. Over and above, following various relaxations, (*viz.,* eligibility criteria, denomination of CP, quantum of CP that could be issued against maximum permissible bank finance (MPBF) and maturity of CP) during the subsequent years, CP issuances gathered momentum. The minimum tenor has been brought down to 7 days in October 2004 in stages and the minimum size of the individual issue as well as individual investment has also been reduced to Rs.5 lakh with a view to aligning CP with other money market instruments. The limit of CP issuance was first carved out of the MPBF limit and subsequently attached only to its cash credit portion. (Table 1).

Table 1: Chronology of Policy Changes in Commercial Paper

Item	Jan. 1990	Jul. 1990	Jul. 1991	Jul. 1992	Jun. 1994	Jul. 1995	Sep. 1996	Feb. 1997	Oct. 2000	Oct. 2004
1	2	3	4	5	6	7	8	9	10	11
Tangible Net Worth	10 crore	5 crore	--	--	4 crore	--	--	--	--	--
WCFBL#	25 crore	15 crore	10 crore	5 crore	4 crore	--	--	--	--	--
Minimum Size	1 crore	50 lakh	25 lakh	--	--	--	--	--	5 lakh	--
Maximum Size	20% of MPBF*	--	30% of MPBF	75% of MPBF	--	75% of Cash Credit Component	100% of Cash Credit Component	100% of WCFBL	Should not exceed WCFBL	--
Denomin-ations	25 lakh	10 lakh	5 lakh	--	--	--	--	--	5 lakh	--
Maturity Period	91 days to 6 months	--	--	--	3 months to 1 year	--	--	--	15 days to 1 year	7 days to 1 year
Credit Rating	P1+ by CRISIL	--	--	P2	--	--	--	--	--	--

#: Working Capital Fund Based Limit.
* : Maximum Permissible Bank Finance.
Source: Collated from Circulars issued by the RBI.

As mentioned earlier, CPs in India are privately placed instruments by highly rated corporate borrowers to diversify their sources of short term borrowings (minimum 7 days to maximum of up to 365 days) from the money market. Though it is usually an unsecured instrument, the issue has a backing of a specific asset of the issuer or may be guaranteed by a bank. As per the latest guidelines of the RBI, a corporate would be eligible to issue CP provided, (i) the tangible net worth of the company, as per the latest audited balance sheet, is not less than Rs.4 crore; (ii) company has been sanctioned working capital limit by banks or all-India financial institutions; and (iii) the borrowal account of the company is classified as a standard asset by the financing banks or institutions.

Furthermore, guidelines were issued permitting investments in CPs only in dematerialised form effective June 30, 2001 which has resulted in reduction in the transaction cost. In order to rationalise and standardise, wherever possible, various aspects of processing, settlement and documentation of CP issuance, several measures were undertaken with a view to achieving the settlement on a T+1 basis. For further deepening the market, the Reserve Bank issued draft guidelines on securitisation of standard assets on April 4, 2005. Accordingly, the reporting of CP issuance by issuing and paying agents (IPAs) on NDS platform commenced effective from April 16, 2005.

The Indian market has seen gradual increase in CP issuance over the years. The CP outstanding, which was Rs.86 crore as at end of financial year 1989-90, had increased to Rs.577 crore by the end of 1992-93. Following various relaxations in the terms and conditions, CP issuances gathered momentum thereafter and reached the level of Rs.14,235 crore by end-March 2005. The amount of CP outstanding had been more than doubled during the past three years, rising to Rs. 32,592 crore at the end of 2007-08 (Table 2).

Issuers' profile in CP market has changed remarkably in recent period. The share of manufacturing companies in aggregate amount of CP outstanding has gone down substantially over a period of time whereas that of ‘leasing and finance companies’ has increased. The share of manufacturing companies which stood as high as 86 per cent in 2000-01 declined progressively to 17 per cent in 2007-08. The share of Leasing and Finance Companies has started showing

Table 2: Commercial Paper: Outstanding Amount, Range of Discount and WADR

As at end-March	Total Outstanding (Rs. Crore)	Range of discount (per cent)	Weighted Average Discount Rate (per cent)
(1)	(2)	(3)	(4)
1993	577	15.76 -16.00	--
1994	3,264	11.01 - 12.00	--
1995	604	14.00 - 15.00	--
1996	76	20.15 - 20.15	--
1997	646	11.25 - 12.25	--
1998	1,500	14.22 - 15.50	--
1999	4,770	10.05 - 11.50	--
2000	5,663	10.00 - 12.00	--
2001	5,846	8.75 - 11.25	9.71
2002	7,224	7.41 - 10.25	8.18
2003	5,749	6.00 - 7.75	6.49
2004	9,131	4.70 - 6.50	5.11
2005	14,235	5.20 - 7.25	5.84
2006	12,718	6.69 - 9.25	8.59
2007	17,838	10.25 - 13.00	11.33
2008	32,592	9.50-14.25	10.38

Source: Column (2) and (3) are from Handbook of Statistics on Indian Economy, RBI.
Column (4): Macroeconomic and Monetary Developments, several issues.

increasing trend from only 13 per cent in 2000-01 to as much as 72 percent during 2007-08. The share of FIs has also increased from an average of only one per cent during 2001-02 to about 10 percent during 2007-08.

Regarding ratings, although issuers with P2 credit rating of CRISIL or equivalent can raise resources through CP, in essence, the issuance is dominated by the prime-rated companies (*i.e.,* companies having credit rating of P1+ or its equivalent). This could be largely on account of search for higher return by investors in an environment of substantial improvement in liquidity in the economy.

Against this background, this study intends to analyse the trends and determinants in the WADR of CPs. There have been studies based on micro variables like rating of the company and its effect on WADR, after controlling for issue size, industry and seasonal patterns. However, one characteristic of the CP market in India has been a skewed pattern towards higher rating. Though, the minimum credit rating for CP is stipulated to be P2 of CRISIL or such equivalent rating by other agencies, around 80 per cent of the CP issued by

companies over the last five years was from the 'prime-rated' companies. This limits the scope for such micro exercises evaluating the impact of heterogeneous rating on CP's WADR in India. Therefore, this study mainly concentrates on the macro determinants of the WADR and evaluates how they influnced the WADR movement over the last five years after controlling for the seasonal patterns.

Section IV
Data and Statistics

This paper concentrates on the monthly CP data for last five years (April 2002 to September 2007) and attempts to identify the determinants of WADR. The major data source for this study is the Handbook of Statistics on the Indian Economy and Macroeconomic and Monetary Developments published by the RBI. The other real and financial sector variables considered for this study are as follows:

- Index of industrial production (IIP);
- Amount of CP issued;
- Cut-off yield 364 days (CY364D);
- Call/notice money (CALL);
- Sensex (BSE);
- INR-USD exchange rate [monthly average (A)]; and
- Bank Credit.

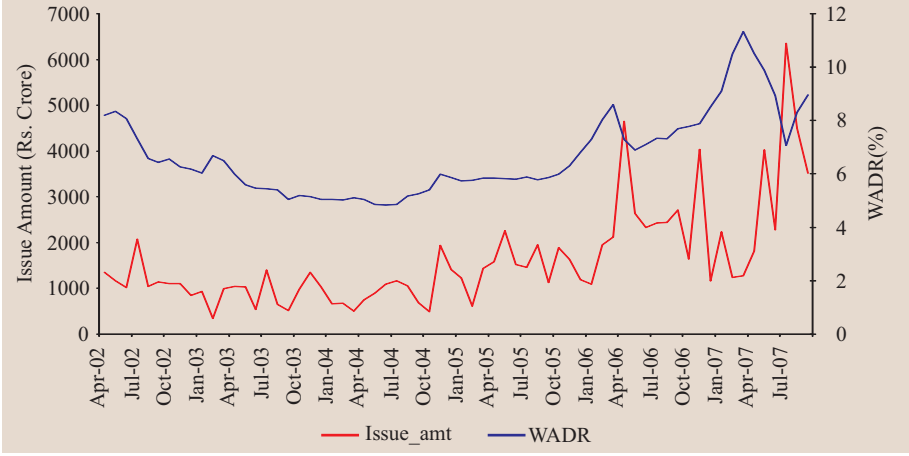
The choice of these variables were guided by the demand and cost considerations underlying the CP market. On the demand side, IIP, BSE Sensex, bank credit and exchange rate were considered for overall economic activity. From the cost angle, the call rate (overnight and notice) was included as an indicator of overall liquidity in the system and the cut-off yield in respect of 364-day Treasury Bill was taken as a measure of benchmark risk-free interest rate of one-year duration (which is the maximum duration in case of CP).

Trends in Amount Issued and WADR

The trends in the amount of CP issued and the WADR during the period under consideration are set out in Chart 1 and Table 3.

As evident from the above chart and table, the average monthly

Chart 1: Amount of CP issued and WADR



amount issued declined sharply by around 20 per cent in 2003-04 from the level in the previous year but then increased by relatively large margins in subsequent years. There have been marked fluctuations in the monthly amount of CP issued across the years, particularly during 2006-07 and 2007-08 so far, as reflected by the coefficient of variation. In tandem with the amount issued, the WADR declined from 6.93 per cent in 2002-03 to 5.29 per cent in 2003-04 and then increased steadily to as much as 8.94 per cent during 2007-08 (April-September). The firming up of WADR has been in line with the increases in policy rates during 2006-07 and early 2007-08. The variability in the WADR, though lower than that of the amount issued, has shown an increasing tendency

Table 3: Descriptive Statistics for WADR and the Monthly Issue Amounts

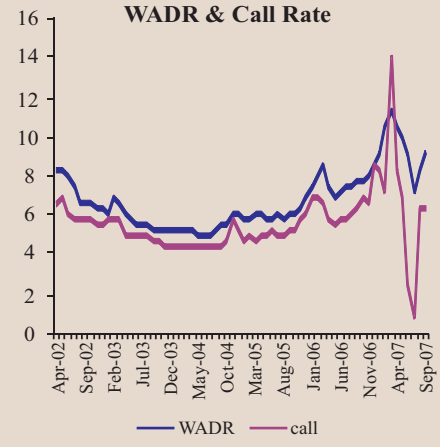
WADR	All Period	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08 (Apr-Sep)
1	2	3	4	5	6	7	8
Mean	6.69	6.93	5.29	5.38	6.50	8.23	8.94
Range	4.83-11.33	6.02 -8.35	5.02-5.98	4.83-5.98	5.77-8.59	6.89-11.3	7.05-10.52
Std. Dev.	1.54	0.84	0.29	0.44	0.97	1.41	1.21
CV	0.23	0.12	0.06	0.08	0.15	0.17	0.14
Amount	**All Period**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08 (Apr-Sep)**
Mean	1626.57	1094.18	867.73	1064.44	1649.42	2397.62	3745.47
Range	347-6346	347-2073	509-1399	489-1934	1093-2259	1165-4642	1815-6346
Std. Dev.	1112.19	392.85	316.63	410.59	391.72	1069.19	1631.12
CV	0.68	0.36	0.36	0.39	0.24	0.45	0.44
Observations	66	12	12	12	12	12	6

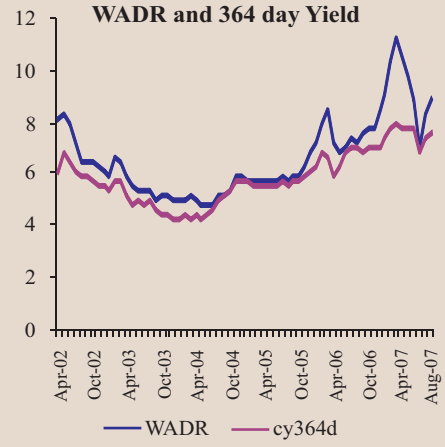
since 2004-05. The relationship between the WADR and the identified 'explanatory' variables are set out in the Charts below.

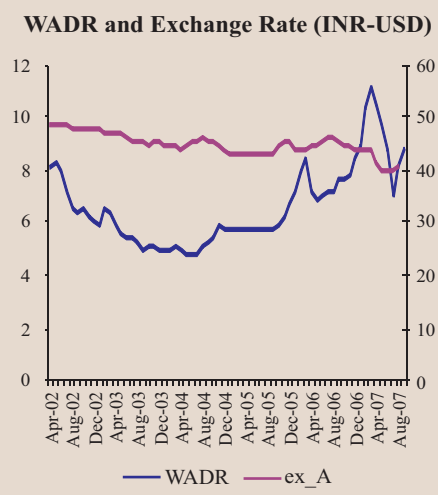
The following may be observed from the above charts:

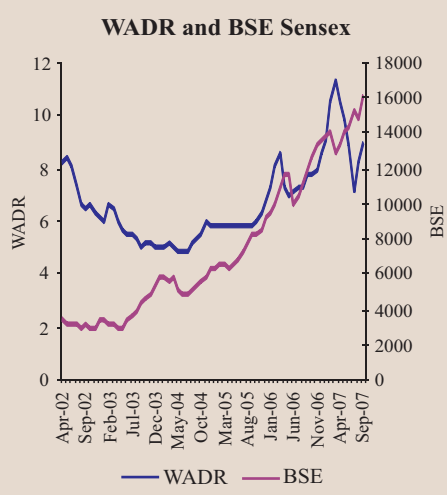
- A close co-movement between: (a) WADR and the call rate for the entire period (April 2002 to September 2007); (b) WADR and 364-day T-bill yield as also WADR and the BSE Sensex after December 2005 was evident.
- No co-movement was evident between WADR and exchange rate; WADR and IIP (however, the peaks of WADR and IIP seem to coincide); and WADR and incremental bank credit.

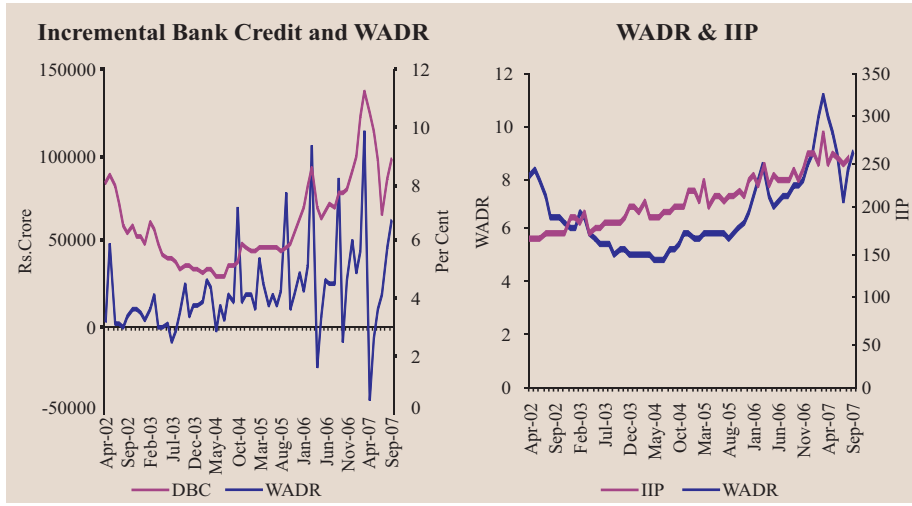
Chart 2











Section V
Empirical Findings

Stationarity Tests

Before proceeding to the test of overall relation between WADR and the explanatory variables, it is appropriate that all the series be tested for stationarity or the 'same statistical property' - means the series have to be differenced or de-trended by the same number of times to render them stationary. Accordingly, in order to test for the stationarity of the series, the Augmented Dickey Fuller (ADF) test was conducted. The ADF test showed that all the variables except the call rate were non-stationary.

Correlation Analysis

The co-movements of the macro variables with the WADR observed in the charts were confirmed statistically by a correlation analysis (Table 4). In view of the non-stationarity of the variables under consideration, the correlations were done using the variables in level as well as in differenced form.

The 364 days yield, call rate and BSE Sensex had positive and significant correlation with WADR. However, the INR-USD exchange rate recorded negative but insignificant correlation with WADR. A positive and significant correlation was observed between WADR and IIP perhaps reflecting the coincidence of their peaks. There was

Table 4 (a): Correlation Coefficient of WADR with Macro Variables:

	CY364D	Amount	CALL	BSE	EX_A	IIP	Incremental Bank Credit
WADR	0.93***	0.44	0.71***	0.67***	-0.20	0.61***	0.30
T - Stat	19.79	0.66	8.11	7.13	-1.61	6.14	0.89

Table 4(b): Correlation Analysis with Differenced Series

	D364	DAMT	DCALL	DBSE	DEX_A	DIIP	DBC
WADR	0.71***	-0. 41***	0.58***	-0.21*	0.12	0.27**	-0.05
T -Stat	7.88	-3.58	5.65	-1.71	0.99	2.21	0.68

*** : significant at one per cent level; ** :significant at 5 per cent level;
* :significant at 10 per cent level.

no significant linear relationship between the monthly amount of CP issued and the WADR; incremental bank credit and WADR. The correlation in the differenced form generally supported the earlier findings. However, a negative correlation was observed between differenced BSE Sensex and WADR (in contrast to a significant positive correlation in the level form); the correlation coefficient was not significant even at 5 per cent and thus provided ground for dropping this variable in the ensuing regression analysis. Similarly, a negative but significant correlation was observed between the amount issued and WADR (in contrast to the lack of correlation in the level form as described earlier). It appears that differencing may have linearised the amount issued series and thus may have resulted in the observed relationship with WADR.

Seasonality Analysis

The literature has documented seasonal variations in the CP rates [Calomiris *et al* (1994); Downing and Oliner (2004)]. In an attempt to find the seasonal pattern in CP rates in India, WADR was regressed on monthly dummies. The coefficients of the dummy variables indicated a seasonal pattern as all the coefficients during February-June had positive values and those for July - December had negative values. This implied a seasonal increase in WADR during first half of the calendar year with the peak around February/March, followed by a reduction during the second part of the year with a trough during September/October. The seasonal pattern was, however, weak as none of these coefficients was statistically significant, indicating that the observed seasonal pattern varied across the years.

Table 5: Seasonality Test

Variable	Coefficient	Standard Error	t-Statistics	Probability
Feb	0.56	1.03	0.54	0.59
Mar	0.95	0.98	0.97	0.34
Apr	0.51	0.98	0.52	0.61
May	0.26	0.98	0.26	0.79
Jun	0.06	0.98	0.06	0.95
Jul	-0.32	0.98	-0.32	0.75
Aug	-0.22	0.98	-0.22	0.83
Sep	-0.09	0.98	-0.10	0.92
Oct	-0.46	1.03	-0.44	0.66
Nov	-0.32	1.03	-0.31	0.76
Dec	-0.15	1.03	-0.15	0.88
C	6.64	0.73	9.14	0.00

R-squared: 0.07 Durbin-Watson statistics: 0.09

Note: January was not included in the regression to avoid dummy variable trap.

The chart 3 below plots the WADR series and seasonally adjusted (using X11 methodology) WADR over the last five years. Reflecting weak seasonality, the 'raw' and the 'seasonally adjusted' curves are fairly coincident, except during February and March in recent years.

Multivariate Regression Analysis

Finally, a multivariable regression of WADR on the explanatory variables was conducted. Since WADR and the macro variables (other than call) were found to be non-stationary, they were taken in differenced form. Although incremental bank credit was also found

Chart 3 :WADR and Seasonally Adjusted WADRSA

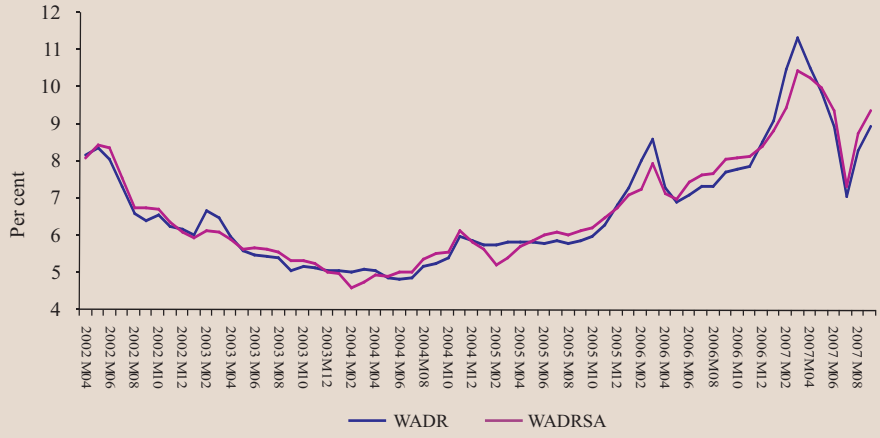


Table 6: Dependent Variable: DWADR

Explanatory Variable	Coefficient	P-value
C	0.417	0.40
DIIP	0.003	0.50
CALL	0.077	0.00
D364	0.858	0.00
DBC	0.000006	0.00
LAMT	-0.140	0.04
FEB	0.288	0.07
MAR	-0.163	0.35
R-squared	0.71	
Adj R-squared	0.67	
F-statistic	19.00	
Prob(F-statistic)	0.00	
D-W statistics	1.95	

DWADR - Differenced WADR of CP
DIIP - Differenced Index of Industrial Production
CALL - Call / Notice money market rate.
D364 - Differenced 364 days cutoff yield
DBC - Differenced Bank Credit
LAMT - Log of issue amount in CP.
Feb, Mar - Dummy variables for February and March

to be non-stationary, since the series was already in differenced form, a second round of differencing was avoided to minimise loss of information. The dummy variables for February and March were included in view of the seasonal fluctuations.

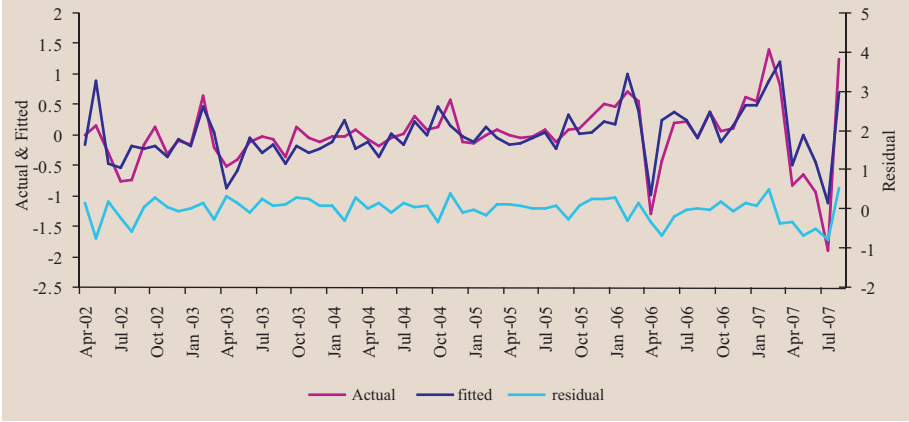
Among several models estimated, the best models in terms of the fit (R^2 and adjusted R^2) and Durbin-Watson Statistics were chosen. The model that gave the best fit is as under:

Among the explanatory variables, the call rate, differenced cut-off yield of 364-day Treasury Bills, differenced (incremental) bank credit and February dummy had positive and significant impact on differenced WADR. In other words, the month-over-month change in WADR is positively impacted upon by the call rate, the change in the cut-off yield of 364-day Treasury Bills and the (monthly) incremental bank credit. Apart from the influence of these factors, seasonality would impart an added 'push' to the change in WADR in the month of February. These results are on expected lines since an increase in the call rate and the 364-day Treasury bill rate reflect tighter liquidity conditions and thereby lead to an increase in WADR. An increase in bank credit (i.e. higher credit off-take) signifies a booming

environment, in which corporates with prime ratings may be expected to avail the CP route in order to reduce their cost of capital to some extent. The coefficient of the log of the amount of CP issued had the expected negative (and significant) sign[5]. The trends in call, incremental bank credit and 364 days treasury yield have been showing a similar (increasing) movement as that in the WADR, which confirms robustness of the finding. The issue amount has also increased in recent years, which should have had dampening impact on the WADR in accordance with the findings. It appears, however, that the overall positive impact of the call, 364 days Treasury Bill yield and the incremental bank credit apart from the 'February' effect, have overwhelmed the negative effect of the issue amount on the WADR[6].

The actual predicted values of WADR and the regression residuals are plotted in the chart 4 below. Mostly, the residuals remained within its two standard deviation band, confirming the robustness of the estimation process.

Chart 4 Actual & Fitted DWADR



[5] The log of issue amount was found to be non-stationary at 10 per cent level of significance. The differenced amount issued series was found to be stationary. The log of the amount issued was, however, preferred to be included in the regression analysis to obviate loss of information.

[6] We have also included coefficient of variation of CP amount, INR-USD exchange rate (average for the month and the standard deviation). However, these variables were found to have insignificant coefficients and were therefore dropped in latter stage.

Section VI
Conclusion

Using last five years data (April 2002 to September 2007), this paper analyses the major determinants of WADR in the CP market in India. The empirical results indicate that there has been an increase in the average monthly issuance, WADR and volatility of WADR over the years. However, around 80 per cent of the CP issued by companies over the last five years was from the 'Prime-rated' companies. The 364 day treasry bill yield, the call rate and the IIP had positive and significant correlation with the WADR. The WADR was found to follow a weak seasonal pattern: during January to June, WADR generally remained higher followed by a decline during the rest of the year. In the multivariate regression, the significant factors explaining the movements in WADR were the call rate, cut-off yield of 364-day T-bills, incremental bank credit, the February dummy and the issue amount. The increase in call rate and cut-off yield represent tight liquidity conditions and, therefore, have a positive impact on the WADR. The issue amount, on the other hand, has a negative impact on WADR indicating large issues when the cost of fund raising through CP route is low.

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Reserve Bank of India Occasional Papers
Vol. 29, No. 1, Summer 2008

Public-Private Partnership in Indian Infrastructure Development: Issues and Options

L. Lakshmanan*

Infrastructure bottleneck has been a serious concern in India in its way of robust pace of economic progression. While many advanced economies and fiscal constrained developing countries have developed their physical infrastructure successfully either through private participation or through public-private partnership (PPP) model, in India, private participation in the process of infrastructure development has received lacklustre response. While private telecom services is a success story in India, the PPP constitutes a miniscule share in overall infrastructure building despite initiation of various policy adjustments and sector-specific reform programmes. The main focus of this paper is to provide an analytical abstract of sector-wise infrastructure developments in the country and the status of private participation and the PPP in building such public infrastructure. This paper raises some specific concerns in the power, transportation, telecom, petroleum, and urban infrastructure sectors and puts forth suggestive measures to enhance the private participation. It also identifies some generic issues such as inadequate transparency of procedures, inappropriate risk allocation, improper project appraisal, cost and time overruns, overlapping of regulatory independence, dearth of good governance, *etc.,* which need attention to attract private investors to participate in the public infrastructure building.

JEL Classification : H400, H420, H540, L900, L980.
Keywords : Infrastructures, Public Provided Private Goods

Introduction

Physical infrastructure is an integral part of development of an economy and provides basic services that people need in their every day life. The contribution of infrastructure to economic growth and development is well recognised both in academic and policy debates. Well developed physical infrastructure provides key economic services efficiently, improves the competitiveness, extends vital support to productive sectors, generates high productivity and supports strong economic growth. Physical infrastructure covering transportation, power

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and telecommunication through its forward and backward linkages facilitates growth; social infrastructure including water supply, sanitation, sewage disposal, education and health, which are in the nature of primary services, has a direct impact on the quality of life.

Over the years, the basic infrastructure in India has been developed to an extent, which is not sufficient enough while considering India's geographical and economic size, its population and the pace of overall economic development. Infrastructure bottleneck has been a serious concern in India and basic infrastructure like roads, railways, ports, airports, communication and power supply are not comparable to the standards prevalent in its competitor countries.

To develop the Indian infrastructure to a world class and to remove the infrastructure deficiency in the country, the investment requirements are mammoth, which could not be met by the public sector alone due to fiscal constraints and mounting liabilities of the Government. This would call for participation of private sector in coordination with the public sector to develop the public infrastructure facilities. In this direction, the economic reforms initiated in the country provide forth the policy environment towards public-private partnership (PPP) in the infrastructure development. Sector-specific policies have also been initiated from time to time to enhance the PPP in infrastructure building. While the PPP is spreading to develop basic infrastructure world wide, in India, the participation of private sector in the infrastructure building has not been much encouraging, despite several rounds of policy reforms.

Against this setting, the rest of the paper is organised as follows. Section I attempts to review the structure of PPP through literature survey. Section II assesses the global practices towards PPP in the infrastructure development. Section III evaluates the status of private sector participation in infrastructure development at the global level and Section IV captures the Indian experiences in this regard. Section V reviews the investment requirements to bridge the infrastructure gap in the country. Section VI focuses on the sector-wise developments of infrastructure projects with the status of PPP and overall private sector participation along with sector-specific concerns. Generic issues while implementing the infrastructure

projects in the country with private participation and options thereon are analysed in Section VII. Finally, concluding observations are drawn in Section VIII.

Section I
Structure of PPP – Literature Survey

What is Public-Private Partnership?

The expression public-private partnership is a widely used concept world over but is often not clearly defined. There is no single accepted international definition of what a PPP is (World Bank, 2006). The PPP is defined as "the transfer to the private sector of investment projects that traditionally have been executed or financed by the public sector" (IMF, 2004). Any arrangement made between a state authority and a private partner to perform functions within the mandate of the state authority, and involving different combinations of design, construction, operations and finance is termed as Ireland's PPP model. In UK's Private Finance Initiative (PFI), where the public sector purchases services from the private sector under long-term contracts is called as PPP program. However, there are other forms of PPP used in the UK, including where the private sector is introduced as a strategic partner into a state-owned business that provides a public service.

The PPP is sometimes referred to as a joint venture in which a government service or private business venture is funded and operated through a partnership of government and one or more private sector companies. Typically, a private sector consortium forms a special company called a special purpose vehicle (SPV) to build and maintain the asset. The consortium is usually set up with a contractor, a maintenance company and a lender. It is the SPV that signs the contract with the government and with subcontractors to build the facility and then maintain it.

Thus, the PPP combines the development of private sector capital and sometimes, public sector capital to improve public services or the management of public sector assets (Michael, 2001). The PPP may encompass the whole spectrum of approaches from private participation through the contracting out of services and revenue sharing partnership

arrangement to pure non-recourse project finance, while sometime it may include only a narrow range of project type. The PPP has two important characteristics. First, there is an emphasis on service provision as well as investment by the private sector. Second, significant risk is transferred from the Government to the private sector. The PPP model is very flexible and discernible in variety of forms. The various models/ schemes and modalities to implement the PPP are set out in Table 1.

Table 1: Schemes and Modalities of PPP

Schemes	Modalities
Build-own-operate (BOO) Build-develop-operate (BDO) Design-construct-manage-finance (DCMF)	The private sector designs, builds, owns, develops, operates and manages an asset with no obligation to transfer ownership to the government. These are variants of design-build-finance-operate (DBFO) schemes.
Buy-build-operate (BBO) Lease-develop-operate (LDO) Wrap-around addition (WAA)	The private sector buys or leases an existing asset from the Government, renovates, modernises, and/ or expands it, and then operates the asset, again with no obligation to transfer ownership back to the Government.
Build-operate-transfer (BOT) Build-own-operate-transfer (BOOT) Build-rent-own-transfer (BROT) Build-lease-operate-transfer (BLOT) Build-transfer-operate (BTO)	The private sector designs and builds an asset, operates it, and then transfers it to the Government when the operating contract ends, or at some other pre-specified time. The private partner may subsequently rent or lease the asset from the Government.

Source: *Public Private Partnership, Fiscal Affairs Department of the IMF.*

Privatisation and Public-Private Partnership

Typically, the PPP is not a privatisation. At the same time, it cannot be described as partial privatisation also. Privatisation has generally been defined as a process of shifting the ownership or management of a service or activity, in whole or part, from the government to the private sector. The privatisation may be of many forms, which include outsourcing, management contracts, franchise, service shedding, corporatisation, disinvestment, asset sales, long-term lease, *etc.* The key difference between the PPP and privatisation is that the responsibility for delivery and funding a particular service rests with the private sector in privatisation. The PPP, on the other hand, involves full retention of responsibility by the government for providing the services. In case of ownership, while ownership rights under privatisation are sold to the

private sector along with associated benefits and costs, the PPP may continue to retain the legal ownership of assets by the public sector. The nature and scope of the services under privatisation is determined by the private provider, while it is contractually determined between the parties in PPP. Under privatisation, all the risks inherent in the business rest with the private sector while, under the PPP, risks and rewards are shared between the government and the private sector.

Thus, the PPP operates at the boundary of the public and private sectors, being neither nationalised nor privatised. Thus, politically, the PPP represents a third way in which governments deliver some public services in conjunction with private sector. Moreover, in a practical sense, the PPP represents a form of collaboration under a contract by which public and private sectors, acting together, can achieve what each acting alone cannot (Michael 2001).

The Indian Case

In the Indian context, the term PPP is used very loosely while at the international arena, the PPP is adopted for developing public assets in various forms as explained in Table 1. According to Ministry of Finance Government of India the PPP project means a project based on a contract or concession agreement, between Government or statutory entity on the one side and a private sector company on the other side, for delivering infrastructure service on payment of user charges. This is a narrower definition as compared to world best practices where the private sector participation in any form of concession agreement, divestiture of the public sector, greenfield projects and management and lease contract are considered as PPP. The Planning Commission of India has defined the PPP in a generic term as "the PPP is a mode of implementing government programmes/schemes in partnership with the private sector. It provides an opportunity for private sector participation in financing, designing, construction, operation and maintenance of public sector programme and projects". In addition, greenfield investment[1] in the infrastructure development has also been given more encouragement in India.

[1] Greenfield investment is defined as an investment in a start-up project, usually for a major capital investment and the investment starts with a bare site in a greenfield.

Section II
Global Practices towards PPP in Infrastructure Development

While discussing the infrastructure development, a generic question arises, 'Why is PPP needed?' In the face of fiscal and other constraints, governments of most emerging economies have been turning towards the private sector as a means of financing infrastructure development. Many countries have, however, found that it is not always easy to attract the private sector, as the conditions for their participation are, in most cases, different from the traditional method of funding. A closer alliance between various parties involved in the infrastructure development will, however, provide the opportunity to share their views on the risk perspectives, legislative and regulatory environments, which support private investment, project funding packages, project formulation and the means of reducing project preparation and gestation period. It has been empirically proved that "both the public and private sectors have significant effect on each other, the magnitudes of the long-run influence of private production on infrastructure expansion are relatively greater than the reverse for most countries" (Eric C Wang 2002). Review of cross-country experiences while adopting the PPP model in the infrastructure development would provide due solution to the critical question raised at the beginning of this Section.

A number of OECD countries have well established PPP programmes. Other countries with significant PPP programmes include Australia and Ireland while the US has considerable experience with leasing. Many continental EU countries, including Finland, Germany, Greece, Italy, the Netherlands, Portugal and Spain have PPP projects, although their share in public investment remains modest. Reflecting a need for infrastructure investment on a large scale, and weak fiscal positions, a number of countries in Central and Eastern Europe, including the Czech Republic, Hungary and Poland, have embarked on PPP. There are also PPP programmes in Canada and Japan. The PPP in most of these countries are dominated by road projects. Similarly, the EU Growth Initiative envisages the use of PPP type arrangements primarily to develop trans-European road network.

While focusing on country specific practices, the PFI of the UK is perhaps the best developed government's PPP programme, which also comprises privatisation and other forms of cooperation between the public and private sectors, including the provision of guarantees. The PFI projects are viewed primarily as being about the provision of services, and not about the acquisition of assets. In this endeavour, the private sector makes a long-term commitment to maintain assets and provide services, and the government makes a long-term commitment to procure those services; significant risk is transferred to the private sector; public sector investment projects are considered for PFI where they are likely to represent value for money, and where it meets the UK government's criteria for efficiency, equity and accountability (IMF, 2004).

In the case of Ireland, the pick up in enthusiasm for PPP can be summarised that there was quick buy-in on the part of all PPP stakeholders, where the government made it clear that its social partners would be consulted on the approach taken to select PPP projects. Second, the government paid more attention to the efficiency benefits of PPP than to just their fiscal advantages. Third, conclusion was reached that the PPP would be a success despite some institutional challenges that had to be overcome. To facilitate the PPP process, the National Development Finance Agency of Ireland was set up to mobilise resources to finance PPP projects and to provide financial advice to government agencies seeking to form PPPs.

Chile's experience with PPP has been successful and a significant portion of the sizeable infrastructure gap was fulfilled through this model. Chile's success with PPP has been underpinned by a solid institutional framework, well developed procedures to identify, evaluate the projects, efforts to ensure adequate sharing of risks between the stake holders, and reforms to ensure the availability of financing for projects. In the case of Mexico, most progress has been made with respect to telecommunications, ports and airports, but this mainly takes the form of privatisation. Empirical evidence suggest that public infrastructure in Mexico has negligible effects on private sector costs.

The PPP has been operating in China for over 20 years. Since the introduction of open economic policy in early 1980s, some state-owned

enterprises started their reform by becoming a limited liability company. Since the 1990s, some local governments have initiated to resort to the private sector on the provision of public facilities and services. Since 2000, the PPP has become one principal strategy used by the Chinese Government in the provision of public facilities and services. The main objective of PPP is to make use of market competition in order to ensure the effective use of resources in the provision of public facilities and services. However, some local governments place too much emphasis on attracting private investments by offering even more favorable terms than the normal national status.

Lessons Drawn for India

Many developing countries like China, have developed toll roads and a number of private sector greenfield power projects, while Argentina has developed its power sector mostly through divestiture and greenfield investments. The main aim of the Chinese is to attract investors through PPP. Brazil has not only attracted more greenfield projects in power sector but also known for its telecommunication sector development under PPP model. The UK provides guarantees for PFI projects to attract more investment. Chile, on the other hand, has succeeded in the PPP model with institutional development, standardised contract procedures and appropriate risk sharing mechanism. Cross country analysis reveals that the PPP model differs widely across countries and sectors. Overall, many developing countries have developed their power projects, roads, telecom, ports and airports through PPP model, which they considered as the apposite way of developing the public infrastructure through private participation, while these countries have faced fiscal constraints. Judging from the country experiences, the selection of right PPP model is based on the concessions that the PPP is getting, level of development, risk sharing mechanism, government guarantees, stability of the policy environment and commercial consideration of the projects. Therefore, it is rightly accepted that right type of private participation in the infrastructure development with right risk sharing is the only way out to build public infrastructure and thereby bridge the infrastructure gap.

Section III
Status of Private Participation in Infrastructure Development – Global Scenario

Till the early 1990s, provision of infrastructure services were the monopoly of the government world over and the private sector participation was very limited. Disenchantment with past approaches to providing infrastructure services, coupled with tightening budget constraints, governments have explored how best to harness the benefits of private participation. Accordingly, the private participation in the infrastructure development has started picking up in various forms. Moreover, the globalisation and opening up of the markets by Emerging Market Economies (EMEs) have provided investment opportunities for the private investors to develop the public infrastructure projects with or without collaboration with the public sector. Multilateral Institutions have also focused their attention towards the progress in the infrastructure development with private participation, as the basic infrastructure would accelerate the pace of overall economic development of a country. The World Bank has stared capturing such details and also a leading data source for private participation in infrastructure development through its Private Participation in Infrastructure (PPI) Project Database[2]. This database has information on over 3,800 projects in energy, telecommunications, transport, and water and sewerage sectors spread across 150 low and middle-income countries. This database covers the private sector investment/commitment to the development of infrastructure projects and does not include public investment.

According to PPI database, between 1990 and 2006, about 3841 infrastructure projects have reached financial closure, of which major share pertaining to Latin America and the Caribbean (31.4 per cent) followed by East Asia and the Pacific (28.6 per cent) and the Europe and Central Asia (19.4 per cent) (Table 2). Middle East and North African region attracted a meager share of private investment at 2.9 per cent. Though the Latin American and Caribbean countries have attracted more private projects during the mid-1990s, the pattern has changed during the recent period towards East Asia and South Asia due to growing investment opportunities in these countries in tandem with their macroeconomic developments.

[2] This database records contractual arrangements with and without investments in which private parties assume operating risks in low- and middle-income countries. Projects included in the database do not have to be entirely privately owned, financed or operated. Some have public participation as well.

Table 2: Number of Projects by Region and year of Financial Closure

Financial closure year	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	Total
1	2	3	4	5	6	7	8
1990	12	2	39	1	4	2	60
1991	9	7	12	0	2	3	33
1992	20	15	42	1	4	4	86
1993	51	164	45	2	6	10	278
1994	81	62	85	4	11	8	251
1995	60	71	86	2	34	16	269
1996	99	70	106	2	30	18	325
1997	113	47	152	7	18	28	365
1998	48	47	153	9	20	28	305
1999	46	32	83	6	25	31	223
2000	48	40	94	11	15	31	239
2001	69	34	58	14	19	29	223
2002	85	24	61	5	16	9	200
2003	98	29	50	5	26	26	234
2004	78	27	49	13	25	18	210
2005	93	36	35	17	25	40	246
2006	89	39	55	12	68	31	294
Total	**1099**	**746**	**1205**	**111**	**348**	**332**	**3841**

Source: *Compiled from Private Participation in Infrastructure (PPI) Database of the World Bank.*

When we look at the details on country-wise infrastructure projects with private sector participation, China tops in the list of attracting more projects in the developing region followed by Brazil, Russian Federation, India and Argentina. Development of energy infrastructure in China was the leading sector, both in number of projects and investments, followed by construction of toll roads. In case of Brazil, large private investment has flown into the telecom sector. Argentina has attracted more private investment towards the development of their energy sector.

In terms of investment, region-wise analysis reveals that projects in Latin America and the Caribbean region have attracted a maximum share at 39.9 per cent between 1990 and 2006 followed by East Asia and the Pacific with 23.1 per cent and the Europe and Central Asia with 18.9 per cent in the development of infrastructure with private sector participation (Table 3). Brazil attracted more investment among the developing countries followed by China, Argentina, Mexico and India. Major share of private investment attracted towards telecom sector in the developing region with a share of 48.9 per cent followed by energy sector (29.3 per cent), transport sector (16.9 per cent) and water and sewerage sector (4.9 per cent).

Table 3: Investment in Projects by Region and year of Investment (US$ million)

Year of investment	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	Total Investment
1	2	3	4	5	6	7	8
1990	1949	68	10598	10	132	40	12798
1991	3090	277	9789	0	640	0	13795
1992	7205	402	12876	10	40	20	20553
1993	13256	1231	15321	2932	1113	32	33882
1994	14773	3655	16296	298	2801	647	38469
1995	17771	8180	17064	120	3845	817	47796
1996	27219	10722	25573	123	5813	1437	70888
1997	36574	14628	48302	5067	6192	2978	113740
1998	10076	11891	68905	3436	2330	2201	98838
1999	12210	9772	38012	2887	4601	2914	70395
2000	18027	25652	38515	4115	3451	2166	91924
2001	12557	14239	33284	4373	4880	4012	73344
2002	11410	17299	19309	1590	6154	3313	59074
2003	17784	12126	15416	1894	3995	5568	56781
2004	13560	17181	17551	7384	11543	3933	71153
2005	17955	35491	20653	7069	14255	8737	104161
2006	17583	23512	28739	10954	24104	11761	116651
Total	**252998**	**206323**	**436201**	**52264**	**95888**	**50575**	**1094241**

Source: *Compiled from Private Participation in Infrastructure (PPI) Database of the World Bank.*

Section IV
Indian Experience in Private Participation in Infrastructure Development

Before the launching of economic reforms in the country, the infrastructure projects were mainly developed by the Government. Since the initiation of the economic reforms, the development of infrastructure has been given thrust through varied means. Along with the initiation of structural reforms in the country, the Government of India has announced new industrial policy in 1991 to develop the industrial and infrastructure sectors, which gave more emphasis on private participation. Policy announcements relating to sector-specific infrastructure developments with the PPP have also been announced in the subsequent annual Budgets of the Union Government. The coverage of the term infrastructure was expanded from time-to-time to enable the sector to avail of fiscal incentives such as tax holidays and concessional duties during the course of their development.

Since the initiation of the reform process, measures were introduced to strengthen the existing infrastructure and to develop new projects with private participation. The private sector participation in the infrastructure building have broadly been taken place through corporatisation of existing PSUs (e.g. GAIL, ONGC, IOC, *etc*), greenfield investment for development of new projects, PPP in the form of BOT or BOOT model in the road sector and concession agreements with the private sector such as rehabilitate, operate, and transfer; or rehabilitate, lease or rent and transfer; or build, rehabilitate, operate, and transfer basis. Recently established joint venture structure of institutions to develop and modernise the Delhi and Mumbai airports is an apt form of PPP.

According to the PPI database of the World Bank, about 249 infrastructure projects in India have attracted private sector participation and reached financial closure between 1990 and 2006, which constituted a share of 6.1 per cent of the total project among 150 low and middle income countries in the world. Of which, transport sector has a major share at 54.2 per cent followed by energy sector at 30.5 per cent during the period (Table 4). The telecom sector accounted for a share of 13.7

Table 4: Number of PPI Projects in India, 1990-2006

Financial closure year	Energy	Telecom	Transport	Water and Sewerage	Total
1	2	3	4	5	6
1990	0	0	1	0	1
1991	1	0	0	0	1
1992	2	0	0	0	2
1993	3	0	0	0	3
1994	1	4	1	0	6
1995	6	10	0	0	16
1996	6	6	4	0	16
1997	2	4	6	0	12
1998	7	2	8	0	17
1999	8	0	13	0	21
2000	9	0	1	1	11
2001	1	8	4	1	14
2002	4	0	8	0	12
2003	6	0	17	0	23
2004	9	0	6	1	16
2005	3	0	14	1	18
2006	8	0	52	0	60
Total	**76**	**34**	**135**	**4**	**249**

Source: *Compiled from Private Participation in Infrastructure (PPI) Database of the World Bank.*

per cent in private participation during the period. Many number of infrastructure projects under private participation have attained financial closure during 2006 particularly in the transportation sector due to mass development of National Highways Development Projects (NHDP) like Golden Quadrilateral and North South-East West Corridor (NS-EW) projects.

Investment requirements of the infrastructure projects are huge and the private sector contribution to the development of public infrastructure has increased many folds during the recent period due to various policy initiatives by the Government towards more encouragement for private participation. However, when compared to other EMEs, private participation in the infrastructure development in India has gained momentum only recently and its share is not much encouraging. India has attracted only about 6.5 per cent of the total investment among 150 low and middle income nations. The investment has flown mainly into the telecom sector which constituted a share of 49.6 per cent of total investment in India, followed by energy sector at 28.9 per cent and transport sector at 21.3 per cent between 1990 and 2006 (Table 5). Among the developing countries, India stood at fourth position, after China, Brazil and Russian Federation, in terms of

Table 5: Investment in PPI Projects in India, 1990-2006 (US $ Million)

Financial investment	Energy	Telecom	Transport	Water and Sewerage	Total Investment
1	2	3	4	5	6
1990	0	0	2	0	2
1991	614	0	0	0	614
1992	13	0	0	0	13
1993	1,051	0	0	0	1,051
1994	311	97	125	0	533
1995	1,008	683	0	0	1,691
1996	1,553	1,229	182	0	2,964
1997	970	3,827	405	0	5,201
1998	1,066	673	296	0	2,035
1999	2,500	1,045	467	0	4,012
2000	2,357	682	30	0	3,068
2001	345	3,445	343	2	4,136
2002	386	4,615	715	0	5,717
2003	835	1,968	550	0	3,352
2004	4,144	3,731	1,117	111	9,103
2005	755	6,201	1,526	0	8,482
2006	2,750	7,271	9,473	0	19,494
Total	**20,658**	**35,466**	**15,230**	**113**	**71,467**

Source: *Compiled from Private Participation in Infrastructure (PPI) Database of the World Bank.*

attracting the projects and fifth position in terms of volume of investment under private participation. Major share of investments have flown mainly to the sectors where the return on the investments and commercial considerations are high. However, while considering the investment requirements of the country to develop the basic infrastructure, it is considered to be a miniscule share.

Section V
Investment Requirements to bridge the Infrastructure Gap

After analysing the realistic stature of private participation in the infrastructure development in India, it would be more appropriate to look into the quantum of investment requirements to bridge the infrastructure gap and to transform the Indian infrastructure into a world-class. The impact of infrastructure investments on growth depends on the timing of investments, their scale in relation to the existing imbalance between demand and supply of infrastructure, and the location of the projects themselves. Taking into account the infrastructure gap in the country, there is no concrete estimation of requirements for infrastructure development to fill the gap in the country as the requirement will vary from time to time, place to place and project to project.

After the initiation of economic reforms, the first estimation of investment requirements for infrastructure development was attempted by the Expert Group on Infrastructure (The India Infrastructure Report, 1996). The Group estimated that the investment in infrastructure was to be stepped up from 5.5 per cent of GDP in 1995-96 to 8.5 per cent of GDP in 2005-06. But at the same time, the average annual investment was at 4.9 per cent during the 10th Plan period. Then the Committee on Infrastructure, headed by the Prime Minister, has estimated in 2006 the investment requirements for the 11th Plan period at Rs.14,50,000 crore or US $320 billion. The 11th Plan document has identified sector-wise infrastructure gap and accordingly fixed physical target to be completed during the 11th Plan to achieve overall GDP growth of 9 per cent (Table 6).

The 11th Plan document has revised the earlier estimation by the Committee on Infrastructure and placed the investment requirement for

Table 6: Infrastructure Deficit and 11th Plan Physical Target

Sector	Deficit	11th Plan Target
Roads / Highways	65,569 Km of NH comprise only 2% of network carry 40% of traffic; 12% 4-laned; 50% 2-laned; and 38% single-laned	6-lane 6,500 km in GQ; 4-lane 6,736 km NS-EW; 4-lane 12,109 km; 2-lane 20,000 km; 1,000 km Expressway
Ports	Inadequate berths and rail/road connectivity	New capacity: 485 mn. MT in Major Ports; 345 mn. MT in Minor Ports
Airports	Inadequate runways, aircraft handling capacity, parking space and terminal buildings	Modernise 4 metro and 35 non-metro airports; 3 greenfield in NE; 7 other greenfield airports
Railways	Old technology; saturated routes: slow speeds (freight: 22 kmph; passengers: 50 kmph); low Payload to Tare Ratio (2.5)	10,300 km new rail; 10,000 km gauge conversion; modernise 21 stations; Dedicated Freight Corridors
Power	11% peaking deficit; 7% energy shortage; 40% transmission and distribution losses; absence of competition	Add 78,000 MW; access to all rural households
Irrigation	1123 BCM utilisable water resources; yet near crisis in per capita availability and storage; only 43% of net sown area irrigated	Develop 16 mha major and minor works; 10.25 mha CAD; 2.18 mha flood control
Telecom/ IT	Only 18% of market accessed; obsolete hardware; acute human resources' shortages	Reach 600 million subscribers; 200 million in rural areas; 20 million broadband; 40 million internet

Source: *Eleventh Five Year Plan Document, Volume I, Planning Commission, Government of India.*

developing the physical infrastructure at about Rs.2,060,193 crore or US $515 billion, which is higher by 136.4 per cent of the anticipated investment in 10th Plan (Table 7). The document estimated that the private investment would be about 30 per cent and suggested a strategy that the private participation is to be encouraged directly as well as through various forms of PPP wherever desirable and feasible.

Table 7: Projected Investment in Infrastructure Development During 11th Plan

Sectors	Investment (Rs. Crore)		Share in Total (%)	
	10th Plan	11th Plan	10th Plan	11th Plan
1	2	3	4	5
Electricity	2,91,850	6,66,525	33.5	32.4
Roads and Bridges	1,44,892	3,14,152	16.6	15.2
Telecommunication	1,03,365	2,58,439	11.9	12.5
Railways	1,19,658	2,61,808	13.7	12.7
Irrigation	1,11,503	2,57,344	12.8	12.5
Water Supply and Sanitation	64,803	1,43,730	7.4	7.0
Ports	14,071	87,995	1.6	4.3
Airports	6,771	30,968	0.8	1.5
Storage	4,819	22,378	0.6	1.1
Gas	9,713	16,855	1.1	0.8
Total	**8,71,445**	**20,60,193**	**100.0**	**100.0**

Source: *Eleventh Plan Document, Planning Commission, GoI.*

In this connection, some basic issues need to be discussed. First, how to step up the investments in infrastructure? Over the past three years, the infrastructure investment was at around 5 per cent of GDP, which is targeted to be increased to 9 per cent at the end of the 11th Plan period as suggested by the Plan document. Here the question arises, where such a huge investment has to come from? To increase the investment to 9 per cent at the end of the 11th Plan, each year, additional investments has to increase by at least one per cent of GDP during the Plan period. To fund such additional investments, there are broadly two sources – domestic savings and external savings. Under the domestic sources, household savings forms part of major source, which are to be stepped up from the level of 23.7 per cent of GDP on an average during the 10th Plan. Then the government savings, which has mainly represent the public sector savings that have started being positive since 2003-04 only. Next comes the private corporate savings that estimated at 6 per cent of GDP on an average during the 10th Plan is to be increased significantly to cope up with the additional infrastructure requirements during the current Plan. To fill the gap between the investment requirements and the domestic savings, foreign capital inflows is to be channelised from the level of 1.1 per cent of GDP in 2006-07. Then the question arises, how to mobilise such huge investments from different sources? At the Government side, both Centre and States have to borrow about 27 per cent of estimated total investments in addition to budgetary allocations and internal generation.

At the financing side, three major initiatives have been taken to augment the funding for infrastructure projects, *viz.,* (a) setting up of India Infrastructure Finance Company Ltd (IIFCL), a SPV, to meet the long term financing requirements of potential investors; (b) provision of viability gap funding; (c) using of a limited portion of foreign exchange reserves for the development of infrastructure projects through the subsidiaries of IIFCL. But these developments will not serve the purpose fully. Private investments have to flow freely to achieve the desired goal.

The ability to tap private resources - from within the country as well as internationally - for financing infrastructure will strengthen the development. In this regard, the banking system would play a crucial

role while transforming the financial savings into investments. But the problem is that, in the post reform era, there has been decline in activities and importance of term lending institutions. In fact, some term lending institutions have converted into banks. Given the huge requirement of funds for investment in infrastructure and increasing role of private players, it is natural to expect them to approach banks to raise funds for investment. As the basic sources of funds for banks are public deposits, mostly of short or medium term in nature, it would create mismatch in the asset-liability management of the banking system while lending to infrastructure on a long term basis, which is to be addressed.

Another major issue is, how to transform corporate and other savings into infrastructure investment? The 11th Plan document has estimated that the private share in infrastructure development would reach 30 per cent during the 11th Plan from 20 per cent during the 10th Plan. Further more, about 48 per cent of the infrastructure financing requirements has to come from debt financing. But the development of corporate debt market is at a nascent stage. A prudent policy to develop the corporate debt market in India will only help to mobilise such huge investment requirements, which would facilitate to achieve the desired development levels in the infrastructure.

Next the foreign investment flows, which requires innovative instruments and mechanisms that are to be devised much attractive to capture such inflows. The international financing of infrastructure could be in the form of greenfield FDI, ADRs, GDRs, asset securitisation, finance through SPV, *etc.,* for which, suitable policy framework are to be devised to utilise economically the increasing capital flows without affecting the domestic monetary and exchange rate stability.

On the whole, the return on infrastructure is not always lucrative as projects yield returns with considerable lags. Also, the implementation of infrastructure project is spread over a long period of time. This creates uncertainty about both the feasibility and profitability of the projects. The massive investments for infrastructure development, therefore, require innovative methods of financing and unbundling of risks. The investment in the infrastructure sector, both from the public and the private, is to be stepped up significantly to remove the infrastructure bottlenecks and thereby sustain the economic growth.

Section VI
Sector-wise Private Participation – Status and Issues

India has been growing at a level of 9.3 per cent, on an average, during the last three years and the supply of infrastructure has also improved to an extent to cope up with the increasing demand. But gaps are widening. The developments in the infrastructure projects since the introduction of economic reforms could be captured on the basis of two major data bases in addition to respective Ministry sources – one by the Planning Commission on PPP projects and the other by the World Bank on PPI database. As we have already discussed about the PPI database, let us have a brief overview on the status of sector-wise infrastructure projects based on Government of India databases and throw some light on the sector specific issues.

A. Infrastructure Projects under PPP Model

Since most of the infrastructure services are rendered by the Government, commercial approach towards cost recovery has not been adopted, and with the limited resources at Government's disposal, PPP has been encouraged to fill the infrastructure gap. To support the PPP model projects, a Public Private Partnership Appraisal Committee (PPPAC) was constituted in January 2006. The PPPAC has been adding value by shortening the approval process within the Government, reducing the transaction costs and acting as a central focal point for identifying and disseminating best practices in rolling out PPP across sectors and Ministries of the Government. Since its constitution, it has granted approval to 65 projects, with an estimated project cost of Rs.53,136 crore.

When we look at the overall developments of infrastructure under PPP model, only 147 projects in the roads, ports, civil aviation and urban infrastructure have been materialised under the Government of India scheme. Investment in these projects is expected to be around Rs.59,793 crore. However, only about 33 projects have been completed and the remaining projects are in progress (Table 8). Majority of the PPP projects are pertaining to the road sector under BOT or BOOT basis. Government has entered into concession agreement with the private partners for a period of 10 to 30 years in these road sector projects for construction, maintenance and revenue sharing arrangements.

Table 8: Sector-wise PPP Projects - Government of India*

Sector/Union Territory	No. of Projects	Estimated Cost (Rs. Crore)
1	2	3
Road Transport & Highways	84	22752
Ports, Births, Terminals, *etc*	30	9770
Civil Aviation	4	21144
Cluster Development	26	1764
Urban Infrastructure	3	4363
Total	**147**	**59793**

* As on October 5, 2006

Source: *The Committee on Infrastructure website, Planning Commission, GoI.*

PPP in the States

Many of the State Governments have also ventured into PPP model to develop their State infrastructure on the lines of central schemes. Accordingly, about 244 projects are in progress under the PPP model with an estimated investment of Rs.69,893 crore and another 76 projects with an estimated cost of Rs.34,724 crore are in the pipeline. Among the ongoing projects, Rajasthan has more number of PPP projects (42 projects), followed by Madhya Pradesh (28), Gujarat (27), Karnataka (26), Sikkim (24) and Andhra Pradesh (21). However, investment-wise, Gujarat attracted higher share at 26.1 per cent of the total investments, particularly for the development of 13 ports at a cost of Rs.11,730 crore and two urban development projects at Rs.5100 crore. Other states like Sikkim and Maharashtra also have more shares in the PPP projects (Table 9).

In the State scheme, road sector attracted about 46.7 per cent of the total PPP projects in the country followed by urban infrastructure and power sector. Along with the national highways development, States have also taken various initiatives to strengthen and modernise their road sector to smoothen the transport movement. However, in term of investments, port sector attracted major share at 34.5 per cent as it involves huge capital requirement for its development. Other sectors like power and roads have also attracted a share of 23.5 per cent and 20.4 per cent, respectively (Table 10). Overall, the potential benefits that normally expected from the PPP projects include cost effectiveness, higher productivity, accelerated delivery of projects, clear customer focus, enhanced social service and recovery of user charges. Due to various

Table 9: State-wise Ongoing PPP Projects in Infrastructure Sector

Name of the State	Total No. of Projects	Total Estimated Cost (Rs.Crore)
1	2	3
Gujarat	27	18251
Sikkim	24	15627
Maharashtra	9	12498
Orissa	4	3668
Kerala	5	3488
Karnataka	26	2930
Madhya Pradesh	28	2615
Puducherry	4	2233
Andhra Pradesh	21	1999
Rajasthan	42	1818
Tamil Nadu	7	1237
West Bengal	13	1216
Punjab	14	750
Jharkhand	8	732
Goa	3	618
Delhi	6	96
Andaman & Nichobar Islands	1	85
Uttaranchal	1	17
Chandigarh Administration	1	15
Total	**244**	**69,893**

Source: *The Committee on Infrastructure web site, Planning Commission, GoI.*

facilities offered by the Government for infrastructure development through PPP, there is further potential for PPPs to contribute more and help bridge the infrastructure gap in India.

B. Sector-wise Infrastructure Developments - Major Concerns

When we assess the overall physical infrastructure development in the country, India has the fifth largest electricity generation capacity and

Table 10: Sector-wise PPP Projects in the States

Sector	Ongoing Projects		Projects in Pipeline	
	No. of Projects	Estimated Cost (Rs.Crore)	No. of Projects	Estimated Cost (Rs.Crore)
1	2	3	4	5
Roads	114	14265	48	14668
Ports	24	24091	10	16676
Airports	4	2358	2	250
Railways	3	812	..	..
Power	35	16409	6	795
Unban Infrastructure	64	11958	10	2335
Total	**244**	**69893**	**76**	**34724**

Source: *The Committee on Infrastructure web site, Planning Commission, GoI.*

has generated about 704 billion units of power in 2007-08. Its road network is the second largest in the world aggregating 3.34 million kilometers (Kms). Indian Railways is the second largest rail network under a single management in the world. India is the third largest telecom services market in the world with 326 million strong telephone networks at the end of June 2008, including mobile phones of around 287 million. Indian ports, both major and minor, have estimated to handle 650 million tonnes traffic during 2006-07. To develop such a huge physical infrastructure, in addition to PPP model, private sector has also been directly involved in the development of public infrastructure, particularly in telecom, power, ports, airports and urban development. Despite various concession agreements, tax holidays and other benefits to develop the public infrastructure with private participation, the infrastructure development so far have said to be not much encouraging due to sector specific policies and other constraints as discussed below.

Power Sector

India has a huge installed power generation capacity of 1,43,061 MW (end-March 2008), of which the private sector projects constituted at 14.0 per cent only (Table 11). Government of India has, earlier, envisaged a mammoth capacity addition plan of 100,000 MW through 2012 to meet its mission of power for all. The 11th Plan has targeted additional power generation capacity at 78,577 MW, which is more than the total capacity added in the previous three Plans. Even among the proposed capacity additions, the private sector would have a share of only 13.7 per cent, which is very low when compared to power requirements. This huge capacity addition may not be feasible viewing from the pace of development of ongoing and proposed new projects.

Table 11: Status of Private Power Capacity (As on March 31, 2008)

(MW)

Item	Thermal	Hydro	Nuclear	RES	Total
1	2	3	4	5	6
Total Installed Capacity	91907	35909	4120	11125	143061
Of which Private Sector	9772	1230	0	9009	20011
Share in Total Capacity (%)	10.6	3.4	0.0	81.0	14.0

RES: Renewable Energy Sources.
Source: *Central Electricity Authority, Ministry of Power, GOI.*

Given the fiscal constraints, private participation in the power sector development has been considered essential for meeting this capacity addition and to meet the growing demand for power. However, there is no PPP model power project in the central sector and in the states also, it is very limited as the power projects have either been developed by the public sector or by the private sector as Independent Power Producers (IPP), Captive Power Plants (CPP) and Merchant Power Plants (MPP).

Though the power sector reform has encouraged private power project, the response in this regard is not much encouraging. According to Power Ministry sources, about 7366 MW capacity (5 per cent of total installed capacity) consisting of 37 projects has been fully commissioned so far in the IPP segment. Five private power projects have been completed with a capacity of 718 MW and about 5776 MW capacity is under execution. There are about 52 thermal power projects and nine hydro power projects with an installed capacity of 30,825 MW have been cleared/appraised by the Central Electricity Authority (CEA), but there is no sign of their early execution. India has an estimated unutilised hydro power potential of more than 1,50,000 MW. However, only 17.5 per cent of the electricity supply comes from the hydro power sector in 2007-08. A study by the CEA has identified 399 potential hydel projects with an aggregate capacity of 1,07,000 MW. Preparation of pre-feasibility Reports of 162 schemes with aggregate installed capacity of 47,930 MW has already been completed by the CEA. In addition, about 60,000 circuit Kms of transmission network is expected by 2012. Of which, how many projects will be executed through private participation is a big question. Ultra Mega Power Projects with each having a capacity of minimum 4,000 MW through private sector funding have also been considered by the Government to augment the capacity addition to meet the power requirement in the country. However, there are certain issues that come in the way of private sector participation need attention to augment the private investment.

The initial response of the domestic and foreign investors to the private participation in the power sector was extremely encouraging. However, many projects have encountered unforeseen delays. There have been delays relating to finalisation of power purchase agreements,

guarantees and counter-guarantees, environmental clearances, matching transmission networks and legally enforceable contracts for fuel supplies. Continuous losses by State Electricity Boards (SEBs) arising both from inadequate tariff and from Aggregated Technical and Commercial losses of as high as 40 per cent discouraged the private investors in power generation as they faced insecurity of payment and hence expansion of private investment in this sector was constrained. In this regard, policy issues such as inability of SEBs and State Governments to provide acceptable payment security to the private power suppliers, delay in finalisation of power purchase agreement (PPA), fuel supply agreement, fuel transportation agreement and problems in sourcing coal supply to thermal power stations need a relook to encourage private participation.

Second, focusing of small projects under private participation may be viable, bankable, and easily executable and above all, the gestation period will also be minimal. On the other hand, big projects like Dabhol, which encountered with many problems, has also been a discouraging factor for the private participation in mega projects. Reducing the risk is a better option than allocating it. Therefore, minor power projects in the private sector or on PPP basis should be encouraged. An important factor which discourages private participation is the reluctance of lenders to finance large IPPs.

Third, using domestically available fuel may reduce the input cost, which is to be explored first before going in for import of fuels by the developers. Captive mining - not only in India but also abroad - by the power producers would ease the fuel constraints. The cost could be reduced by minimising the complexities in the projects instead of shifting the risks to other parties. Better management and appropriate choice of technology for the Indian condition would reduce the capital cost significantly.

Fourth, the disappointing aspect of the reform process could be the slow tangible progress on competition and open access to grid in the sector. The Electricity Act 2003 provides for an enabling framework to stimulate private investments for capacity augmentation and also for private licensees in transmission and distribution through an independent network. However, private participation in transmission and distribution

system has not been an easy task. It is widely debated that the captive unit have found it difficult to transmit excess power through the national grid, while putting private grid is a costly affair and unviable option at the initial stage.

Fifth, renewable energy should play a major role in the supply of power. However, using of renewable energy sources in India is very limited at around 25 per cent of hydro power and another 7.7 per cent of other renewable energy out of total installed capacity, which is to be encouraged in the wake of their availability, cost and environmental friendly features. Gross wind power potential in the country has been estimated at over 45,000 MW, based on the areas having wind power density of 200 Watt per square meter or more, which is to be explored fully to optimise the power generation at a lower cost. When renewable energy sources are used, the demand for fossil fuels will be reduced. Unlike fossil fuels, most renewable sources do not directly emit greenhouse gases. In view of aforesaid issues, power sector reform has to go a long way, although the legislative and institutional pre-requisites are now in place. If implemented properly, it would create a user competition in wholesale as well as retail power supply.

Telecommunication Sector

Usually, the Government owned operators play a major role in the development of telecom sector worldwide. In India, private investment and association of the private sector was needed in a big way to bridge the resource gap. Therefore, the telecom sector was opened up for private participation after the announcement of industrial policy in 1991 to bridge the gap. As a result, the private telecom companies have started operations in the Indian soil due to vast availability of market potentials. Slowly, they picked up their market share and currently they outperform the government owned services due to increasing commercial gains.

Adoption of unified access service, accepting the intra-circle mergers and acquisitions, licensing regulations and announcement of broadband policy, the private sector has continued to play a significant role in the growth of the telecom sector and their participation has increased significantly during the recent period. The total telephone connections

have increased substantially from 45 million at the end of March 2003 to over 300 million at the end of March 2008 (Table 12). The Government continues to provide incentives to the telecom sector and reduced the

Table 12: Private Sector Performance in Telecommunication Sector

Description	Sector	Position as at the End of			
		Mar-02	Mar-06	Mar-07	Mar-08
1	2	3	4	5	6
Wireline Phones (In Lakh)	Public	379.44	419.79	374.61	352.28
	Private	5.93	309.15	33.13	41.85
	Total	385.37	728.94	407.74	394.13
Wireless Phones (GSM+CDMA*) (In Lakh)	Public	2.18	191.05	339.3	443.21
	Private	62.13	500.93	1321.24	2167.58
	Total	64.31	691.98	1660.54	2610.79
Total Telephones (Fixed + Cellular)		449.68	1420.92	2068.28	3004.92
Tele-density (%)		4.29	12.74	18.31	26.22
Switching Capacity (In Lakh)	Public	474.25	792.14	888.17	959.76
VPTs [PSUs+Private]	Total	468862	547111	564610	532281
OFC Route Kms (Inclusive of MTNL)		326271	490437	519155	564166
TAX Lines (In Lakh)		34.27	69.53	82.2	86.85
Rural Phones (in Lakh)		-	147.68	233.07	765.0

* CDMA : WLL (Wireless+Mobile)

Source: *Department of Telecommunications, GoI.*

license fees significantly. Due to acute competition in this sector, the tariffs for various services have experienced a downward movement apart from harmonisation. As at end March 2008, 134 private licensees have been providing mobile telephony services with a total investment of Rs.95,000 crore. Besides, 120 new private licensees are yet to commence their service (GoI).

New mobile phone connections have been increasing substantially during the recent period and as a result, India has 326 million strong telephone networks with 88 per cent share relates to mobile segment at the end of June 2008, which is one of the largest in the world. Due to continuous encouragement for private operators in this sector, their share in the total telephones has increased to about 73.5 per cent as at end-March 2008. India has joined 100 million mobile club of the world during 2006 as the fifth country after China, the US, Japan and Russia. The private sector projects are reported to be working successfully in the cellular segment due to increase in commercial gains and also vast investment opportunities available in this sector.

Though it appears to be a major success story in private sector participation in the telecom sector, some of the issues deserve attention.

Issues such as spectrum allocation, tariff rationalisation, *etc.,* need to be addressed to encourage further healthy competition in this sector. Since April 2008, one of the major issues concerning the private operators, *viz.,* the access deficit charges have been removed, which may lead to a downward tariff revision. Though the overall tele-density has improved to 28.3 per cent at the end of June 2008, the slow progress in rural tele-density is to be addressed to improve the communication facilities across the country.

Petroleum Sector

The Government has formulated New Exploration Licensing Policy (NELP) to accelerate and expand exploration of oil and gas in the country. The latest NELP-VII is offering 57 blocks under transparent international competitive bidding system (29 onshore, 9 shallow water and 19 deepwater blocks beyond 400m bathymetry). Simultaneous 10 blocks of Coal Bed Methane is under offer for exploration in the third round. Some of the PSUs in this sector have formed joint venture companies for exploration and production. However, the response of the private sector has not been much encouraging. About 14 per cent of the crude oil production is under joint venture and private sector projects. In the refinery sector, India has a refinery capacity of over 156 million tonnes. During the recent period, creation of additional refinery capacity has been limited in the country in the public as well as in the private sector when compared to the demand. Currently, two private sector refineries control 28 per cent of refinery capacity in the country. In the case of natural gas production, the share of private/joint venture sector has been picking up with 23 per cent during 2005-06 (Table 13). Steps to augment

Table 13: Oil and Gas: Public Private Share in 2005-06

(Per cent)

Sector	Public	Private
1	2	3
Retail Network	94.3	5.7
Refinery Capacity	75.0	25.0
Crude Production*	86.0	14.0
Natural Gas Production*	77.2	22.8

* Private sector include JVCs

Source: *Indian Infrastructure, Eight Anniversary Issue, August 2006.*

the crude oil production as well as refinery capacity of the country would ease strain on domestic petroleum prices and supply.

Roads and Highways

The PPP model may be considered as a successful one not only in the world over but also in India in the development of road sector as majority of the on-going highways development projects have been taken up under this model. With a view to attract private investment in road development, maintenance and operation, National Highways Act (NH Act) 1956 was amended in June 1995 to facilitate private participation in road infrastructure projects. While there are a number of forms of PPP, the common forms that have been used for development of National Highways are Build Operate and Transfer (BOT) on Toll basis, BOT on Annuity basis and SPV basis. At present, the Government has embarked upon a massive programme to develop highways through the National Highways Development Project (NHDP), Phase-I to Phase-VII. Under these projects, 13,146 Kms of National highways have been proposed at an estimated cost of Rs.54,000 crore. So far 82 projects valued about Rs.23,104 crore have been taken up on BOT (Toll) basis. Of this, 34 projects have been completed and remaining 48 projects are under progress. Under annuity basis, 25 projects covering a length of 1376 Kms have been taken up, of which eight projects have been completed and the remaining projects are under progress (Table 14). Another 12

Table 14: Projects Undertaken through PPP in Road Sector
(As at end-March 2008)

Item	BOT (Toll)	BOT (Annuity)
1	2	3
Number of Projects	82	25
Value of the projects (Rs.Cr)	23104	7695
Projects Completed	34	8
Projects Under Progress	48	17

Source: *Annual Report 2007-08, Department of Road Transport and Highways, GoI.*

projects have been taken up under SPV funding, of which five projects have been completed. Given the unmatched investment opportunity, contractors and supervision consultants consisting of 46 firms from 27 countries have been implementing about 80 projects with a cost of about Rs.22,000 crore in India.

The Committee on Infrastructure has proposed a massive infrastructure developmental programme, of which the road sector projects include (i) Completion of GQ and NS-EW corridors, (ii) Four-laning of 10,000 kms under NHDP Phase-III, (iii) Two-laning with paved shoulders of 20,000 Kms of national highways under Phase-IV, (iv) Augmenting highways in North East under Special Accelerated Programme, (v) Six-laning of selected stretches of National Highways under Phase-V, (vi) Development of 1000 Kms expressways under Phase-VI, and (vii) Construction of ring roads, flyovers and bypasses on selected stretches under Phase-VII. NHDP Phase I and II were mostly funded through Government where the share of BOT highways was only 10 per cent. Under the second phase, financing was through cess and market borrowings in addition to external funding of Rs.7,609 crore by World Bank and Asian Development Bank. Further, a policy decision has been taken that all the projects in NHDP Phase-III to Phase-VII would be taken up on the basis of PPP on BOT model. The development of 1,000 Kms access-controlled Expressways under PPP will be on new alignment and built on Design, Build, Finance and Operate (DBFO) model. The Committee on Infrastructure had mandated the formulation of a Model Concession Agreement (MCA) for PPP projects in national highways to specify the policy and regulatory framework on a fair and transparent basis. Accordingly, a MCA has been released by the Government as a guideline. The MCA unbundles the risks and costs, and allocates them to the partners best suited to manage them. Establishment of Dedicated Road Fund may ease the financial constraints of the Government in view of the large number of projects, which are under various stages of implementation.

Another issue in the road sector is that many of the projects have been delayed due to problems in land acquisition, hurdles in material movements, law and order problem. A clear mandate to acquire land for public use is to be conceived and to be operationalised to speed up the public projects. In case of toll roads, levying of user charges at a higher rate at the initial stage may dampen the road users, which could be rationalised through gradual increase in the later stage. Risk and revenue sharing arrangements should be clearly dealt with for smooth passage of project implementation. Excessive commercialisation may affect the

common man, who may be protected with some element of subsidy at the initial stage. Above all, the confidence of the local people is to be gained for smooth implementation of the project.

Airports

There are 449 airports/airstrips in the country. Among them, the Airport Authority of India (AAI) owns and manages 92 airports and 28 civil enclaves at defence airfields, which provides air traffic services over the entire Indian airspace and adjoining oceanic areas. The legislative framework for privatisation of airports already exists in India. Some airports have already been owned by State Governments, private companies and even individuals. However, the financing of airport infrastructure has some inherent problems. These projects have a large element of cost, very long gestation period and highly uncertain returns on investment based on several assumptions of traffic growth that may not materialise. It has been estimated by the Task Force on Financing Plan for Airport constituted by the Planning Commission that private sector investment for the modernisation and development of various airports under PPP model would be Rs.31,100 crore (Table 15).

Table 15: Projected Investments from PPP in Airports

(Rs. Crore)

Airport	**Private Investment**
1	2
Delhi & Mumbai	11,400
Bangalore & Hyderabad	4,000
Chennai & Kolkata	5,700
Five Greenfield Airports	8,500
City side Development	1,500
Total	**31,100**

Source: *Report of the Task Force on Financing Plan for Airports, Planning Commission, GoI.*

Modernisation and restructuring of Mumbai and Delhi airports at an estimated investment of US $3 billion over next 20 years under PPP model has already been in operation. Construction of new greenfield international airports at Bangalore and Hyderabad on BOOT basis, though delayed, have been completed by April 2008. Modernisation of other major airports like Chennai, Kolkata, *etc.,* is pending due to procedural hassles and land acquisition problems, which are to be addressed urgently to ease the air traffic. Due to the introduction of open sky policy, the air

traffic has increased significantly in major airports and the runways in these airports are not in a position to handle the increasing traffic, which resulted in flight delays. This call for expansion and modernisation of existing airports on a priority basis and also new airports of international standard, at least in the metros, are to be developed to accommodate the growing air traffic. Further more, the Committee on Infrastructure has approved the development of 35 non-metro airports. While the AAI will undertake all the development works on the air side, city side developments at most of the viable airports will be undertaken with private sector participation through JVC/private consortium.

In view of worldwide thrust towards corporatisation and privatisation of airports, comprehensive strategy needs to be prepared to capture the best investment opportunities. In case of greenfield projects, the promoter may be required to prepare pre-feasibility study for the smooth functioning of the project. Transparency in the operations and in the revenue and risk sharing would ease the hurdles in the implementation of the projects under PPP model. There will also be need for commercialisation of marginal or loss-making airports by transferring them to private companies, State Governments, urban local bodies *etc.,* for operation and management under negotiated terms and conditions.

Ports and Shipping

There are 12 major ports and about 60 non-major and private ports in the country. With the awarding of infrastructure status for inland waterways and inland ports, the construction of ports under private sector has picked up. At present, 36 private/captive port projects involving capacity addition of about 137 MTPA[3] and an investment of about Rs.9,756 crore are at various stages of evaluation and implementation. Out of these, 13 projects with capacity addition of about 47.40 MTPA involving an investment of about Rs.2662 crore have been operationalised and four projects are under implementation through private participation. Development of other ports is under slow progress, which needs attention of all concerned for early execution. The main areas which have been thrown open for private investment under BOT basis include construction of cargo handling berths, container terminals, warehousing facilities, installation of cargo handling equipments, construction of dry-docks and

[3] Million tonnes per annum.

ship repair facilities. There is a plan to develop 54 new berths through PPP model in the next five years, which are to be hastened to relieve the port congestion problem.

India's weak export infrastructure in the ports such as congestion problems, insufficient bulk terminals and age old Coastal Regulatory Zone Act, need to be addressed. More encouragement for PPP model and captive ports for development of minor/intermediate ports will improve the port infrastructure in the country. In addition, efficiency in cargo handling is to be improved to reduce the dwelling time of ships, which is higher when compared to international standards.

Railways

The demand for railway containers has grown rapidly due to increasing containerisation of cargo during the recent period. Since the beginning of the year 2006, container movement has been thrown open to competition and private sector entities would be eligible for owning and operating container trains. The rapid rise in international trade and domestic cargo has placed a great strain on the Delhi-Mumbai and Delhi-Kolkata rail track. Government has, therefore, decided to build a dedicated freight corridor on these high density routes. This corridor would be constructed, operated and maintained by a corporate entity on commercial principles. Part of eastern, western and dedicated fright corridors would be undertaken through PPP model. The approach to be adopted for the dedicated freight corridor would herald the ownership and operation of a large number of freight trains by competing private entities. It is expected that the proposed separation of rail from wheels would initiate a paradigm shift in the functioning of Indian railways.

Urban Development

Over the next 25 years, modernising and expanding the water, electricity, and transportation systems of the cities of the world will require approximately $40 trillion. But the cost of not meeting the challenge could be even greater than $40 trillion (Viren Doshi et al, 2007). In the Indian scenario, there are about 400 cities with more than 100,000 population, which are facing immense problems in terms of financial management, in the provision of public services, and overall city

management. Government or local bodies alone could not develop the cities and solve the problems. Development of urban infrastructure should be an integral part of development strategy, which includes mass rapid transport system, drinking water, sewage system, solid waste management, urban roads and lightings, *etc.* However, investment in these areas has been inadequate. Development of this sector with the PPP may have a changing pace in the overall economic development, which requires an investor friendly environment with commercial viability of the projects. Overall, the solution to overcome the urban infrastructure bottlenecks is to organise the infrastructure more effectively, balance the public-private interest, reinvigorate electricity, water and transportation system by integrating finance, governance, technology and proper designing of the projects.

Section VII
Generic Issues and Options

Despite improvements in physical infrastructure development in the country during the recent years, significant gap exists between demand and supply of critical infrastructure facilities, which has become a binding constraint on the rapid pace of economic progress. As mentioned earlier, infrastructure gap exists in almost all the sectors (Table 6). In the case of power sector, the power shortage stood at around 9.8 per cent and the power shortage during the peak demand period has been much higher at about 16.6 per cent (in 2007-08), which severely affected the industrial production and economic development. The per capita consumption of electricity has increased to 704 kwh in 2007-08, which constantly put pressure on the generation front. In the road sector, among the proposed development of about 5846 Kms of Golden Quadrilateral (GQ), 96.7 per cent of the projects have been completed and the remaining works are pending due to various litigations. In North South-East West corridor of 7142 Kms, only about 1962 Kms have been completed till February 2008 even though the completion target has been fixed by end-December 2009. Employee productivity of railways in India is very low when compared to China, Korea, Brazil and Indonesia. Wagon shortage hinder the movement of industrial raw materials, coal, minerals, *etc.,* which affects the industrial production. Port container and air freight traffic is

also very low in India as compared to other Asian economies. India's weak export infrastructure in the ports, congestion problem and insufficient bulk terminals are major constraints in this sector. Space is a major constraint in big cities to expand the basic infrastructure. In the absence of well defined law to acquire land for public infrastructure development has also lead to slowdown in the urban infrastructure. Poor basic amenities in the rural areas are also a major concern, despite 72 per cent of the population lives in villages.

When we look at the progress of infrastructure development so far, private participation and PPP arrangements in the development of public infrastructure have still faced several implementation challenges. These challenges typically involve tariff setting and adjustment, regulatory independence or dispute over contractual provision and risk sharing. It may be observed from the discussion so far, the PPP in the infrastructure development is picking up during the recent years, particularly in the road sector and to some extent in the airports and ports sectors. Telecom sector is considered to be a successful sector in attracting private participation on a large scale. This may be due to sector-specific policies and other factors such as Government commitment, increased private interest in these sectors, move towards better competitive process, greater availability of information, size of the projects, acceptable price and encouraging developer return, fiscal concessions, *etc.* However, considering the size and magnitude of the proposed and ongoing projects in the infrastructure sector as a whole, the lacklustre response by the private participation and slow progress in some of the projects need to be reversed through investor friendly policies, transparent procedures and other conducive measures. The PPP model will not be feasible in all types of infrastructure but they are possible in many areas, which are to be exploited fully. The key to making PPP model acceptable is to create an environment where PPPs are seen to be a way of attracting private money into public projects, not putting public resources into private projects. Towards this direction, the following generic issues, therefore, need the attention to make the PPP model as a success storey in the infrastructure development as in the case of some of the developed and developing economies.

Transparency: There is a widespread consensus among economists that transparency is crucial in the case of PPP projects. At present, the process of executing the projects in India involves various stages and each stage is to pass through complicated policies and programmes. Though, the process of bidding and awarding the contract is stated to be much transparent, still there is scope for improvements. The PPPs can sometimes run into controversy if the private partner is seen to have received unduly favourable treatment. This can be overcome by ensuring that the terms of concession agreements are transparent and protective of public interest. Though this approach has been adopted by the Centre through model concession agreement, the State governments should also adopt transparent approach similarly to ensure that the PPP will be a success story.

Risk Allocation: As the projects in the infrastructure sector requires huge investments and involve much time frame for their execution, various risks, *viz.,* construction risk, financial risk, market risk, performance risk, demand risk and residual value risk are to be allocated appropriately among the constituents. The risks should not be passed on to others as and when arise, which would affect the cost and progress of the project and create unnecessary litigations. Too many risks assumed by Government will likely put unjustified pressures on taxpayers. On the other hand, too few will prevent potential private investors from participating in the venture.

Project Appraisal: Execution of infrastructure projects should have a clear choice about its implementation whether by the Government or private or both under PPP. Also, the technicality of the project should be clear regarding its soundness, viability and return. When we look at the PPP programme, while there are a number of successful projects, there have also been a number of poorly conceptualised PPPs brought to the market that stood little chance of reaching financial closure. Clear appraisal of the project before its execution would avoid many litigations. At the same time, it is important to avoid a possible bias in favour of the private sector.

Cost and Time Overruns: Many of the projects under the PPP are delayed due to litigations, which lead to cost and time overruns in their

implementation. For instance, as per the Ministry of Statistics and Programme Implementation, out of 491 central sector projects of more than Rs.100 crore at the end of March 2008, about 231 projects have witnessed delays in their execution due to varied reasons. The cost overrun of these projects has, though, come down from 51.8 per cent of the original cost in March 2004 to 13.9 per cent in March 2008, still it constitutes a significant share, which is to be reduced through implementation of the projects on schedule.

Government Guarantee: Generally, investors look for Government guarantee for their investments and their return before entering into a venture. Constant changes in the procedures for offering Government guarantees discourage the investment opportunities. Though, Government guarantee for private investment is not a preferred option in the fiscal angle, transparent policies and guidelines towards Government guarantee will provide clear perception and encouragement towards the PPP even in the risky areas of investment. But at the same time, the guarantee should not put the Government into pecuniary losses due to lack of clarity as in the case of Dabhol power.

Centre-State Disagreement: Execution of some of the projects like airport development, road, *etc.,* are delayed due to disagreement between the Centre and the State Governments in various aspects, particularly locational choice, cost sharing structure, political disagreement, *etc.,* which are to be avoided with appropriate policies, political will, cooperation, coordination, dedication and determination.

Regulatory Independence: In the infrastructure sector, regulatory bodies like Telecom Regulatory Authority of India, Central Electricity Regulatory Commission, State Electricity Regulatory Commissions, Tariff Authority of Major Ports, National Highway Authority of India and Airport Authority of India have established as autonomous agencies to regulate the activities coming under their jurisdiction. Though regulatory independence is vital for speedy implementation of policies, there are instances of disagreements between the regulatory authorities. To reduce the risk of arbitrary and ad-hoc policy interventions due to disagreement between the authorities, principles on key issues need to be specified upfront in sufficient detail.

Corporate Governance: Good corporate governance will succeed in attracting a better deal of public interest because of its apparent importance for the economic health of corporates and society in general. The corporate governance framework should ensure that timely and accurate disclosure is made on all material matters. The corporate governance practices of the parties involving in the PPP have to match with the benchmarking corporate governance practices with the best in the rest of the world.

In addition, appropriate institutional framework is a prerequisite for the success of the PPP in the infrastructure development due to its size, investment requirements, structure and dimension. Foreign investment will freely flow into a country when there is sound, stable and predictable investment policy. Frequent changes in the policies will be an irritant to the investors, which is to be restricted in an emerging economy like India. Overall, in addition to sector-specific issues, the generic issues also need the attention of all concerned to make not only the PPP model a successful but also to attract more private participation to upgrade the Indian infrastructure into a world-class.

Section VIII
Concluding Observations

In India, infrastructure gaps exist in all most all the sectors, posing a serious threat to sustenance of the growth momentum. To augment the infrastructure facilities with private participation, the initiated policy measures have not met with significant success. Except for the telecom sector, which has witnessed a revolution and has been able to attract massive private investments, other sectors have faced with lacklustre response. Even in the telecom sector, though the overall tele-density has improved during the recent period, rural tele-density remains low, which needs to be dealt with appropriate policy measures.

The status of the PPP in the infrastructure development in India, both in the Central Government schemes as well as State sponsored schemes, is not encouraging. Stable macroeconomic framework, sound regulatory structure, investor friendly policies, sustainable project

revenues, transparency and consistency of policies, effective regulation and liberalisation of labour laws, and good corporate governance are the basic requirements, which define the success of the PPP model. The PPP model in the road sector has experienced with enthusiastic response with the introduction of massive NHDP with structured MCA. However, many of the road projects are faced with cost and time overruns on account of prolonging disputes in land acquisition, hurdles in the material movements, law and order problems, etc.

Power shortage is a serious concern and the quality of the power supply is generally poor, especially in rural and semi-urban areas, which has affected the micro and small enterprises severely. Though the Planning Commission has put in place an ambitious plan to provide power for all by 2011-12 by adding more than 78,000 MW of generation capacity and also facilitate capacity additions in transmission and distribution networks during the 11th Plan period, slow progress in capacity addition needs to be speaded up with a policy thrust. Further, private sector participation in power generation is not forthcoming due to specific issues such as delays in finalising power purchase agreements, high aggregated technical and commercial losses, age-old transmission networks, shortage of fuel supply and policy and procedural barriers while exploring renewable energy sources.

The progress in the development of many of the port projects under private participation is at a sluggish pace, which requires conducive policy environment. Efficiency in cargo handling needs to be enhanced through modernisation of port facilities to facilitate the trade. The PPP model projects in the airport sector are in slow progress and also restricted to major airports. Modernisation of airports like Chennai and Kolkata is yet to take-off due to procedural hassles and land acquisition problems. This brings to the fore a need for constructive and stable policy environment towards land acquisition for public utilities. The urban infrastructure bottlenecks need to be addressed through a development strategy, which encompasses efficient planning and organisation of the project, balancing the public-private interest, reinvigoration of electricity, water supply and transportation system and integration of finance and technology.

International experience suggests that the success of PPP projects requires a single objective of better services for the public at a reasonable

cost. This is achievable through realistic and reasonable risk transfer while addressing the public concerns. The Indian PPP model should adhere to such objectives and best practices to march forward on the success path. In this pursuit, easy availability of long-term private capital is an essential requirement. Fostering the greenfield investments in the public infrastructure with appropriate user charges, transparent revenue and risk sharing agreements would transform the international capital inflows into productive ventures. Above all, selection of right PPP model for a right project at a right time through realistic planning would go a long way in providing meaningful and hassle free infrastructure development, which ultimately would increase the infrastructure standards and thereby sustain the overall macroeconomic developments of the country.

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Reserve Bank of India Occasional Papers
Vol. 29, No.1, Summer 2008

Capital Adequacy in Indian Agriculture: A Riposte

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Weakening impulse of capital formation in the face of surging capital intensity continues to be a binding constraint, impinging on the growth of Indian agriculture and remains a major cause of concern, particularly when viewed in the recent turbulent world of food crisis. It needs to be reiterated that investment is most important single factor in the growth process and agricultural public investment in less-favored areas not only offers the largest poverty reduction per unit of spending but also leads to the highest economic returns. Only step up in investments can provide a much needed structural break and lift the Indian agriculture from the world of stagnation, notwithstanding the fact that ICOR in agriculture sector continues to be high. While there is a pressing need for a more fundamental change in the strategy to raise resources and accelerate the pace of capital formation, nevertheless, it is also a critical input that needs to be appropriately structured, timed and well implemented to have the maximum impact.

JEL Classification : Q 10, Q12, 14
Keywords : Agriculture, Investment, Farm Inputs

Introduction

Agriculture continues to be a prime pulse of the Indian economy and is at the core of socio-economic development of the country. It accounts for around 19 per cent of GDP and about two-thirds of the population is dependent on the sector. Growth of other sectors and overall economy hinges on the performance of agriculture to a considerable extent through its backward and forward linkages. It is not only a source of livelihood and food security for a large population of India but also has a special significance for low income, poor and vulnerable sections. The Indian agriculture notwithstanding its importance, suffers from various constraints such as traditional methods of cultivation, heavy dependence on monsoon, fragmentation of land holdings, low productivity and low investment. Among others, declining investment over time has emerged

* Authors are working in the Department of Economic Analysis and Policy of the Reserve Bank of India. They are grateful to Shri KUB Rao, Adviser for encouragement and guidence. Usual disclaimer applies.

as a major binding constraint on the performance of agriculture and remains a cause of concern. Inadequacy of new capital formation has slowed the pace and pattern of technological change and the infrastructural development with adverse ramification on agricultural productivity. On the contrary, there has been a large increase in the capital intensity of agricultural production during the 1990s, doubling the incremental capital-output ratio (ICOR) from about 2 to 4, implying higher cost of production and lower profitability. In the era of globalisation, when agriculture is expected to satisfy not only the domestic demand but also to encash on its comparative advantages and contribute substantially to foreign exchange earnings by way of exports, upgradation and modernisation of technology and management practices are critical. Besides, attaining sustainable growth has become an imperative in order to meet the steadily rising need of food and fiber for the burgeoning population. Hence, the need for increasing investment in agriculture is being felt as never before. The issue of augmenting agricultural production on a sustainable basis assumes all the more importance when seen in the context of recent turbulent world of food crisis.

The National Agriculture Policy (2000) and the 11th Five Year Plan envisage an annual growth in agriculture of over 4 per cent. Investment in agriculture, the prime mover, therefore, needs to be accelerated to achieve the desired rate of growth. More importantly, this investment needs to be appropriately structured, timed and well implemented to have the maximum impact. Against this backdrop, this paper attempts to critically evaluate the investment scenario in agriculture. Section I underpins the role of investment in Indian agriculture and in poverty reduction and the types of investment undertaken by both public and private sectors. The analytics of trends in investment, its composition, trends in investment credit and plan outlay, both at the national and State level are set out in Section II. Section III discusess the quality and linkages between public and private investment, constraints to investment in agriculture and the extant policy measures. Section IV sets out the way forward, highlighting the complementarity between public and private sectors while Section V contains the concluding observations.

Section I
Nature and Criticality of Investment in Agriculture

The investments in any sector generate capital in the form of infrastructure, improvement in the quality of natural resources and assets, and lead to the creation of productive assets. The importance of capital in a country's economic development is well recognised and documented. Several studies have found investment as the single most important factor in the growth process (Lewis, 1955; Rostow, 1960). Given the importance of investment in economic growth, there has been a considerable interest in the factors affecting investment during different periods and stages of development. While public investment is determined largely as a matter of policy and by the availability of funds, private investment is affected by a variety of factors, which differ over time and space.

Investment in agriculture is generally undertaken for realising the long-term potential by (i) augmenting natural resources, (ii) enhancing efficiency of use of existing resources and (iii) generating value addition. Thus, in simple terms, investment means acquiring physical assets that result in the creation of a stream of incremental income over a period of time. Capital formation through investment in agriculture helps in improving the stock of equipment, tools and productivity of natural resources, which, in turn, enables the farmers to use their resources, particularly land and labour, more productively. Creation of capital goods, thus, is necessary for raising productivity of existing resources and realising the long-term growth potential.

The relationship between capital formation and agricultural growth, and agricultural growth and poverty alleviation are very well articulated in literature. Given the positive impact of agricultural growth on poverty alleviation, the role of capital formation as one of the major engines of agricultural growth has been well placed in the development policy perspective. There are some major streams of research on capital formation that have sharpened this role in the development policy framework (FAO 2004).

Public investment reduces rural poverty through improved growth in agricultural production, agribusiness, rural non-farm employment and

lower food prices. While there are often long time lags between investment and visible impact, investments in agricultural research, education, and rural infrastructure are often the most effective in promoting agricultural growth and poverty reduction (Table-1). Regional analysis within India also suggests that public investment in less-favoured areas not only offers the largest poverty reduction per unit of spending but also leads to the highest economic returns (Fan, Zhang, and Zhang 2002).

Table-1: Returns of Agricultural Public Investment and Impact on Poverty Reduction in China and India

	Economic Returns[@]		Returns – Poverty[$]	
	China	**India**	**China**	**India**
R & D	9.59	13.45	6.79	84.5
Irrigation	1.88	1.36	1.33	9.7
Roads	8.83	5.31	3.22	123.8
Education	8.68	1.39	8.80	41.0
Electricity	1.26	0.26	2.27	3.8
Anti Poverty Programmes	-	1.09	1.13	17.8

@ : Return per Rupee spending in India and Yaun per spending in China.
$: Average number poor reduced per million Rupee spending in India and average number of poor reduced per 10,000 Yaun in China.
Adopted from Fan, Zhang and Zhang, 2002.

Public vis-a-vis Private Investment in Agriculture

Investment in agriculture is undertaken by both public as well as by private sectors. While public sector investment in agriculture is undertaken for building necessary infrastructure, private investment in agriculture is made either for augmenting productivity of natural resources or for undertaking such activities, which supplement income sources of farmers. Private sector investment includes investments made by private corporates and households. The corporate sector investment includes investment by organised corporate bodies like big private companies and unorganised entities like sugar co-operatives and milk co-operatives. The household sector investment comprises investment on farm equipments, machinery, irrigation, land improvement and land reclamation. With about 90 per cent share, households dominate the private investment scene. These investments enable farmers to grow existing crops more productively and intensively and take up non-conventional/high value crops.

Section II
Investment Trends in Indian Agriculture

1. Trends in Agriculture Investment

An analysis of investment trends in agriculture over a span of last five decades brings out the following facts:

- Over the years, the share of agriculture investment in the total investment has declined, particularly more rapidly in the 1990s to 7.9 per cent of GDP and between 2000-01 to 2005-06 to 7.4 per cent of GDP as compared to the level of 1980s (11.4 per cent of GDP) (Table-2).

Table-2: Trends in Investment in Agriculture and the overall Economy

Decade/Year	Average Annual Investment in Agriculture			Average Annual Investment in the Overall Economy			Share of Agriculture in Total Investment
	Public	Private	Total	Public	Private	Total	
1	2	3	4	5	6	7	8
1950s	-	-	4,370	-	-	25,508	17.9
1960s	2,904	3,929	6,833	21,281	27,577	48,858	13.9
1970s	4,851	7,297	12,149	33,511	44,690	78,201	15.3
1980s	6,443	7,840	14,283	57,539	71,914	1,29,454	11.4
1990s	4,837	12,299	17,136	74,265	1,48,627	2,22,892	7.9
2000-2006	5,237	17,184	22,387	85,327	2,27,216	3,12,543	7.4
2000-01	4,435	15,574	19,809	81,718	1,80,428	2,62,146	7.6
2001-02	5,488	14,872	20,360	82,824	1,68,840	2,51,664	8.1
2002-03	4,760	16,740	21,500	75,469	1,64,485	2,39,954	9.0
2003-04	5,699	18,487	24,186	82,998	2,04,946	2,87,944	8.4
2004-05	4,832	18,028	22,860	87,311	2,93,569	3,80,880	6.0
2005-06	6,206	19,400	25,606	1,01,640	3,51,028	4,52,668	5.7

Source: Computed from National Accounts Statistics and Agricultural Statistics at a Glance, Ministry of Agriculture, GOI.

- Following the above trend, the share of public sector in the total investment in agriculture has declined more sharply during the 1990s (6.5 per cent), as compared to the 1980s (11.6 per cent), while that of private sector investment has gone up simultaneously (Table 3).
- Notwithstanding an increase intermittently, the average share of public sector investment between 2000-01 to 2005-06 still remained below the level of 1990s.

Table-3: Trends in Public *vis-à-vis* Private Investment in Agriculture

Decade/Year	Ratio of Public and Private Investment in		Share of Public Investment in Agriculture	Share of Agriculture in total GDP	Ratio of Agri. GCF to Agri. GDP
	Agriculture	Economy			
1	2	3	4	5	6
1950s	-	-	-	56.1	5.1
1960s	43:57	44:56	13.7	47.8	6.4
1970s	40:60	43:57	14.3	42.8	9.1
1980s	45:55	45:55	11.6	36.4	8.0
1990s	28:72	34:66	6.5	29.1	6.5
2000-2006	23:77	28:72	6.1	21.8	7.9
2000-01	22:78	31:69	5.4	23.9	6.4
2001-02	27:73	33:67	6.6	24.0	6.2
2002-03	22:78	31:69	6.3	21.5	7.1
2003-04	24:76	29:71	6.9	21.7	7.2
2004-05	21:79	23:77	5.5	20.2	10.0
2005-06	24:76	22:78	6.1	19.7	10.2

Source: Computed from National Accounts Statistics and Agricultural Statistics at a Glance, Ministry of Agriculture, GOI.

- The loss in momentum in public sector investment in agriculture is more clearly noticed when it is juxtaposed with the private sector investment in the economy as a whole. Private sector investment in agriculture also showed a similar trend over the years. It could, therefore, be inferred that the decline in investment in agriculture is due to relatively lower shares of both public and private sector investments compared to their shares in total investment in the economy.
- The trends in the contribution of agriculture to the overall GDP reveals that the share of agriculture GDP in the total GDP has been declining over the years, the decline being sharper after 2001-02, implying relatively faster growth in sectors other than agriculture.
- The ratio of GCF to GDP is an important measure for the assessment of investment efficiency in a given sector. The ratio of GCF to GDP originating in agriculture declined to 6.5 per cent in the 1990s from 8 per cent in the earlier decade before showing a trend of gradual revival since 2002-03.

- Furthermore, the share of the agricultural sector investment in GDP declined from 2.2 per cent in the late 1990s to 1.9 per cent in 2003-04 and has remained unchanged upto 2005-06**.** This decline was partly due to the stagnation or fall in public investment in irrigation, particularly since the mid-1990s (Economic Survey, 2006-07) (Table 4).

Table-4 : Gross Capital Formation in Agriculture

	Investment in Agriculture (Rupees crore)			Share in Agriculture Gross Investment (per cent)		Investment in Agriculture (per cent of GDP at constant prices)
Year	**Total**	**Public**	**Private**	**Public**	**Private**	
1	2	3	4	5	6	7
Old Series (at 1993-94 prices)						
1990-91	14836	4395	10441	29.6	70.4	1.9
1995-96	15690	4849	10841	30.9	69.1	1.6
1996-97	16176	4668	11508	28.9	71.1	1.5
1997-98	15942	3979	11963	25.0	75.0	1.4
1998-99	14895	3870	11025	26.0	74.0	1.3
1999-00	17304	4221	13083	24.4	75.6	1.4
New Series (at 1999-00 prices)						
1999-00	43473	7716	35757	17.7	82.3	2.2
2000-01	38176	7155	31580	18.5	81.5	1.9
2001-02	47043	8746	38297	18.6	81.4	2.2
2002-03	46823	7962	38861	17.0	83.0	2.1
2003-04	45132	9376	35756	20.8	79.2	1.9
2004-05	48576	10267	38309	21.1	78.9	1.9
2005-06*	54539	13219	41320	24.2	75.8	1.9

* : Quick Estimates
Source: Central Statistical Orgianisation.

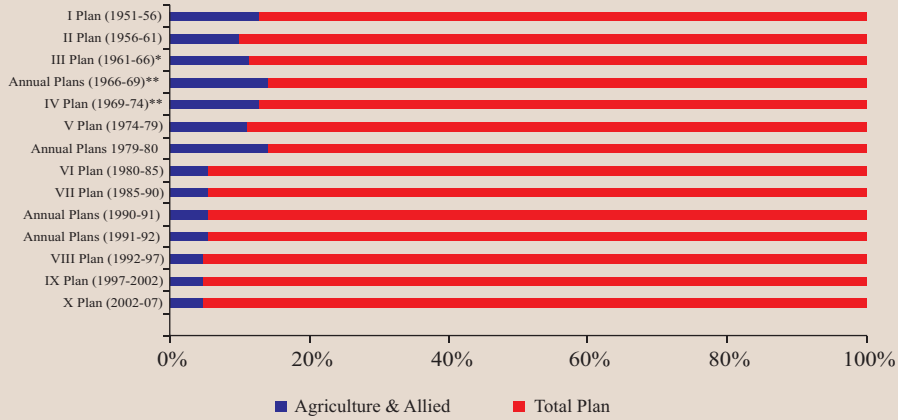
2. Trends in Investment Credit and Private Capital

Private investment in agriculture depends, among other things, on the availability of enabling infrastructure, investable resources and expected rate of return on investment. The expected rate of return to an investor is largely determined by the prices of agricultural inputs and output. It is in the context of availability of investable resources that credit from financial institutions becomes critically important.

Inadequacy of farm credit continues to be one of the major bottlenecks hindering the growth in investment and growth in agriculture

(Economic Survey 1997-98). The growth of direct finance to agriculture and allied activities witnessed a decline in the 1990s (12 per cent) as compared to the 1980s (14 per cent) and 1970s (around 16 per cent). The average share of long-term credit, which is important from the point view of capital formation has not only been much lower but has also decelerated (from over 38 per cent to around 36 per cent), impacting adversely the future growth process (Chart 1) .

Chart 1 : Share of Agriculture and Allied Activities in the Total Plan Outlay



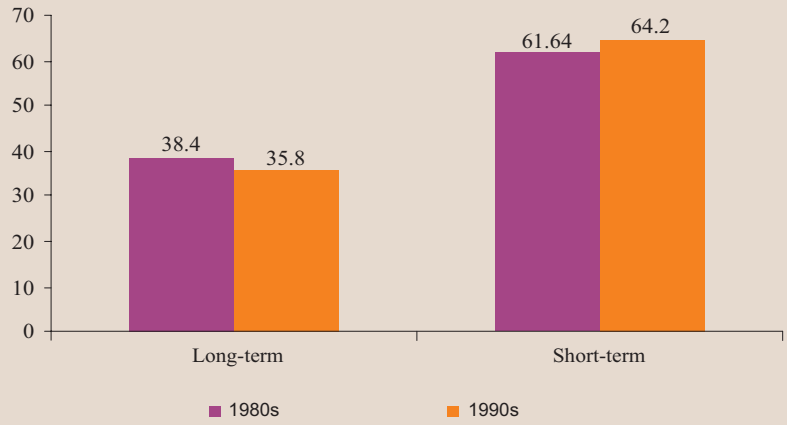
Continued higher proportion of short-term credit could probably be due to the relatively higher comfort level of those who demand and those who supply credit. Since expenditure on inputs is inevitable to sustain their agricultural operations, irrespective of the weather conditions obtaining in the field, farmers prefer to borrow short-term credit as it provides them necessary control over resources through continued liquidity. The suppliers on the other hand, favour short-term credit due to relatively lower lending and risk costs, supervision and monitoring costs and a better asset-liability management.

3. Trends in Plan Outlay on Agriculture and Allied Activities

Another evidence of investment in agriculture could be the share of agriculture in the total Plan outlay. There has been a continuous decline in the share of plan outlays for agriculture and allied activities, over the years. The share of agriculture and allied sector in the total Plan outlay registered a fall from 5.8 per cent during the 6th Plan (1980-85) to 4.9

per cent during 9th Plan (1997-2002). According to the Mid-term Review of the Tenth Plan, the share of agriculture and allied activities during 10th Plan period (2002-07) came down further to 3.9 per cent lower than the earlier projected level (5.2 per cent) (Chart 2).

Chart-2: Share of Short-term and Long-term Credit to Agriculture



4. Pace and Pattern of Investment in Agriculture and Allied Activities

National Level Trends

Composition

An analysis of the composition of investment in terms of total outlay (Revenue and Capital Outlay) of the Government on different heads relating to agriculture and rural development during the period 1991 to 2004 (on an average) reveals that:

- The investment is concentrated and skewed in favour of irrigation and flood control, which accounts for a major share (around 12 per cent) in the total development expenditure, while the share of agriculture and allied activities (around 10 per cent) and rural development (7 per cent) is relatively low.
- Of the total development expenditure on agriculture and allied activities, crop husbandry occupies the largest share (27 per cent) followed by forestry/wild life (20 per cent) and animal husbandry (11 per cent).

- The other items such as dairy development, food storage and warehousing also account for a significant share (around 8 per cent). However, the share of expenditure on agriculture research and education (6 per cent) - an important component - stands on the lower side.

Growth Pattern

Analysis of available data relating to expenditure on agriculture and allied activities since 1991 up till the early part of current decade (2004) from the Handbook of Statistics on State Government Finances, RBI, reveals the following trends (Table 5):

1. The total expenditure on agriculture and allied activities which recorded, on an average, a growth of around 13 per cent in the 1990s, dropped thereafter to around 10 per cent during the current decade (early part).
2. Similarly, the growth of expenditure on irrigation and flood control slackened considerably to 10 per cent in the second half of the 1990s and further to 4 per cent in the subsequent period from the level of around 14 per cent during the first half of the 1990s.
3. The expenditure on rural development, which recorded highest growth (among all) at around 18 to 19 per cent during the 1990s also came to register a decline at over 5 per cent.
4. The only exception was special area programme, the expenditure on which witnessed continued growth momentum from around 8 per cent in the first half of 1990s to around 17 per cent in the subsequent period.
5. Of the total expenditure on agriculture and allied activities, the growth in expenditure on crop husbandry, soil and water conservation, fishery, plantation was impressive in the second half of the 1990s, but lost the momentum during the current decade.
6. On the other hand, investment in animal husbandry and dairy development witnessed a continuous decline over time. The only

exceptions were food storage/ warehousing and other agricultural programmes, which witnessed increase in the expenditure during the current decade.

Table 5: Composition and Growth of Investment in Agriculture and Allied Activities in India

Items	Composition	Growth Rate		
	Percentage share	1991-92 to 1995-96	1996-97 to 1999-2000	2001-02 to 2003-04
Agriculture and Allied Activities				
Share as % of total expenditure	5.9	14.4	15.3	11.7
Share as % of develop exp.	10	13.2	13.2	9.9
Share as % of Exp on agri&allied				
Crop Husbandry	27.4	9.5	13.8	3.6
Soil and Water Conservation	6.9	11.7	14.8	3.6
Animal Husbandry	11.1	15.9	12.8	-0.1
Dairy Development	7.6	13.6	9.6	6.3
Fisheries	2.6	5.5	15.6	-1.8
Forestry and Wildlife	20.3	13.3	11.7	1.7
Plantations	0.1	10.4	15.2	5.7
Food Storage and Warehousing	7.9	-9	8.7	16.3
Agriculture Research And Education	6.3	14.2	-	5.3
Co-operation	9.2	11.4	12.4	6.6
Other Agricultural Programmes	0.9	1.7	-0.2	6.8
Rural Development	7.1	19.1	18.1	5.3
Share as % of develop exp				
Special Area Programmes	0.8	7.6	13.4	16.8
Share as % of develop exp		10.7	13.4	10.2
Irrigation and Flood Control	11.5	14.1	10.2	3.8
Share as % of develop exp.				

Source : *Handbook of Statistics on State Government Finances, RBI, 2004*

State Level Trends

Composition

The composition of investment in terms of the total outlay (Revenue and Capital) in the case of major agricultural States over the period from 1990-91 to 2003-04 brings out several issues of concern to the fore (Table 6).

- The share of agriculture and allied activities in the total development expenditure in the case of agriculturally important

Table-6: Average Share of Agriculture and Allied Activities in the Total Revenue and Capital Outlay of the States (1990-91 to 2003-04)

Items	Bihar	Gujarat	Haryana	Karnataka	MP	Maharashtra	Punjab	UP
Agriculture and Allied Activities								
Share as % of total exp.	3.7	4.3	6.0	6.5	8.6	8.4	3.9	4.8
Share as % of develop exp.	6.2	6.0	10.0	9.6	12.8	13.3	7.7	8.7
Share as % of agr&allied exp								
Crop Husbandry	30.9	29.9	15.6	21.3	21.0	13.5	19.0	36.8
Soil and Water Conservation	4.0	8.1	6.3	8.2	4.4	8.2	6.7	14.0
Animal Husbandry	20.5	8.6	16.8	10.2	10.7	5.6	19.5	10.3
Dairy Development	1.3	0.4	0.9	0.6	1.2	33.6	1.2	1.5
Fisheries	2.4	3.0	1.4	2.5	1.3	1.2	1.1	1.4
Forestry and Wildlife	17.4	30.8	13.9	23.9	41.7	12.4	13.3	11.7
Plantations	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.7
Food Storage and Warehousing	0.0	1.5	26.6	19.4	8.2	7.9	9.9	12.1
Agriculture Research And Education	9.2	10.1	10.9	6.4	3.0	6.2	16.7	5.0
Co-operation	13.8	7.5	7.3	6.3	8.5	11.5	11.2	6.3
Other Agricultural Programmes	0.4	0.2	0.3	1.8	0.0	0.0	1.6	0.4
Rural Development								
Share as % of develop exp.	14.9	4.3	2.0	4.5	9.1	6.0	1.0	10.3
Special Area Programmes								
Share as % of develop exp.	0.1	0.2	0.0	0.3	0.6	0.2	0.3	3.2
Irrigation and Flood Control								
Share as % of develop exp.	10.0	18.5	13.0	15.7	8.8	14.7	13.6	12.0

Source: *Computed based on the data from Handbook of Statistics on State Government Finances, RBI, 2004*

States such as Punjab, UP, Gujarat, Bihar and Karnataka is below the national average (10 per cent). Only Madhya Pradesh with over 18 per cent share followed by Maharashtra (13.3 per cent) and Haryana (10 per cent) fare better in this regard.

- Of the total outlay on agriculture and allied activities, crop husbandry stands out as one of the major items- occupying first or second place in most of the States under review.
- Animal husbandry also accounts for a major proportion in States such as Punjab, Haryana and Bihar, while forestry and wildlife account for the largest share in the States like MP, Gujarat and Karnataka.

- On the agriculture research and education front, Punjab (16.7 per cent) and Haryana (10.9 per cent) fare relatively better, while the share of other States stands below the level of 10 per cent.
- In terms of the share of irrigation and flood control in the total development expenditure, Gujarat (18.5 per cent) occupies the first place followed by Karnataka (15.7 per cent), Maharashtra (14.7 per cent), Punjab (13.6 per cent) and Haryana (13 per cent).

Growth Pattern

The analysis of growth pattern of investment in terms of total outlay (Revenue and Capital) on agriculture and allied activities since the 1990s in respect of major States brings out the following:

In terms of the growth pattern, the major States could be broadly classified into three categories (Table 7).

- In the first category are the States such as Punjab and Haryana, which recorded remarkable growth during the 1990s and continued the momentum in the subsequent period (2001-2006).

Table-7: Growth in Outlay on Agriculture and Allied Activities in the Major States

State	Share of Agri.in GSDP*	Average Growth in the Outlay on Agri and Allied		
		1991-92 to 1995-96	1996-97 to 1999-00	2000-01 to 2005-06
1	2	3	4	5
Punjab	37.2	26.8	109.8	193.1
Haryana	28.9	4.1	19.1	40.4
UP	30.3	8.4	36.6	-6.9
Maharashtra	13.4	9.5	17.2	-5.5
MP	21.7	4.7	13.9	3.1
Gujarat	13.6	10.2	17.5	4.3
Bihar	38.3	7	12.8	-11.8
Karnataka	21.9	25.3	7.3	4.5

*: Share of agriculture in GSDP during 2002-03 at constant prices

Source: Computed based on the data from Handbook of Statistics on State Government Finances, RBI, 2004

- In the second category, States such as Madhya Pradesh, Gujarat and Karnataka, witnessed considerable growth in the second half of the 1990s, but lost the momentum thereafter.

- In the last category, the States such as UP, Maharashtra and Bihar, which posted significant growth during the second part of the 1990s, came to register a sharp negative growth in the subsequent period.

International Trends: Investment in Agricultural Science and Technology

At the international level, the data on investment in agriculture are not available in the public domain. However, the limited investment data available (2000) in the case of agricultural science and technology particularly in research and development activities indicate that the share of public sector is predominant (94 per cent) in respect of developing countries (Table 8). Conversely, in the case of developed countries, private sector (55 per cent) dominates the scene, implying that as countries progressively develop, public sector should give way to private sector by creating an enabling policy environment.

Table-8: Public and Private Agricultural Research and Development Expenditure (2000)

	Expenditure ($ 2000 million)			Share (Per cent)		
	Public	**Private**	**Total**	**Public**	**Private**	**Total**
Developing Countries	12,816	869	13,688	93.7	6.3	**100**
Developed Countries	10,191	12,577	22,767	44.8	55.2	**100**
Total	23,010	13,446	36,456	63.1	36.9	**100**
Adopted from Pardey *et al*., 2000.						

Interestingly, the rate of return to investment in agricultural research (based on studies carried out from 1953 to 1997) is found to be highest in the case of Asian region (50 per cent), higher compared not only to the developing countries as a whole (43 per cent) but also developed countries (46 per cent) (Alston *et al.,* 1998) (Table 9). Investments in agricultural

Table-9: Estimated Rates of Return to Investment in Agricultural Research (based on studies carried out from 1953 to 1997)

Region	Number of estimates	Median Rate of Return (%)
Africa	188	34
Asia	222	50
Latin America	261	43
Middle East/North Africa	11	36
All Developing Countries	683	43
All Developed Countries	990	46
All	1,772	44
Adopted from Alston *et al*. 1998		

research and development (R&D) from both the public and private sectors can lead to technology generation and productivity improvements. The impact of investment on agricultural research can be seen most clearly from Rosegrant, Agcaoili-Sombilla, and Perez (1995). In their global food projections for 2020, they assumed a baseline scenario of US$10 thousand million public investment in national agricultural research and extension services. The low-investment scenario, which assumed an annual cut of US$1.5 billion to the current level of public investment, resulted in a fall of 15 per cent in crop and livestock yield growth rates by 2020. In contrast, if funding of national and international research were to rise by US$750 million per year, crop yield growth would be six percent higher in 2020 than under the baseline scenario. Although these figures are projections and their accuracy is subject to underlying assumptions, they indicate strongly the negative effects of reduced public investment in research and extension, and the crucial role of investment in increasing agricultural productivity.

The growth of public expenditure on research and extension, at constant prices, decade-wise for four decades upto 2006 indicates that the growth has slowed since 1990. In the case of extension services the slowdown is particularly sharp. It is interesting to note that for this category the growth of expenditure was highest by far in the sixties the period of the last acceleration in the agricultural growth rate, suggesting that extension is a crucial component of an enabling policy. The rate of growth of expenditure on extension services has declined three-fold since the nineties (Table 10).

Table-10: Growth in Public Expenditure on Research and Extension

(Per cent)

Year	Research and Education	Extension and Training
1960s	6.5	10.7
1970s	9.5	-0.1
1980s	6.3	7.0
1990-2005	4.8	2.0

Source : DRG study no.27, RBI, 2008.

Section III
Linkages Between Public and Private Investment: Policy Implications

Policy support for private investment could be placed in the proper perspective.

- First, during post-reform regim, since the early 1990s the rate of increase in the share of private sector in total agriculture investment has been less than what it was during the pre-reform period, unlike the other areas, where private sector has increased its stake.
- Second, it may be recalled that the impact of public investment on private investment is found to be asymmetric. An increase in public investment is found to have positive impact on private investment, but a decline in public investment is found to have increased private investment (S. Bisaliah, 2001). The Government has to create a favourable policy and development support environment for private sector (both domestic and foreign agri-business investors) to fill the investment gap in agriculture. Increased share of private investment in agriculture tends to improve the efficiency of capital use.
- Third, there has to be a shift of emphasis from the present situation where the infrastructure investment is dominated by the public sector towards a system where public-private partnership functions.
- Fourth, institutional transformation through social capital formation has high potential for increasing the efficiency of

capital use (lowering the capital requirement for achieving a targeted output growth).

- Fifth, while designing policy options to stimulate private farm investment, the interaction between technology, terms of trade and private investment has to be kept in view.
- Sixth, public sector investment with proper project portfolio would be crucial for inducing private investment. Further, public investment alone cannot be expected to fill the investment gap in agriculture. Hence, the role of private investment could be placed in the perspective of huge investment gap.

Traditionally, most agricultural research is publicly funded. However, in recent years, the costs of agricultural technology generation and transfer are shared increasingly with the private sector, particularly in more advanced countries. The proportion of privately funded research is in the order of 30 to 40 per cent of all research expenditures in developed countries (nearly two-thirds in the United States) and about five percent in the less-developed countries. Thus, the relationship between public and private investment in agriculture is complementary.

Private research is attracted to sectors of the market where research results exist and benefits can be privately appropriated (Alston, Norton and Pardey, 1995). This is typically the case in more developed countries where intellectual property rights are well established and protected for inputs such as agrichemicals, agricultural machinery and seeds.

Constraints to Investment in Agriculture

There are several factors, which impede the flow and pattern of investment in agriculture, the major being:

- Meagre growth in minor irrigation and farm mechanisation, which are the major sub-sectors in agriculture;
- Declining public sector investment in the basic infrastructure;
- Limited credit absorptive capacity;
- Lack of effective mechanism for technology transfer and poor extension services;

- Limited infrastructure for agro-processing, storage, warehousing, value addition and marketing;
- Restrictions on purchases outside the mandis;
- Weather aberrations and output price fluctuations;
- Inadequate risk mitigation mechanism; and
- Absence of proper land records.

Some of the reasons for slower growth particularly in public investment in agriculture are: i) diversion of resources from the investment to current expenditure in the form of subsidies (Economic Survey, 1997-98), ii) large expenditure incurred on maintenance of existing projects, iii) inordinate delays in completing the projects on hand, iv) relatively lower allocation for irrigation, v) poor rural infrastructure and research, and vi) belated growth in private investment in agriculture.

Besides, there are several factors in particular constraining the banking institutions in deployment of investment credit: (i) high transaction costs; (ii) structural deficiencies in rural credit delivery system resulting in limited outreach; (iii) issues relating to credit worthiness; lack of collateral or low asset base of farmers; (iv) low volume of loans associated with high risk; (v) high manpower requirement, *etc.*

Policy Initiatives

Recognising the importance of adequate investment in agriculture, both the Government and the Reserve Bank have taken several policy initiatives. As a response to inadequate private investment in agriculture, the Rural Infrastructure Development Fund (RIDF) was set up way back in 1995. The fund is financed by the scheduled commercial banks to the extent of their shortfall in meeting the stipulated target of 18 per cent of adjusted net bank credit to agriculture.

The Committee on Capital Formation in Agriculture, (Chairman: B.B. Bhattacharya) set up by the Government of India in 2003 called for devising a conscious, implementable strategy for increasing investment

in the agriculture sector. Furthermore, with a view to address the issues and to suggest a road map for banks to increase investment in agriculture, the RBI constituted an Expert Group on Investment Credit to Agriculture in 2005 under the Chairmanship of Shri Y .S. P. Thorat.

The National Agriculture Policy adopted in July 2000 and various committees appointed earlier had highlighted the need for adequate and timely supply of institutional credit to farmers. There is a wide gap in supply of credit, requiring a large increase in credit, particularly investment credit, to facilitate capital formation in agriculture and to achieve the stipulated growth rate. The Government of India had emphasised the need for doubling of credit flow to agriculture during the three-year period, *viz.,* 2004-05 to 2006-07. In 2005, the Government of India launched the Bharat Nirman Programme, a time-bound plan for action in rural infrastructure for the four years (2005-2009). The Union Budget 2005-06 also stepped up public investment significantly for rural infrastructure development.

In the recent period, several measures have also been taken for augmenting capital formation in agriculture such as: i) a roadmap for agriculture diversification has been prepared with focus on horticulture, floriculture, animal husbandry and fisheries; ii) strengthening of agriculture marketing infrastructure; iii) national scheme for the repair, renovation and restoration of water bodies; iv) focus on micro-irrigation, micro-insurance and rural credits; and v) setting up a national fund for strategic agriculture research.

Section IV
Way Forward

Given the importance of agriculture in India, in terms of its contribution to GDP, employment and income, a low growth rate and agriculture will have an adverse impact on the growth of the economy. According to the Approach Paper for the 10th Plan, the objective of doubling the growth rate of agricultural GDP to 4 per cent per annum is critical to ensure the inclusiveness of growth. This, however, poses major policy challenges in the immediate future. It is necessary to adopt region

specific strategies focusing on the scope for increasing yields with known technologies and the scope for viable diversification. Investment, the prime mover, therefore, needs to be accelerated to achieve the desired level of growth.

The public investment in agriculture has been declining and is one of the main reasons behind the declining productivity and low capital formation in the agriculture sector. With the burden on productivity-driven growth in the future, this worrisome trend needs a reversal. Private investment in agriculture has also been slow and must be stimulated through appropriate policies.

The broad thrust areas for increasing investment and investment credit in agriculture could be as follows:

- Traditional investments on land development, irrigation and farm mechanisation and integration of small and marginal farmers in the mainstream in the case of marketing and exports deserve renewed attention.
- Public investment needs to be channelled appropriately in agricultural infrastructure should get a greater priority especially in poorer states, *viz.,* Eastern and North Eastern regions for facilitating greater private investment.
- Public investment in research and development of varieties of crops, breeds of livestock, strains of microbes and efficient packages of technologies, particularly those for land and water management, for obviating biotic, socio-economic and environmental constraints also calls for increased attention.
- Effective and credible technology, procurement, assessment and transfer and extension system involving appropriate linkages and partnerships; again with an emphasis on reaching the small farmers also remain the other thrust areas.

In this context, the need for augmenting term credit to agriculture cannot be overemphasised. In view of the structural weaknesses of co-operative banks and the limited presence of RRBs, commercial banks may have to shoulder the responsibility of

supporting private investment in agriculture. As observed by the Mid-Term Policy for 10th Five Year Plan, there is a need to step up public investment, particularly in irrigation and water resources management; watershed development and reclamation of waste/ degraded land; and provision of essential infrastructure such as roads, markets and electricity.

From the point of agricultural production, the single most effective supply side constraint is that irrigation coverage still extends to only about 40 per cent of net sown area. In particular, slow expansion of surface irrigation through investment in major and medium projects has been the main reason why public investment in agriculture has declined since the early 1980s. While there are genuine problems that make it difficult to initiate new irrigation projects quickly, a concerted effort is required to expedite ongoing but unfinished projects.

Section V
Conclusion

Over time, agriculture investment has been loosing its share, more rapidly since the 1990s led by loss in momentum of public sector and compounded by inadequacy of farm credit. Not only the pace of investment has been slow, but even the pattern of investment has skewed. The share of agriculture and allied activities in the total development expenditure in the case of agriculturally important States such as Punjab, UP, Gujarat, Bihar and Karnataka is below the national average. Inadequacy of new capital formation has slowed the pace and pattern of technological change and the infrastructural development with adverse effects on agricultural productivity.

The need of the hour is to step up domestic investment in agriculture sector, notwithstanding the fact that the ICOR of agriculture sector is very high. The idea is to modernise the agriculture sector through conscious investments and bring down the ICOR and thereby allow the agriculture sector to perform well like industrial sector. Investment in agriculture, the prime mover needs to be accelerated to achieve the desired level of growth of over 4 per cent per annum as

envisaged by the 11th Five Year Plan. More importantly, this investment needs to be appropriately structured, timed and well implemented to have the maximum impact.

There is a pressing need for a more fundamental change in the strategy to raise resources and accelerarate the pace of capital formation in agriculture through targeting and downsizing of subsidies and ploughing back the resources so generated to agriculture sector as investment in irrigation and other infrastructure activities, selling off the public sector enterprises to partially finance the resources for agriculture investments. The public investment with a proper choice of project portfolio would be crucial for inducing private investment. Furthermore, public investment alone cannot be expected to fill the investment gap in agriculture. Therefore, the Government has to create a favourable policy and development support environment for private sector (both domestic and foreign agri-business investors) to fill the investment gap in agriculture. It needs to be emphasised that institutional transformation through social capital formation has high potential for increasing the efficiency of capital use There is also a need to encourage the banking sector to view the new changes witnessed in entire value chain of agriculture as potential business opportunities and extend more investment credit to these areas. Thus, accelerating the pace of investment holds the key to provide a much-needed structural break and lift the Indian agriculture from the world of stagnation.

NOTE

[1] Investment in agriculture has two components *viz.,* the Gross Fixed Capital Formation (GFCF), which includes primarily the investment in physical assets in agriculture, and the stocks which are presently in the form of inventories but which are not actually used for further production, although they could be used. The two components taken together constitute the Gross Capital Formation (GCF). The relative shares of the two components *viz.,* GFCF and GCF indicate that investment in agriculture is predominantly in the form of physical assets and that stocks (which include livestock) are relatively less important.

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Reserve Bank of India Occasional Papers
Vol. 29, No. 1, Summer 2008

Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships edited by Peter Barrar and Roxane Gervais, Gower Publishing, England, 2006, pages 322, price £ 75

The book "Global Outsourcing Strategies: An international reference on effective outsourcing relationships" contains 22 chapters divided into 5 broad sections. The theme of the book is on importance of management of outsourcing. According to this book, traditionally, outsourcing has tended to be seen as cost reduction tool with a limited scope. But now, outsourcing is regarded as means of achieving major change in performance, agility and customer services. While conventional outsourcing was to facilitate better, faster and cheaper completion of work; transformational outsourcing is about helping to create a new business model and a new management approach. Shared risk and reward is an important feature of modern outsourcing. Differing from conventional belief this book stresses principal motives for outsourcing as technological and strategic and not cost reduction. Part 1 of the book is on the nature of outsourcing. Part 2 addresses the ways in which outsourcing influences change in the organization. Part 3 analyses the ways in which outsourcing has impacted on the workplace including trade unions. Part 4 focuses on legal and relationship issues relating to outsourcing and part 5 provides few case studies on outsourcing. In short, this book is very comprehensive and explores different facets of the outsourcing process, such as contract negotiation, the risks involved in outsourcing, the need for service level agreements, the critical requirements to sustain outsourcing relationships, ethical issues, legal issues, *etc*.

The opening chapter of Part 1 presents a cost benefit analysis of outsourcing. The authors examine the concept of outsourcing from a firm's perspective with a focus on its specific governance costs. This chapter points out that competition is normally the crucial driver that reduces the production costs. However, internal production units may not be subject to much competition. Therefore, outsourcing of some of

the products may lead to rise in efficiency and thus cost reduction. To overcome various difficulties and costs associated with implementation of outsourcing, a specialized department to deal with outsourcing may be created in the firm. In the second chapter, authors outline the nature of outsourcing. This chapter defines outsourcing and lists major theoretical perspectives that researchers have used in studying the process. It correctly points out that most definitions of outsourcing are too broad and do not capture the true complexity of outsourcing phenomenon. It presents a summary of existing studies on outsourcing and points out that principal source of data collection for majority of the study is questionnaire based surveys. Furthermore this chapter points out that research on the outsourcing is still in its early stages and indicates that a relatively unexplored area of research is the relationship between the firm's life-cycle stage and appropriateness of its outsourcing strategies.

Chapter 3 focuses on major drivers and future directions in the outsourcing sector. This chapter examines the effect of these drivers (globalization) and a more demanding consumer on the economy. Chapter 4 investigates the ways in which outsourcing has evolved over the years. Part 1 concludes with the fifth chapter which examines the recent developments in global information technology sourcing. This chapter proposes best-practice factors that could lead to a better outsourcing relationship and also presents a table indicating challenges associated with outsourcing such as; late delivery, corruption, accusations of fraud and incompetence, *etc*.

Part 2 of the book addresses how organizations change as a result of contracting out services. Chapter 6 provides an overview of the ways in which a company can benefit from insourcing needed skills rather than outsourcing services. This chapter illustrates the usefulness of a Global Laboratory Network (GLN). GLN involves finding a university, national lab or person with technology competencies in a country in which one does business. In the subsequent chapter, authors provide a comprehensive assessment of how outsourcing is affected by corporate competiveness strategy, innovation and productivity growth. The study

points out that, there is a positive and significant correlation between wage growth and growth in outsourcing. An analysis of Swedish firm-level innovation survey data has been covered in this chapter.

Chapter 8 is very pertinent from the point of view of workers. Over 200 supervisors and Junior managers from UK companies were interviewed to gain their perspectives on outsourcing. Trade unions have conveyed employee anxiety and resistance during period of outsourcing. The limited knowledge that workers have about their employment rights during the outsourcing process has been highlighted. Unambiguous process of outsourcing through better information mechanism and a well managed outsourcing effort is necessary for the benefit of both the company and employees.

Final chapter of this section examines the impact of outsourcing on employees and looks at their organizational commitment levels, among other factors. This chapter cautions that outsourcing may sometimes lead to detrimental impact on the employees. As a consequence, much of the possible strategic value of outsourcing that could have created a competitive advantage will be lost. The key aspect in this chapter is that outsourcing should only be considered when it clearly contributes to the firm's core objectives.

In this context, eventhough not directly related to outsourcing in manufacturing sector, it is pertinent to mention that studies point out that besides possible job loss due to contracting out jobs; workers in the firms which accept outsourcing contract may also suffer. For example, a survey points out the vulnerabilities for laborers in India's Business Process Outsourcing (BPO) sector (Ramesh, 2004). According to this survey, firms often terminate the job to get rid of long-term commitments towards employees. Furthermore, odd working time conflicts with the natural rhythm of human body resulting in increased healthcare costs besides affecting personal and social life. Workers are not entitled for national / religious holidays, as the firms work with clients' calendar. The study also observed that workers develop poor eating habits, smoking,

excessive drinking of coffee, *etc* to cope up with the psychological and physical stress.

In part 3, the book highlights the ways in which outsourcing has impacted the workplace, and the changes that will continue to occur within the workplace, due to the dynamic nature of the outsourcing process. Chapter 10 explores the effects of outsourcing on international trade flows. It points out one way of measuring outsourcing is by calculating the amount of imported intermediate inputs within each industry. Authors provide cross country tables on share of imported to total intermediate inputs. The study indicates that there is no single measure to capture the phenomenon of outsourcing and various studies define it differently. This chapter presents the findings of studies that examine the usefulness of outsourcing to small and medium sized enterprises and the hindrances that may limit their engagement in such activities.

In chapter 12, authors delve into the economic rationale for outsourcing activities, especially the impact that outsourcing has on wages and employment. Various institutional and legal reasons can also affect the outsourcing decision. For example, employment protection legislation decreases the discretionary power of management to adjust a firm's employment level at will. Authors observe outsourcing at both firm and international level, and point out instances of outsourcing increasing wage inequality and decreasing labour demand. However, this chapter cautions against the total acceptance of these findings due to the differences between measurement and theory. In this context, a study explains outsourcing as a process in which the innovating firms introduce a product in the domestic market, which is later shifted to other countries where it is cheaper to produce (Bhagwati, Panagariya and Srinivasan, 2004). In this process, even though home country may lose low wage jobs, it will gain high wage jobs due to increase in efficiency.

Direct and indirect influences of outsourcing on trade unions are investigated in chapter 13. It correctly points out that the effects of outsourcing cannot be approached in a homogenous way because of the

heterogeneous nature of legal and negotiated framework of countries. The existence of well established legal structures is essential for smooth functioning of any contract. The chapter also provides evidence from the automobile industry on the trade union's attempt to negotiate and maintain an element of control on the outcomes of an outsourcing process.

Subsequently the chapter indicates that companies outsource some of their activities for short-term and strategic motives. While short term motives includes cost reduction, obtaining new technology etc, strategic motives include concentrating on the core business. Chapter 14 is very unique in literature and deals with outsourcing and accounting practices. Transaction costs, controlling and monitoring costs are important in outsourcing agreements. The outsourcing company's profitability tended to decrease in the event year but increase in the subsequent year. The capital structure and risk profile change as a result of outsourcing. The change in liquidity ratios of outsourcing companies indicates that current resources are used to cover the payment of outsourcing contracts, including set-up costs.

Part 4 deals with legal, control and relationships issues pertaining to outsourcing. Legal issues are key components on which companies should focus to ensure successful relationships between themselves and those to whom they outsource. Chapter 15 discusses the requirements relating to confidentiality and treatment of personal data, dispute management, *etc*. It advises that a procedure must be detailed in the contract for enabling changes in the outsourcing contract. Authors point out a critical fact that legal system relating to outsourcing is in their infancy. The chapter ends by highlighting that a well-constructed contract can contribute to a successful outsourcing relationship. Next chapter examines the risks involved in outsourcing and point out a balanced contracting model may create mutual dependence between buyer and supplier and thus reduce the risk of noncompliance. Chapter 17 acknowledges that service-level agreements are necessary in any outsourcing relationship. The service-level agreements deal with the compensation to be paid in the event of failure to fulfill the contracts.

Chapter 18 presents a detailed overview of critical requirements that are needed to build and sustain an outsourcing relationship and stresses the importance of concept of partnership mentality. Partnership mentality can be defined as 'the parties' attitudes and behaviors that motivate them to move together to attain their objectives. These attitudes include cultural compatibility, commitment and mutual trust. The degree to which buyers and sellers are compatible in these components will determine their ability to jointly work and carry on outsourcing contract. This chapter compares outsourcing to marriage, which requires mutual commitment to make a relationship work. Next chapter of this section examines ethical issues within outsourcing such as fair trade, social responsibility and codes of conduct, which are meant to encourage more ethical behavior. This includes ban on child labour, issues regarding payment of minimum wage, *etc*. In order to protect themselves from allegations of social responsibility, organizations need to look into these issues and know the background of companies with which they do business.

Part 5 provides a few case studies that will feature the specific processes involved in outsourcing and the different results that arise from such processes. Chapter 21 outlines a practical guide for public-sector managers who are considering outsourcing a government activity or service. The final chapter presents an in-depth assessment of an outsourcing relationship between two companies.

On the whole, the book is a substantial contribution to the existing literature on outsourcing and is very topical. It includes rare literature on the topic like outsourcing and challenges to accounting practices and importance of ethical issues, the concept of partnership mentality, *etc*. The book includes number of well presented tables providing data and statistical results of various studies. It contains number of case studies which added its worth. It points out that international outsourcing was one of the strongest components of international integration in recent years. It also proposes future areas for research like relationship between the firms life cycle stage and appropriateness of its outsourcing strategies.

The scope of the book largely confined to manufacturing sector. In this context it may be mentioned that, the recent literature on outsourcing is synonymous with service sector outsourcing from developing countries to developed countries. This book does not contain any significant study on emerging players in the outsourcing like India, Ireland, *etc*. Case studies are mainly on Western countries like Australia, UK, *etc*. Characteristics of outsourcing in these countries may be different from features of service sector outsourcing in developing countries which are growing rapidly. To conclude, the book is very exhaustive, informative and useful for researchers and institutions having interest in outsourcing.

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Reserve Bank of India Occasional Papers
Vol. 29, No. 1, Summer 2008

Microfinance and Public Policy: Outreach, Performance and Efficiency edited by Bernd Balkenhol Palgrave Macmillan Publication, New York, 2007, pages 286, price £ 60.00

Microfinance has globally emerged as a major policy tool for eradication of poverty in the previous two decades. During this period, Micro Finance Institutions (MFIs) experienced a spectacular growth in terms of volume and outreach. The book, "Microfinance and Public Policy: Outreach, Performance and Efficiency", which was published by Palgrave Macmillan in 2007, addresses some important issues relevant to microfinance. The book, edited by Bernd Balkenhol of International Labour Office, presents the findings of a survey by Geneva International Academic Network (GIAN) of 45 MFIs, which are operating in 21 countries across Africa, Asia, Latin America, Eastern Europe and Middle East and North Africa. The research work was a joint project of Geneva International Academic Network, the Institute of Development Studies, International Labour Office, University of Cambridge and University of Geneva, with ILO as coordinating agency. The major focus of the book is to examine the efficiency of MFIs.

Part I, comprising the Chapter, 'Efficiency and Sustainability in Microfinance', which is the introductory chapter, discusses various dimensions of the microfinance, *viz.*, promises and achievements made by it, efficiency and financial sustainability of microfinance institutions. Efficiency refers to the ability of firms of using scarce resources in most effective ways in providing greatest number of goods and services to end-users. Efficiency is a matter of technical transformation of inputs (staff, funds) into outputs (loans and other financial services). In case of MFIs, such technical efficiency can be measured in terms of ratios such as number of clients per loan officer, average loan balance and staff costs. Book emphasises the need to differentiate efficiency from financial sustainability. There could be situations where an MFI is efficient in technical and allocative terms under market constraints, but not financially sustainable. Chapter concludes that in situations of discrepancy between

efficiency and financial sustainability in MFIs, efficiency can be considered as neutral and high order performance criteria.

Part II of the book covering four chapters, discusses the conceptual framework in terms of theoretical link between poverty, inequality and finance from various perspectives. It also sets out various issues in the area of microfinance. It depicts that the microfinance products other than microcredit such as micro insurance and micro deposits can be more useful for poor. There could be trade-off between poverty reduction and financial performance of MFIs. Surveys of some MFI recognise the indispensability of subsidies for financial performance and targeting the poor. However, in many cases, MFIs face some kind of problem related to getting subsidies. It has been observed that public donors attach more conditions than private donors to subsidies they provide. In the absence of subsidies, it would be difficult for microfinance institutions to reach to very poor which may lead to exclusion may also happen because of various constraints, *viz.,* climatic conditions, geographic distance, low population density, lack of sufficient collateral and irregularity of income, *etc.* It is also to be noted that by increasing over-indebtness in some sections of poor population microfinance can increase inequality in society. Authors Amadou Diop, *et al.,* draw conclusion that micro-credit by itself cannot be panacea to reduce social inequalities and eradicate poverty.

The chapter on 'Poverty Reduction through Microfinance: A Capability Perspective' attempts to examine the issues raised in previous Chapter. It explains that there could be positive and negative effects of microfinance. Positive aspects are based on the assumption that there is a managerial capacity in poor people (idea of self employment). It may be broadened by linking food and income security with financial security. Access to financial services may increase the risk bearing appetite, smoothen the consumption pattern, increases the expenditure on medical, education and other social occasions. But at the same time many mechanisms might be detrimental to poor from enjoying the benefits of microfinance, *viz.,* strict group membership rules, peer group

expectations, *etc.* Author, Flavio Comim, in comparison to other value-based approaches, advocates adopting Sen's capability approach for assessing the true requirement of credit. Unlike standard measures of poverty which emphasise resources as indicators of human well being, capability approach focuses on people's level of education, self confidence and autonomy as capabilities, and can have intrinsic and instrumental values. Capabilities are intrinsic when they are valued independently of their consequences, while they may be instrumental when they are valued dependent on their consequences.

Next article on 'Achieving Poverty Outreach, Impact and Sustainability: Managing Trade-offs in Microfinance', examines the conundrum of the trade-off between social and financial objectives and how it can be managed practically. The questions at the helms of trade-offs are social objectives of MFIs, who are served, what are the services being served and what is the level of viability. According to author Anton Simanowitz through analysis and program design, greater depth and outreach can be achieved. It can, but must not always, affect the financial performance of an MFI. It strongly believes that it is possible and cost effective for the MFIs to devise systems for monitoring and assessing their outreach performance.

Last chapter of this part, 'Smart Subsidies,' argues that government measures can be meaningful and effective and can be devised so as to avoid negative externalities. It can be in the form of startup subsidies for institutions or can be startup subsidies for customers. It emphasises that startup subsidies have advantage of being time limited and relatively transparent. According to the Chapter, arguments against subsidies spring from fears that they would undermine the long term viability of microfinance and limit its scale. However, Jonathan Morduch emphasises that, in principle, subsidies in modern microfinance can be well designed. And, if so, they can be part of efforts to achieve meaningful transformation in the lives of clients, without sacrificing the integrity of institution.

Part III of book, comprising four chapters discusses methodology for estimating efficiency. 'Efficiency in Microfinance Institutions: An Application of Data Envelopment Analysis to MFIs in Peru' argues that in case of MFIs, traditional methods of estimating efficiency would not be sufficient as MFIs are non-profit organisations which work for social cause. Therefore, there is a need for a methodology applying multiple efficiency criteria for assessing the degree to which MFIs are financially and socially efficient. For this authors Renata Serra, Fabrizio and Milasoa Cherel-Robson apply Data Envelopment Analysis, which very often used for measuring the financial and social performance of banks and other financial institutions. It uses a data set of 40 microfinance institutions active in Peru in 2003. In the analysis, authors, found that efficiency level of MFIs is quite high.

The next chapter 'Efficiency in Financial Intermediation: Theory and Empirical Measurement' by Thorsten Beck has applied interest rate as a measure of efficiency. It discusses that, while in developed countries interest rate spread is 2 to 4 per cent, in developing countries often it could be up to 10 per cent and in certain cases it may reach up to 30 per cent (*e.g.,* Brazil). The Chapter concludes that, while the efficiency of financial system is reflected in interest spread and margins, one has to consider underlying causes in order to formulate sensible policies. Chapter emphsises the reforms in macroeconomic and institutional framework of economy to enforce competition and attain higher efficiency.

Findings of Chapter, 'Efficiency Drivers and Constraints: Empirical Findings', show that efficiency and financial results are distinct dimensions of performance of an MFI. According to the author,Yousra Hamed, there are five drivers that position an MFI on the socio-financial space, *viz.,* location, legal form, scope for externalisation of transaction costs, method of staff remuneration and delivery techniques (group *vs.* individual loans and collateralised *vs*. uncollateralised loans). It concludes that the diversity of operating environments and rich variety of institutions, both influence the position of an MFI on the trade-off between financial and social performance, and it appears timely to ground donor

support on a more general, fair and neutral criteria, which is efficiency. Author briefly presents the results of the 2004-05 GIAN survey. Based on survey it arrives at a set of efficiency indicators - measured in terms of financial as well as operational self sufficiency - such as administrative expenses per loan outstanding, cost per borrower, average loan processing time, *etc.,* which can be taken as neutral criteria for funding.

In the last chapter of this section, 'Measuring the Performance of MFIs: An Application of Factor Analysis,' Giovanni Ferro Luzzzi and Sylvain Weber have used factor analysis method for measuring the performance of the MFIs. Chapter follows somewhat similar methodology used in Chapter 6 where MFI's output are measured and evaluated with respect to resources used in efficient frontier context but with, a different dataset and an alternative model. Authors demonstrate that by factor analysis it is possible to present graphically the location of efficient MFIs as clusters, the relative best performer and distance of any given MFI in a cluster to that relative best performing MFI.

Part IV of book comprises four case studies in four chapters related to MFIs of four countries/regions, *viz.,* Mali, Morocco, Eastern Europe and Central Asia and Chile, which illustrate the variety of exogenous variables bearing on the precise position of an MFI on poverty profitability continuum. Mali's case study by Renata Serra *et al;* deals with the consequences of subsidy dependence despite impressive growth and encouraging policy and regulatory environment. The case of Morocco is probably a unique combination of government support and commitment of the commercial banking sector for its pronounced poverty eradication focus. The scenario is entirely different for Eastern Europe and Central Asia where most MFIs are involved in lending to micro-enterprises. Vito Sciaraffia Merino presents a unique case study of Chilean auctioning system of subsidy to microfinance to commercial banks. It claims that evaluation by academicians show that not only this method was less costly to taxpayers than alternative methods but also that a substantial portion of these clients graduated into the banks regular portfolio: an illustration of smart subsidy.

Part V is concluding section of the book. It discusses the policy implications by editor of book himself. The chapter sums up the arguments, findings and suggestions and indentifies the implications for the managers of MFIs, policy makers, governments and donors. It calls on donor community to focus on efficiency as the fundamental performance criteria so as to be able to encompass different degrees of social financial missions in large universe of MFIs.

Overall it may be concluded that though the conclusions of book are based on a very narrow data, it raises a number issues for further research. This book may prove as an important reference book for academicians and policy makers who are concerned about the MFIs and eradication of poverty. Though it does not shed sufficient light on Indian scenario. The book is very relevant for India, which is emulating the policies of financial inclusion with microfinance institutions.

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