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EFFECT OF FINANCIAL LIBERALISATION ON INVESTMENT ALLOCATION: AN EMPIRICAL ANALYSIS

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Foreword

This paper by Basudeb Guha-Khasnobis and Saumitra Bhaduri of the Madras School of Economics attempts an early evaluation of the effect of the ongoing reforms in the financial sector, especially those related to the capital market. The authors address the question of whether the abolition of the Controller of Capital Issues (CCI), the gradual easing or removal of a few other restrictions on interest rates and reserve requirements and reductions of Statutory Liquidity Ratio (SLR), have led to an improvement in the allocation of investment in India during the 1990s. They test the hypothesis that a more market oriented financial sector should be able to direct investment towards industries, and firms within an industry, which are growing or profitable, so that the growth rate of the economy is maximised. Their econometric analysis leads them to the findings that for the chemicals, automobiles, electronics and food industries, the allocation effect of investment is in the expected direction. But in other industries, e.g., cement, drugs & pharmaceuticals, iron and steel, machinery, paper and metal products, etc., this does not hold.

Given that financial reforms in India are still at an early stage, the authors are careful to qualify their findings accordingly. I have no doubt that this study will stimulate further empirical analysis in this very complex area of policy reform.

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Introduction

A fundamental job of the financial sector of any economy is to allocate capital efficiently. To achieve this, capital is supposed to be invested in the sectors that are expected to have high returns and be withdrawn from sectors with poor prospects. It has been argued that formal financial markets and associated institutions improve the capital allocation process and thus contribute to economic growth. However, there is little actual evidence on whether and how financial markets improve the allocation of capital. Recently, Wurgler (2000), using a data set comprising 65 countries and 28 industries over 33 years finds that developed financial markets, as measured by the size of the domestic stock and credit markets relative to GDP, are associated with a better allocation of capital. Financially developed countries increase investment in their growing industries and decrease investment in their declining industries. Thus, although financially developed countries might not invest at a higher *level* (Carlin and Mayer, 1998; Beck, Levine, and Loayza, 2000), they do seem to *allocate* their investment better. For example, the elasticity of industry investment to value added is several times higher in Germany, Japan, the United Kingdom, and the U.S. than in financially undeveloped countries such as Bangladesh, India, Panama, and Turkey. Relative to countries with large financial markets, other countries both over-invest in their declining industries and under-invest in their growing industries.

Wurgler argues that capital allocation is improved through at least three mechanisms. First, countries with stock markets that impound more firm-specific information into individual stock prices exhibit a better allocation of capital. This is consistent with the suggestion that larger markets have more informative prices which help investors and managers distinguish between good and bad investments. Second, capital allocation improves as state ownership declines. This is not surprising since, in state-owned firms, resource allocation is guided less by value-maximisation than by political motives. Also, soft budget constraints and poor monitoring give managers in state-owned firms few incentives for efficiency. The existing evidence on this supports Shleifer's (1998, p. 144) view that "elimination of politically motivated resource allocation has unquestionably been the principal benefit of privatisation around the world." Third, strong minority investor rights, as measured by La Porta et al. (1998), are associated with better capital allocation. The allocational benefit of investor rights seems to come through limiting over-investment in declining industries rather than through improving the supply of finance to growing industries.

There are other notable contributors to the literature on the relationship between finance and economic growth. At the country level, King and Levine (1993), Levine (1998), Levine and Zervos (1998), and Beck, Levine, and Loayza (2000) make an empirical case that financial development causes growth. At the industry level, Rajan and Zingales (1998) show that the industries that rely on external financing in the U.S. grow faster in financially developed countries. Arguably, these are industries with a technological need for external finance, perhaps to reach an efficient scale. At the U.S. state level, Jayaratne and Strahan (1996) find that economic growth increases in states that relax intrastate bank branching restrictions. At the firm level, Demirguc-Kunt and Maksimovic (1998) use a financial planning model to estimate sustainable growth rates in the absence of external finance and find that firms in financially developed countries are able to grow faster than this benchmark.

One of the central questions asked by researchers on this topic is whether better capital allocation a reason why financial development is associated with economic growth. Several authors have suggested this, including Goldsmith (1969), McKinnon (1973), Shaw (1973), and Greenwood and Jovanovic (1990). Some empirical evidence supports this suggestion. Bagehot (1873) cites better capital allocation as a primary reason for England's comparatively fast growth in the mid-to-late 19th century. Jayaratne and Strahan provide evidence that their U.S. state-level results reflect improvements in the quality of banks' loan portfolios, i.e., improvements in the allocation of their capital. Also, in their cross-country study, Beck et al. infer that the link between finance and growth is improved allocational efficiency, as suggested by the fact that financial development (specifically, the banking sector) is robustly associated not with higher capital accumulation but rather with higher productivity growth, which is how an improvement in capital allocation is expressed in their growth accounting framework.

A hallmark of the new economic policy of India has been the gradual liberalisation of its financial sector. The immediate effect of reforms in this sector has been a perceptible rise in the level of activity in the various financial markets. In this paper we ask questions that are similar to those described above to get at least a preliminary impression of the possible effects of the policy changes implemented so far. Although the first stock exchange in India is now well over a century old, until the 1990s, the volume of activity in Indian stock markets was insignificant compared to even some of the more recently opened stock exchanges of the developed countries, in particular, those of East Asia. One of the reasons for the low

volume of activity was the degree of control exercised by the central authority over a firm's choice of both the sources as well as the uses of funds. For example, the Controller of Capital Issues (CCI) imposed strict conditions on firms trying to raise funds through the equity route. Also, long-term borrowing was largely under the purview of the public sector Development Financial Institutions (DFI) which, either through direct lending or through re-financing arrangements, virtually monopolised the supply of debt finance to the corporate sector.

In May 1992 the CCI was abolished, making access to the equity market much less restrictive, subject only to meeting certain technical conditions, and not to any formal approval process as had been the case earlier. On the debt front, institutional reform was less significant, in the sense that the DFI monolith remained virtually intact. However, there were some reforms in interest rate policy, with the institutions increasingly being given the freedom to determine their structure of interest rates. The government reduced pre-empting of bank resources through a gradual reduction in reserve requirement ratios. The cash reserve ratio on incremental deposits was also reduced to 15 per cent by 1994, while the statutory liquidity ratio was brought down to 31.5 per cent. These measures led to a significant increase in funds at the disposal of Banks for lending. The interest rate controls were relaxed as well. Finally, in order to encourage competition, new private sector banks were given licenses and branch-licensing restrictions were relaxed. The Government reduced its stake in many financial institutions. The broad objective of financial reforms in India, of which the ones cited above are specific measures that are directly relevant to our analysis to follow, is to ensure that a market-oriented financial sector contributes positively to economic growth of the country by providing access to external (equity) funding for firms that have a technological need for it, and, by channeling investment towards growing and profitable industries and firms.

We first examine whether the total funds (debt and equity) available for investment   started flowing to the more profitable (defined later) industries and to the better firms within an industry, during the process of liberalisation (1991-1998). We examine changes in the allocation of credit across industrial sectors and changes in the allocation of capital among firms within the same sector or industry by using a simple measure of efficiency, developed by Schiantarelli, Weiss, Jaramillo and Siregar (1994). Barring a few exceptions, such as the electronics, chemicals and automobile industries, there is no perceptible increase in allocation efficiency as yet. We next examined whether external financing gained in importance in the three years immediately following the abolition of the CCI

and found that equity, as a source of fund, had risen dramatically, as it should be the case, in the period immediately after the abolition of CCI. However, investment in gross fixed assets did not match it at all, except for Matured Firms, which are more than 50 years old. Instead, the correlation between increments in Internal Sources of Funds and investment in gross fixed assets increased after liberalisation. The findings are disturbing, as they fail to generate to the private investors any clear and positive signals about sound corporate management. We stop short of ascribing the lack of allocational efficiency of investment that we found in the first part of this report to possibly badly managed "use" of funds in the years immediately after liberalisation, because there were many other changes both at the domestic as well as the international levels in the 1990s, which are outside the scope of this analysis. However, we do reiterate that since financial reforms in a weak regulatory framework can be fruitless, effort should be made to strengthen the existing framework. There is one possible caveat in our empirical finding, viz., it may be argued that investment decisions bear results with a lag. Therefore, a comparison of three years prior to and six years after liberalisation may not reveal its full effect on investment measures. However, we cite and discuss the results of similar exercises performed by others on the corporate sectors of Indonesia and Ecuador and note that they do show improvements within even shorter time frames.

Data

The data for our efficiency analysis is drawn from the Prowess database compiled by the Center for Monitoring Indian Economy (CMIE), which reports accounting information for a large number of firms in the Indian manufacturing sector. A balanced sample is used for this exercise. Only those firms who reported their annual accounts for the financial years 1989-98 consecutively were selected. Based on this criterion, we were able to generate data for 620 firms in 13 broad manufacturing sectors. In our sample almost 45% of firms come from Chemicals, Textiles or Machinery which is reasonably representative of the general structure of India's manufacturing sector. Next, we divide the sample into smaller sub-groups according to three firm-characteristics, viz., size, age and ownership. Specifically, we take four quartiles of capital employed in 1992 as proxy of size variable. These quartile values are (in Rs. Crores) 9.73, 23.19, 48.71 and more than 48.71. Similarly, we take four quartiles of age (15, 28, 42 and more than 42 years) as proxy of the age variable. Ownership takes three dimensions: group, foreign private and Indian private. Table 1 below describes the sample.

Table 1
Sample of firms

Industry	No. of Firms	Percentage
Group	374	60.32
Private (Foreign)	61	9.84
Private (Indian)	185	29.84
Total	620	100
Industry		
Automobile	34	5.48
Cement	30	4.84
Chemical	73	11.77
Drugs/Pharmaceuti cal	35	5.65
Electronics	19	3.06
Food	54	8.71
Iron and Steel	18	2.90
Metal Products	41	6.61
Machinery	118	19.03
Paper	27	4.35
Plastic and Rubber	36	5.81
Textile	87	14.03
Miscellaneous	48	7.74
Total	620	100.00

A Measure of the Efficiency of Investment Allocation

In order to calculate the efficiency of the allocation of investment we first need measures of the marginal product of investment. In general, one cannot obtain direct measures of the marginal product of investment without knowing the parameters of the production function. We make the standard assumption that the marginal product of capital is proportional to particular measures of the average product of capital. The two principal proxies for a measure of the average product of capital that we have used are the ratio of operating profits to capital and the ratio of value added to capital. The former proxy is the correct one when the production function is homogeneous of degree one, while the latter is correct when the value added production function is Cobb-Douglas. To arrive at the measure of efficiency of investment allocation between firms belonging to a particular industry, we proceeded as follow. First, we calculated the return to investment for each firm by multiplying investment by the firm by one of our

proxies of the firm's marginal product of investment. We added the return to investments by each firm across all firms to get an estimate of the total return to investment for the industry in a particular year. Next, this measure of the total return on investment was divided by the total return that would have been realised if investment funds had been allocated amongst firms in proportion to their share of capital in the industry. Our measure of the efficiency of the allocation of investment is the ratio of our estimate of the actual total return on investment to this hypothetical estimate of the total return that would have been achieved if investment funds were allocated according to each firm's share of the capital stock. The index is invariant to macroeconomic changes that raise the value of the marginal product of capital uniformly for all firms. This approach gives two different measures of the efficiency of the allocation of investment funds: one where operating profits per unit of capital is used as a measure of the marginal product of investment, the other where value added per unit of capital is used for the same purpose. Thus, the estimate of the efficiency of the allocation of investment when, say, operating profits (Π) are used as a proxy for the marginal product of capital is

$$A = \frac{\sum\limits_{t=T_0}^{T_1}\sum\limits_{i=1}^{N_1} I_{it}\frac{\Pi_{it}}{K_{it}}}{\sum\limits_{t=T_0}^{T_1}\sum\limits_{i=1}^{N_1} I_{0t}\frac{K_{it}}{K_{0t}}\frac{\Pi_{it}}{K_{it}}} = \frac{\sum\limits_{t=T_0}^{T_1}\sum\limits_{i=1}^{N_1} I_{it}\frac{\Pi_{it}}{K_{it}}}{\sum\limits_{t=T_0}^{T_1}\sum\limits_{i=1}^{N_1} I_{0t}\frac{\Pi_{it}}{K_{0t}}}$$

N_t represents the number of firms in year t. I_{it}, K_{it}, Π_{it} refer, respectively, to investment, capital stock and operating profits for firm i in period t. I_{0t} and K_{0t} refer to total investment and capital stock in period t. The following definitions are used.

(1)   Capital Stock: We are interested to know how the external finance is distributed across firms with different levels of productivity.

(2)   Capital Stock (Capital Employed) = Equity Capital + Preferred Capital + Reserves + long term borrowings.

(3)   Gross Value Added (GVA) = Operating Profit + Wages + Lease rent + Other rent.

(4)   Operating Profit: Profit before depreciation, Interest and Tax (PBDIT).

The alternative measure of efficiency, denoted by B, is obtained by replacing Π_{it} with value added. An analogous formula is used to measure

efficiency of investment allocation across industries. The indices are calculated for both the pre-liberalisation (1990-1992) as well as the post-liberalisation (1993-1998) periods.

Table 2
Measures of Efficiency of the Allocation of Investment in India:

Total and within Various Groups of Firms

Category	Period	A (Based on Profits)	B (Based on Value Added)
All	Pre Lib (1990-1992)	0.96	0.98
	Post Lib (1993-1998)	0.87	0.81
Size			
Quartile_1	Pre Lib (1990-1992)	1.04	1.21
	Post Lib (1993-1998)	0.92	0.90
Quartile_2	Pre Lib (1990-1992)	1.10	1.10
	Post Lib (1993-1998)	0.91	0.90
Quartile_3	Pre Lib (1990-1992)	0.98	0.97
	Post Lib (1993-1998)	0.96	0.97
Quartile_4	Pre Lib (1990-1992)	0.94	0.96
	Post Lib (1993-1998)	0.84	0.83
Age			
Quartile_1	Pre Lib (1990-1992)	0.96	0.98
	Post Lib (1993-1998)	0.90	0.96
Quartile_2	Pre Lib (1990-1992)	0.98	1.01
	Post Lib (1993-1998)	0.80	0.77
Quartile_3	Pre Lib (1990-1992)	0.95	0.96
	Post Lib (1993-1998)	1.05	.99
Quartile_4	Pre Lib (1990-1992)	0.97	0.98
	Post Lib (1993-1998)	0.86	0.85
Association with Business Group			
Group	Pre Lib (1990-1992)	0.96	0.97
	Post Lib (1993-1998)	0.89	0.87
Private (Foreign)	Pre Lib (1990-1992)	0.99	0.98
	Post Lib (1993-1998)	0.92	0.95
Private (Indian)	Pre Lib (1990-1992)	1.03	1.15
	Post Lib (1993-1998)	0.94	0.92

In Table 2, category "All", we find that the overall efficiency of allocation of investment in India has declined in the post-liberalisation period irrespective of the measure used. The same result prevails when firms are sub-divided according to "Size". When firms are sub-divided according to "Age", the third quartile shows improvement in the efficiency of allocation of investment. These are firms that are 28-42 years old. The rest show a decline in the same. There is also persistent decline when firms are subdivided according to "Association with Business Group."

Table 3
Measures of Efficiency of the Allocation of Investment in India: within Industries

Industry	Period	A (Based on PBDIT)	B (Based on VA)
Automobile	Pre Lib (1990-1992)	1.02	1.03
	Post Lib (1993-1998)	1.07	1.04
Cement	Pre Lib (1990-1992)	0.93	0.91
	Post Lib (1993-1998)	0.88	0.86
Chemical	Pre Lib (1990-1992)	0.85	0.88
	Post Lib (1993-1998)	0.86	0.90
Drug and Pharmaceutical	Pre Lib (1990-1992)	1.00	0.97
	Post Lib (1993-1998)	0.94	0.88
Electronics	Pre Lib (1990-1992)	0.98	0.89
	Post Lib (1993-1998)	1.07	1.10
Food	Pre Lib (1990-1992)	0.98	0.98
	Post Lib (1993-1998)	0.99	1.03

Iron and Steel	Pre Lib (1990-1992)	0.95		0.98
	Post Lib (1993-1998)	0.93		0.99
Metal Products	Pre Lib (1990-1992)	0.96		1.027
	Post Lib (1993-1998)	0.96		0.89
Machinery	Pre Lib (1990-1992)	0.99		0.98
	Post Lib (1993-1998)	0.82		0.85
Paper	Pre Lib (1990-1992)	1.00		1.00
	Post Lib (1993-1998)	0.95		0.95
Plastic and Rubber	Pre Lib (1990-1992)	0.96		0.96
	Post Lib (1993-1998)	0.88		0.86
Textile	Pre Lib (1990-1992)	1.05		1.08
	Post Lib (1993-1998)	0.98		0.98
Miscellaneous	Pre Lib (1990-1992)	0.96		0.99
	Post Lib (1993-1998)	0.99		1.00

In Table 3, we have reported the efficiency estimates of firms across several industry categories including automobile, cement, chemicals, drugs and pharmaceuticals, electronics, food, iron and steel, metal products, machinery, paper, plastic and rubber and textiles. The automobile, chemicals, food and electronics industries show an improvement in the degree of efficiency of allocation of investment across firms. The rest show a decline.

Table 4 reports the change in investment shares and change in profitability of the different groups of firms. These calculations have been made with a view to identifying groups of firms where attention and possibly intervention are called for if the economy-wide efficiency of investment allocation is to be raised.

Table 4
Share of Investment and Profitability by Categories of Firms in India.

Category	Share of Investment (I_{it}/I_{0t})		Profitability (π_{ot}/K_{0t})	
	Pre-Lib	Post-Lib	Pre-Lib	Post-Lib
Size				
Quartile_1	0.01	0.02	0.41	0.33
Quartile_2	0.06	0.06	0.35	0.29
Quartile_3	0.11	0.11	0.32	0.28
Quartile_4	0.809668	0.81	0.26	0.22
Age				
Quartile_1	0.13	0.15	0.27	0.24
Quartile_2	0.24	0.24	0.24	0.21
Quartile_3	0.21	0.18	0.32	0.28
Quartile_4	0.40	0.41	0.28	0.22
Association with Business Group				
Group	0.84	0.86	0.27	0.22
Private (Indian)	0.09	0.07	0.32	0.26
Private (Foreign)	0.06	0.06	0.36	0.36

The general picture that emerges is that the groups that show an increase in share of investment also tend to show a decline in profitability. An implication of this finding is that investment funds of the economy went largely to groups of firms which were not growing or profitable. For instance, quartiles 1, 2 and 4 in the "Size" category experienced a rise in their share of investment. But all three quartiles show a decline in their profitability ratios after liberalisation. Similarly, quartiles 1 and 4 in the "Age" category reveal a similar trend as do "Group" firms.

In Table 5 we report results of the same exercise for different cross sections of the manufacturing sector. The cement, electronics, food, metal products, machinery and paper industries depict the unhealthy correlation of rising investment shares and declining profitabilities. The sole exception is the chemical industry, which shows a fall in the share of investment with a rise in profitability.

There are some caveats that are to be kept in mind while interpreting the estimates. First, it is assumed that the firm's ratio of profits or value added to capital is proportional to the firm's marginal product of capital. Admittedly, this is true for some production functions but not all. Second, it has been assumed implicitly that cost of investment is proportional to the quantity of investment, ignoring any possible non-linearity in such cost. Also, we have assumed that market prices reflect the social value of goods. This was necessitated by the near impossibility of measuring social values. However, the robust nature of our estimates across and within sectors seems to indicate that none of these assumptions are critical to our results in a qualitative way.

Changes in Sources and Uses of Funds

The second effect of stock market deregulation that we have investigated is that on the sources and uses of funds by Indian firms. The abolition of the CCI and the general easing of control over the banking sector created a more enabling environment for firms to decide on the source through which they wish to raise funds for new projects and also the use of such funds. This question is important in itself and perhaps can also throw some light on the possible causes behind the rather unimpressive record of the efficiency of investment allocation discussed in the previous section. First, we present graphs showing the evolution of borrowing and spending patterns of the firms in our sample. We have concentrated on four key flow of fund variables: (a) Changes in Gross Fixed Asset (GFA) as a measure of long-term investment (b) Net Total Borrowing (NTB) as a measure of long-term liability (c) Current Liability (CLIB) as a measure of short-term liability, and (d) Equity Capital (EQCAP) which represents fresh equity and share premium. Thus, (b)-(d) are variables that capture the importance of borrowing sources for the firms while (a) represents spending on long-term, productive assets.[1]

Let C_t denote the ratio of Gross Fixed Asset (GFA), to Total Sources of Funds where "t" is a time subscript and each C is defined as an average over all the firms in a particular sub-group. Thus, we can define a cumulative density function (cdf) for Gross Fixed Assets (as a proportion of total sources of funds) as:

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[1]   See Guha-Khasnobis and Bhaduri (1999).

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$$Index_t = \frac{\sum_{t=0}^{t} C_t}{\sum_{t=0}^{T} C_t},$$

Where T is the terminal year.
For t = T the index will take the value 1.

The properties of this index make an assessment of the trends in the underlying variable quite simple and intuitive. To facilitate comparison, we have introduced a diagonal in each figure. If a particular cdf function lies above the diagonal, it is indicative of that particular ratio *falling* over time, especially after liberalisation. Similarly, if a cdf function lies below the diagonal, it indicates a *rising* trend in that ratio over time and after liberalisation.

Business Group Firms

Young Firms

Large Firms

Matured Firms

GFA, NTB, CLIB, EQCAP, Diag
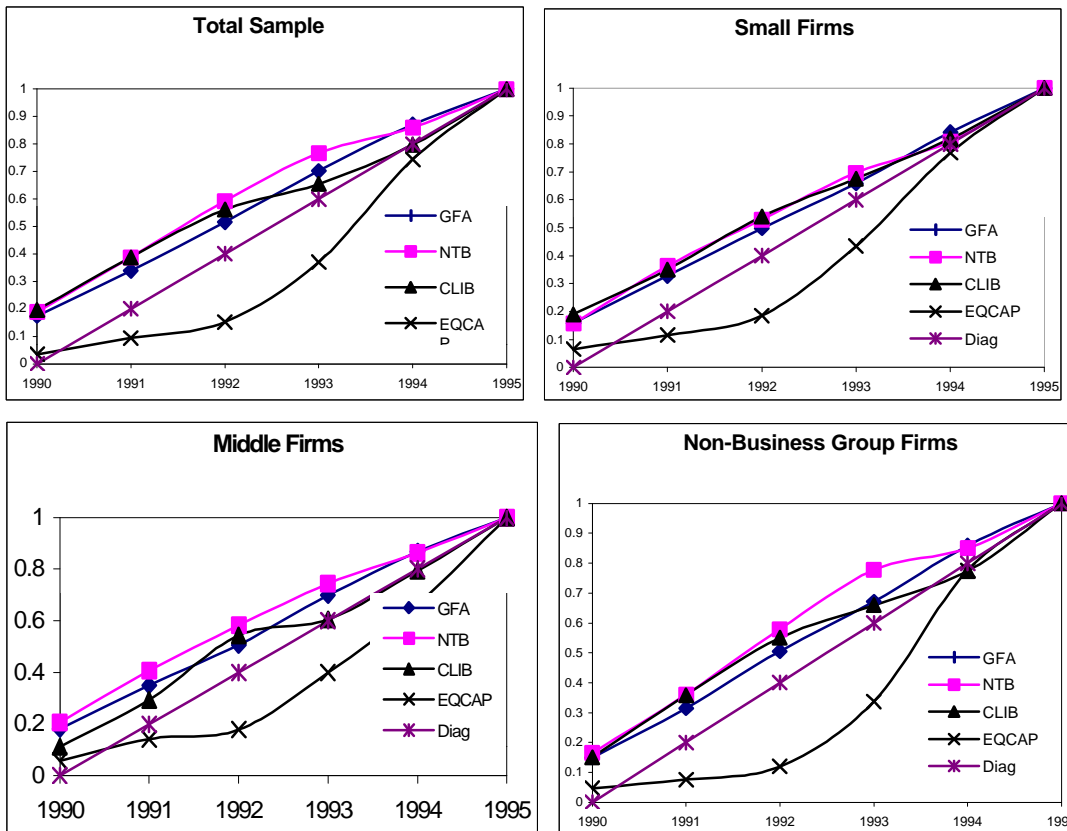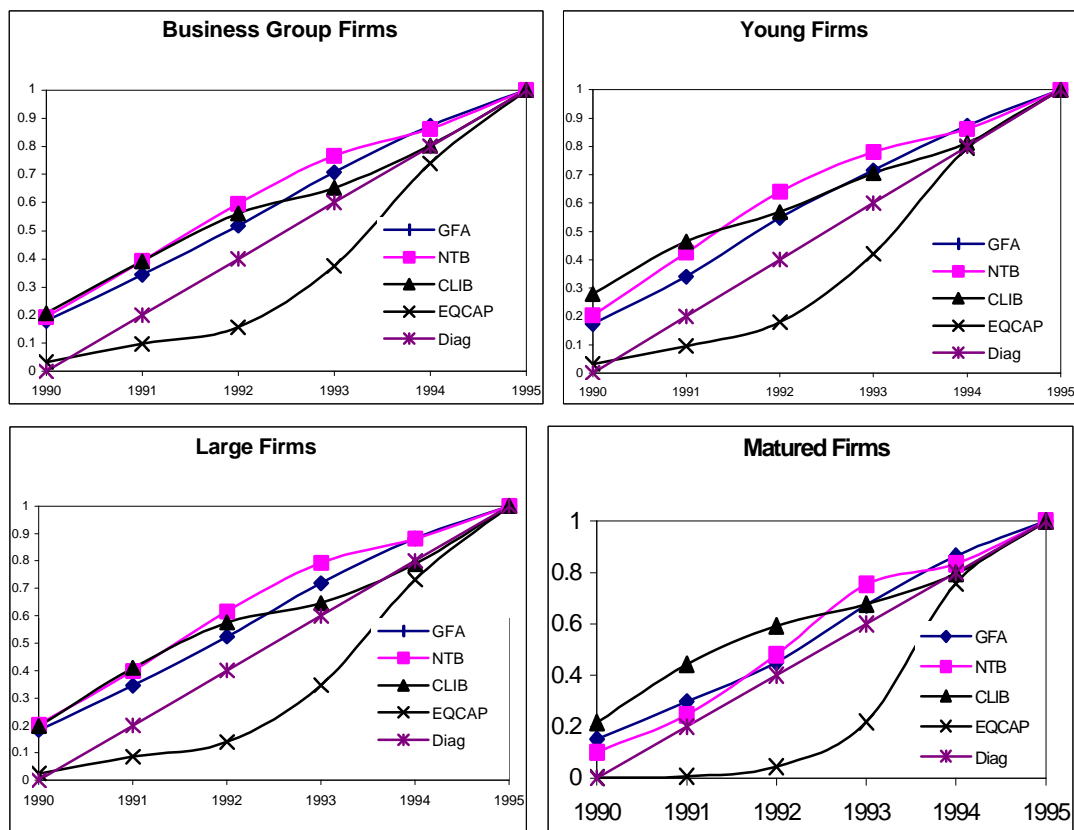
We note that the *share of equity* in total source of funds has risen sharply for all firms after CCI was abolished. This is evident from the fact that the cdf of "EQCAP" lies below the diagonal for the total sample as well as for every subgroup of firms. This finding is in conformity with the strand of literature (*e.g.,* Kunt and Maksimovic, 1995) that emphasises the impact of financial reform, particularly stock market development, on the capital structure choice of a firm. Both Gross Fixed Asset as well as Net Total Borrowing, as fractions of Total Source of Funds has declined after liberalisation. The latter indicates that equity capital may have replaced other sources of capital, especially debt, in the firms' financing methods. The former implies a decline in productive investment, which may be a possible explanation for the decline of overall efficiency that we found in the previous section.

The cdf for Current Liabilities (CLIB) is generally above the diagonal with a tendency to cut across towards the end of our sample period. Current liabilities comprise mostly trade credits. Its growing importance around 1995 for all firm categories raises further doubts regarding the end use of equity raised during the period. Given that investment did not go up during the period, the frantic reliance on trade credits and short term borrowing points towards the possibility that the capital raised from the market may

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have been diverted towards speculative financial investments by most firms.

We examined the statistical relationship between the composition of investment and that of financing for the total sample as well as the various sub-groups. In order to discern any changes in this relationship due to liberalisation, we examine the pre and post liberalisation periods separately. We regressed Gross Fixed Assets on the three sources of external funds, viz., Equity Capital (EQCAP), Net Total Borrowing (NTB) and current liabilities (CLIB). As in Demirguc-Kunt and Maksimovic (1996), we dropped internal sources of funds (including reserves and depreciation) as an explanatory variable since the sum of all standardised sources of funds for a firm must equal unity. The empirical model used in this exercise is specified as follows:

$$GFA = a + b_1 NTB + b_2 CLIB + b_3 EQCAP + e$$

All the variables used in the above regression equation are in *first-difference* and scaled by total sources of funds. This cross-section regression is used for both pre and post liberalisation periods. To avoid short-term fluctuations we use three-year average of each variable. The results for the pre-liberalisation period are presented in Table 6 while those for the post-liberalisation period are presented in Table 7.

Table 5
Share of Investment and Profitability by Industries

Category	Share of Investment (I_{it}/I_{0t})		Profitability (π_{ot}/K_{0t})	
Period	Pre-Lib	Post-Lib	Pre-Lib	Post-Lib
Automobile	0.08	0.07	0.32	0.30
Cement	0.05	0.05	0.33	0.24
Chemical	0.16	0.12	0.21	0.23
Drugs-Pharmaceutical	0.02	0.02	0.36	0.33
Electronics	0.02	0.02	0.34	0.22
Food	0.04	0.05	0.43	0.35
Iron and Steel	0.13	0.08	0.20	0.14
Metal Products	0.08	0.20	0.26	0.17
Machinery	0.14	0.18	0.26	0.23
Paper	0.01	0.01	0.331	0.30
Plastic and Rubber	0.04	0.03	0.33	0.27
Textile	0.15	0.10	0.29	0.21
Miscellaneous	0.02	0.02	0.31	0.29

Table 6
Long-Term Investment Finance
Pre-liberalisation Period (1990-92)

Firm Characteristics	Intercept	NTB	CLIB	EQCAP	R^2(adj)	F-Value
All	0.5022 (27.43*)	0.0375 (1.17)	-0.3371 (-7.68*)	0.1167 (2.94*)	0.18	26.21*
Small	0.4988 (23.82*)	0.0228 (0.63)	-0.3275 (-6.79*)	0.0802 (0.68)	0.18	20.09*
Large	0.5222 (11.20*)	0.0843 (1.09)	-0.4429 (-3.21*)	0.2035 (2.37*)	0.16	5.86*
Young	0.5281 (19.52*)	0.0485 (1.08)	-0.2463 (-3.80*)	0.0903 (1.783*)	0.15	7.88*
Middle	0.510 (16.68*)	0.0541 (0.97)	-0.4300 (-5.88*)	-0.0199 (-0.11)	0.2	14.7*
Matured	0.4487 (9.37*)	0.0488 (0.50)	-0.3041 (-2.74*)	-0.2129 (-0.81)	0.17	4.97*
Group	0.5050 (22.01*)	-0.0001 (-0.003)	-0.3347 (-6.28*)	0.0771 (1.54)	0.16	14.48*
Non Group	0.4977 (15.23*)	0.0862 (1.63**)	-0.3271 (-4.03*)	0.3314 (1.76**)	0.23	13.62*

In the pre-liberalisation period, the pooled sample of all firms reveal a significantly positive association between long term investment and equity capital. This is evident from the fact that the coefficient of EQCAP on GFA in that period is .1167 with a t-ratio of 2.94. The same story prevails for Large, Young, Group as well as Non-Group firms. Only Middle and Mature firms depict a negative association between the two variables, but the coefficients are statistically insignificant. All the groups show a positive association between Net Total Borrowing and Gross Fixed Assets as well.

Table 7
Long term investment Finance
Post-liberalisation period (1992-95)

Firm Characteristics	Intercept	NTB	CLIB	EQCAP	R^2 (adj)	F-Value
All	0.4882 (23.59*)	-0.0384 (-1.29)	-0.1569 (-3.69*)	-0.0259 (-0.54)	0.03	4.66*
Small	0.4757 (21.07*)	-0.0198 (-0.60)	-0.1669 (-3.59*)	-0.0129 (-0.23)	0.04	4.52*
Large	0.5742 (9.72*)	-0.1433 (-1.65)	-0.1712 (-1.29)	-0.1557 (-1.45)	0.0001	1
Young	0.5380 (15.54*)	-0.0099 (-0.26)	-0.2071 (-2.59*)	-0.1214 (-1.29)	0.03	2.46**
Middle	0.519 (15.29*)	-0.0962 (-1.69)	-0.1693 (-2.72*)	-0.1404 (-1.78)	0.03	2.73**
Matured	0.3261 (5.03*)	0.1386 (1.29)	-0.0443 (-0.43)	0.2797 (2.22*)	0.1	3.11*
Group	0.4888 (18.49*)	-0.0379 (-1.12)	-0.1117 (-1.72*)	-0.0580 (-0.86)	0.002	1.18
Non Group	0.4789 (12.80*)	-0.0255 (-0.39)	-0.1798 (-3.01*)	0.0048 (0.06)	0.06	3.87*

Note: T values are reported in the parenthesis. "*" indicates a significance level of 5%.

The situation almost reverses itself in the post-liberalisation period. The signs of the equity capital variable are now largely negative, although not always significantly so. There is one exception, viz., the Matured firms, which depict a significantly positive association between equity capital and gross fixed assets in this period. Also, the relationship between Net Total Borrowing, which is a measure of long-term liability of the firms, and gross fixed asset, is negative for all other groups except the matured firms.[2]

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[2]   Our Chow test for the null of equality of parameter estimates between the two periods is rejected for all groups except the young and mature firms.

Conclusions

Financial reforms leading to a well functioning, market based financial sector are supposed to enhance economic growth mainly by directing investment towards growing industries and better firms. We found that the efficiency of investment allocation in India failed to satisfy this criterion during the six years after liberalisation of stock markets in 1992. The results are robust across industries and firms, with very few exceptions. This stands in contrast to the experience in Indonesia, where Schiantarelli et.al. (1994) find strong evidence of an improvement in the efficiency index between 1981-84 (pre-liberalisation) and 1985-88 (post-liberalisation). They find similar positive results for Ecuador as well, where the major financial liberalisation was in 1986. Therefore, the possible caveat that the efficiency index for India fails to show an improvement due to gestation lags, may not necessarily apply. One possible explanation for the lack of any spectacular improvement in allocation efficiency, which we examined in some detail, is the change in the source and use of funds by Indian firms after liberalisation. Although equity capital increased sharply as a source of fund, there was no corresponding rise in investment in productive assets in our sample. Thus, the deterioration in the efficiency index may have been caused by the choice of the wrong types of investments to begin with, which did not lead to higher profits or value added for the firms. On the positive side, the efficiency index shows improvement for the electronics, chemicals, food and automobile industries. It also shows an improvement for the Mature group, when firms are classified according to age.

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