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**Why Did the Elephant Start to Trot?
India's Growth Acceleration Re-examined**

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Why did the Elephant Start to Trot? India's Growth Acceleration Re-examined¹

Abstract: It is commonly believed that India's growth acceleration was mainly due to a change in the state's *attitude* towards the business sector in the early 1980s and less to do with changes in economic policies. We re-examine this argument by first noting two anomalies – i) that the data suggests that the turnaround in GDP growth was in the late 1970s, and ii) that the attitudinal shift of the national government seem to have occurred as early as the mid 1970s. We observe that among the sources of growth, the distinctive 'stylised fact' was the remarkable increase in private equipment investment that occurred from the mid 1970s. We then go on to provide an explanation of India's growth acceleration that encompasses these features of the data. We show that economic growth in India has been mostly driven by the rate of private equipment investment, and that the latter has been driven by financial deepening, public fixed investment and the relative price of equipment investment, with no discernible effects of changes in entrepreneurial attitudes on private equipment investment. We conclude that the effect of the attitudinal shift of the state towards the private sector on India's growth acceleration was second order, and if it did have an effect on growth at all, it was only through changes in economic policies, rather than independently of the latter.

1. Introduction

The Indian economy has been growing at a faster pace in recent decades than it has done so in the first few decades after independence. Most observers of the Indian economy commonly believe that the acceleration in the rate of India's economic growth predates the radical economic reforms of 1991, and that the turnaround occurred around 1980. Economists such as De Long (2003) and Rodrik and Subramanian (2004) [henceforth, RS] and political scientists such as Kohli (2006) have argued that the acceleration in India's growth occurred primarily due to a change in the attitudes of the national government under the Prime Ministership of Indira Gandhi towards the private sector from being anti-business to being pro-business and less to do with economic policies. As RS state, "the trigger for India's economic growth was an attitudinal shift on the part of the national government in 1980 in favour of private business" (p. 2). They argue that this attitudinal shift "left little paper trail in actual policies but had an important impact on investors' psychology" (p. 3). Similarly, Kohli (2006) states that "Indira Gandhi shifted India's political economy around 1980 in the direction of a state and business alliance for economic growth" (p. 1255). While De Long dates the timing of the growth acceleration later than RS and Kohli at around 1985, he also argues that "the most important factor that changed in India over the 1980s had more to do with entrepreneurial

¹ The paper has benefited from comments received from participants in conference and seminar presentations in the Centre for Studies in Social Sciences, Kolkata and the Nabakrishna Centre for Development Studies, Bhubaneswar. I would like to thank Barry Bosworth for providing the detailed total factor productivity data. The usual disclaimer applies.

attitudes and a belief that the rules of the game had changed than with individual policy moves” (2003, p. 203).ⁱ

The argument that India’s growth acceleration can be attributed more to the attitudinal shifts of the government than to substantial policy moves has interested not only India-observers but a wider audience as well, and has been influential in the literature on the political economy of economic growth. As Rodrik (2003) has argued, India’s growth experience suggests that it may be possible for other economies not to undertake significant institutional reforms, particularly of the Washington Consensus variety, in order to bring about growth accelerations. In the language of institutional economics, the ‘attitudinal shift’ story of India’s economic growth seems to suggest that informal institutional change related to changes in attitudes and beliefs may be sufficient to ignite economic growth without any need for significant changes in formal institutions – changes in the *actual* rules of the game such as reforms in laws and regulations that influence economic activity. How valid is such a reading of the Indian growth experience?

In this paper, we re-examine the ‘attitudinal shift’ argument, paying particular attention to the causal mechanisms that may link the shifts in attitudes and beliefs of the government and the business sector to economic growth. We first evaluate the empirical basis of the argument and note two anomalies – firstly, the descriptive statistics and estimates presented both by RS and De Long and by others subsequently seem to suggest that the growth acceleration may have occurred in the second half of the 1970s, and not in the early 1980s as argued, and secondly, that the changes in the attitude of the national government to the business sector and the shift in the vision of the political class and in the economic bureaucracy from Nehruvian socialism to a more sympathetic view of capitalism may well have occurred in the mid to late 1970s, and pre-dates Indira Gandhi’s return to power in 1980. We next explore the possible sources of India’s growth acceleration with a more detailed examination of the investment data than has been undertaken previously. We find that among the different types of investment, there has been a significant increase in the rate of private equipment investment since the mid-1970s.

To examine whether the observed increase in private equipment investment has any role to play in India’s growth acceleration, we estimate a simple growth regression and find a positive and significant effect of private equipment investment on the growth rate of India’s GDP per capita. We also find that the primary determinants of private equipment investment are financial deepening, public fixed investment and the relative price of equipment investment. We attempt to capture the

effect of a possible change in entrepreneurial attitudes and beliefs on private equipment investment both as a one-off shift in the investment function in the 1980s and as a cumulative process that would lead to our estimated investment function under-predicting actual investment in the 1980s. We find little support for the proposition that the attitudinal shift of the state towards business led to changes in entrepreneurial beliefs that would have brought about a higher rate of investment.

We then go on to put together an account of India's growth acceleration that draws on the empirical features that we have observed in the data and the estimated relationships for economic growth and private equipment investment. We argue that India's growth experience in the late 1970s and 1980s was caused by an acceleration in the rate of private equipment investment driven by three policy-influenced fundamentals - financial deepening, a fall in the relative price of equipment investment and a rise in public fixed investment – but that the roles of these three factors were different over the period mid 1970s to late 1980s. Diving this period into two sub-periods – i) mid 1970s to early 1980s, and ii) early 1980s to late 1980s, we argue that in the first sub-period, financial deepening mostly brought about by bank nationalisation along with an increase in public fixed investment were the primary factors for India's growth acceleration, and that growth was sustained in the second sub-period by the fall in the relative price of equipment investment brought about by trade reforms targeting the capital and intermediate goods sectors, as public investment rates started falling off. Thus, the attitudinal shift of the state towards the private sector cannot be seen as the independent and primary reason for India's growth acceleration as has been argued by RS and De Long among others.

The rest of the paper is divided into five sections. In the next section, we revisit the 'attitudinal shift' story and critically evaluate the empirical evidence presented by the contributors to this story. In Section 3, we examine the investment data in detail to uncover what may have been the proximate cause of India's growth acceleration. This turns out to be private equipment investment. In Section 4, we flesh out the causal mechanisms that have been at work behind India's growth acceleration by estimating the determinants of economic growth and private equipment investment. We also assess whether the 'attitudinal shift' argument can provide an explanation of the 'stylised facts' of Section 3 and the estimated empirical relationships. Section 5 puts together our account of the causes of India's growth experience, based on the evidence presented in the previous sections. Section 6 makes some concluding remarks.

2. Revisiting the 'Attitudinal Shift' Argument

The two planks of the ‘attitudinal shift’ argument are: i) India’s growth acceleration started in 1980 according to RS and Kohli, and in 1985 according to De Long; and ii) the change in the attitudes of the Indian government to being more pro-business occurred with the return of Indira Gandhi to power at the central government level in 1980. We revisit the empirical basis of the two building blocks of the ‘attitudinal shift’ argument in turn.

When did the growth acceleration begin?

We begin with a summary table of both economy-wide and sectoral growth rates (Table 1). The growth rates in the table are non-overlapping five year averages of annual growth rates. The increase in the growth rate of total output in 1980-84, as compared to the 1970s is palpably clear from the table – the average annual growth rate in 1980-84 was 5.6 per cent as compared to 3.7 per cent in 1975-79. The increase in the economy-wide growth rate seems to be primarily due to an increase in agricultural growth and in the growth rate of registered manufacturing. However, this reading of average growth rates in the 1970s and early 1980s is misleading, as it does not take into account the fact that the Indian economy contracted significantly in 1979, due to the second oil price shock and due to a drought which was the worst since independence (Joshi and Little 1994). The growth rate of the economy in this year was a staggering negative 5.2 per cent – the highest drop in GDP that has happened in India since independence. If we exclude 1979 from our calculations, we find that the growth rate of the economy in 1975-1978 is a more respectable 6.0 per cent, not very different from the average growth rate of the economy in the 1980s!

Table 1. Growth Rates of real GDP – Overall and by Sector^{a,b}

Average over Years	AMQ	MF	REGMF	UNREGMF	CON	TRFIN	INF	CSPS	GDP
1955-59	1.9	6.2	8.2	4.4	7.4	4.5	7.7	4.0	3.8
1960-64	3.4	8.1	10.1	5.8	8.6	5.6	7.4	6.0	5.2
1965-69	1.8	3.7	4.8	2.3	5.7	3.3	6.0	4.5	3.0
1970-74	1.2	3.4	2.7	4.3	-1.4	3.2	5.5	4.1	2.1
1975-79 ^c	1.5 (4.9)	5.2 (7.4)	5.8 (7.8)	4.6 (6.9)	5.3 (8.0)	5.4 (7.2)	6.6 (7.1)	4.1 (3.3)	3.7 (6.0)
1980-84	5.8	6.3	7.8	4.1	4.1	6.2	5.9	5.1	5.6
1985-89	3.5	7.8	7.9	7.5	5.6	8.3	7.2	7.1	6.3
1990-94	3.6	5.4	6.4	3.7	4.7	7.2	6.5	3.6	4.9
1995-99	2.7	6.6	6.0	7.6	6.6	8.9	8.6	9.7	6.5
2000-03	2.4	6.1	6.7	5.1	6.2	6.8	10.7	5.0	5.4

Notes: a) annual percentage rate of growth; b) AMQ= Agriculture, Mining and Quarrying; MF=Manufacturing; REGMF= Registered Manufacturing; UNREGMF = Unregistered Manufacturing; CON= Construction; TRFIN= Trade, Hotels, and Restaurants + Financing, Insurance, Real Estate and Business Services; INF= Electricity, Gas and Water Supply + Transport, Storage and Communication; CPS = Community, Social and Personal Services; b) Figures in brackets for period 1975-79 are averages for that period, excluding 1979, the year of the second oil price shock;

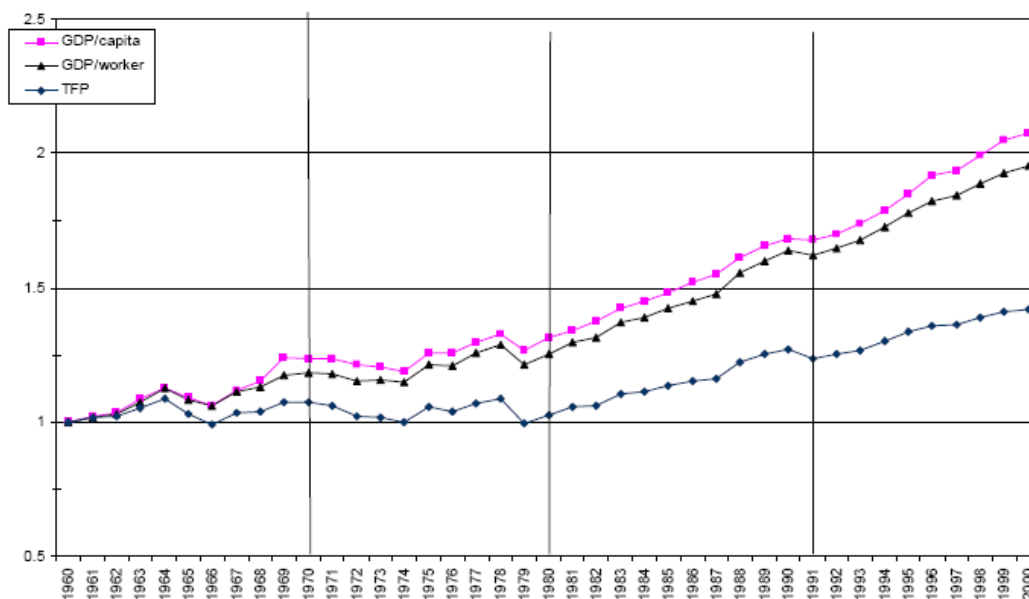
Source: Central Statistical Organisation, *National Accounts Statistics*, various issues; our calculations.

Our finding that the exclusion of the oil price shock/drought year of 1979 leads to a substantial revision of growth rate calculations since the mid-1970s is not a mere statistical curiosity. As we will see next, the exclusion of 1979 leads to a significant re-interpretation of the data used by RS and De Long which they adduce to make the point that the growth acceleration occurred in the 1980s. First, let us consider the summary figure used by RS to date the growth acceleration, which uses in part estimates of total factor productivity calculated by Bosworth, Collins and Virmani (2006) (Figure 1).ⁱⁱ

It is clear from the figure that the increase in GDP per capita occurs from the mid-1970s, *and not from the 1980s*, once we exclude the outlier of 1979, the oil price shock/drought year. It is also clear that the increase in GDP per capita (or GDP per worker) parallels an increase in economy-wide total factor productivity (TFP) – in fact, the figure suggests that the primary proximate cause of India’s growth acceleration is not capital accumulation or labour force growth but an increase in the productivity of both capital and labour. The fact that the growth acceleration was primarily due to an increase in TFP is itself a reason to be sceptical of the ‘attitudinal shift’ argument. During the second half of the 1970s, there were no significant changes in the industrial licensing regime or a easing of restrictions on foreign direct investment that would allow firms to reap economies of scale

by expanding or to increase their absorption of technology from abroad. If total factor productivity increased due to the positive effects that the state's attitudinal shift had on the private sector, how exactly did this happen? We will return to this point later in the paper, as we believe that our account of India's growth acceleration provides a more consistent explanation of why TFP increased since the mid 1970s.

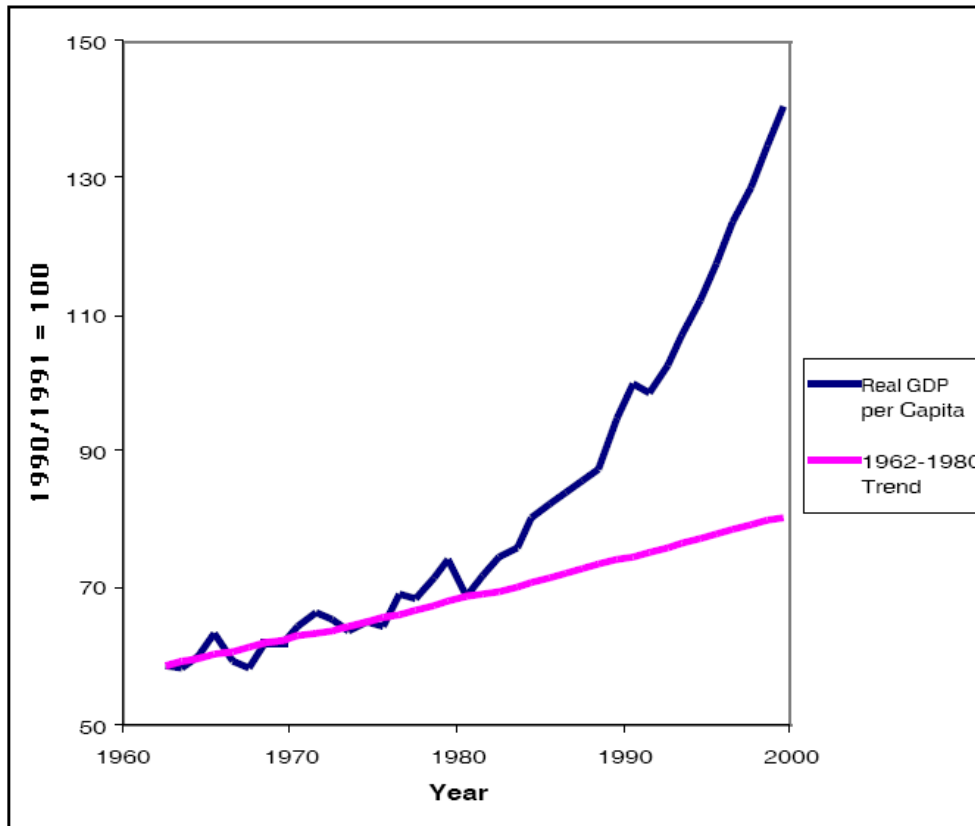
Figure 1. Economic Performance in India, 1960-2000 (log scale, 1960=1)



Source: RS (2004)

De Long establishes the date of India's growth acceleration using a different approach – he estimates the trend level of GDP per capita over the period 1962-1980, and plots actual GDP per capita over the period 1962-2000 against the trend rate. An under-prediction of actual GDP using the trend estimates from a certain year will indicate that there has been a break in the GDP per capita series in the upward direction from that year and thus, establish the beginning year of the growth acceleration. We reproduce De Long's figure below (Figure 2). Again, it is clear that once we exclude the outlier of 1979, actual GDP per capita started deviating from its trend level in an upward direction from the mid-1970s, which suggests that growth had already accelerated by the late 1970s.

Figure 2. Indian GDP per capita level and 1962-1980 Trend



Source: De Long (2003)

The RS and De Long (and our own) conclusions on the timing of the growth acceleration seem to be mostly based on descriptive statistics. The application of modern time-series methods provides a more robust way of establishing the timing of the growth acceleration than a simple eyeballing of the data. Balakrishnan and Parameswaran (2007) test for multiple structural breaks on Indian output data using a methodology pioneered by Bai and Perron (1998) which identifies structural breaks endogenously rather than being based on exogenous information such as the date of initiation of a policy change. This implies that the researcher's prior beliefs do not have a part to play in the timing of the growth acceleration. Balakrishnan and Parameswaran find a single shift in the GDP series which occurs in 1978-1979, and conclude that India's growth acceleration occurred from this year onwards. Thus, both descriptive statistics presented by RS and De Long and independent econometric estimates suggest that the timing of the growth acceleration was as early as the second half of the 1970s and not the early 1980s as commonly believed.

When did the state's attitude to the private sector change?

The most forceful presentation of the argument that the state's attitudes towards business changed with the return of Indira Gandhi to power in 1980 can be found in Kohli (2006). In his words, "she downplayed redistributive concerns and prioritised economic growth; sought an alliance with big business; adopted an anti-labour stance; put brakes on the growth of public sector industries; and demoted the significance of economic planning and of the Planning Commission" (p. 1255).

However, as has been pointed out by Nayar (2006), the problem with this argument is that many of the elements described above that characterised the Indira Gandhi regime of the 1980s were also evident when she was earlier in power, especially during and after the turbulent years of 1973 and 1974 (after the first oil price shock). For example, in 1974, the national government declared the threatened strike by 2 million railway employees as illegal and arrested 20,000 workers and trade union leaders, 'with some display of brutality' (Joshi and Little 1994, p. 55). In the same year, the national government abandoned the nationalisation of the wholesale wheat trade, a pet project of the Left at that time (Nayar 2006). There were also clear changes in the attitudes of the economic bureaucracy towards a more liberal view of economic planning. As Ahluwalia (1991) notes, "the second half of the seventies can be characterized as a period of 'official reflection' marked as it was by a number of official committees reviewing different aspects of industrial and trade policies" (p. 5). One outcome of this 'official reflection' was the slow but steady liberalisation of import controls from the late 1970s (Panagariya 2004). While the changes in attitudes of the politicians and bureaucrats towards the private sector during this period were incremental, they were no less than so than the ones pointed out by Kohli and RS in the early 1980s. What was *particularly* growth-enhancing about the attitudinal shift of the national government when Indira Gandhi returned to power in 1980 as compared to that of the Indira Gandhi led government of the mid 1970s?

3. Sources of India's Economic Growth: An Examination of the Investment Data

If, as we have argued, economic growth accelerated in the second half of the 1970s, what was the proximate cause of such acceleration? We have already noted that one candidate for the proximate cause could be total factor productivity which increased sharply since the mid 1970s. But this begs the question: why did TFP increase? To answer this question, we first look closely at the data on investment and establish some 'stylised facts' which we will argue later in the paper helps us to understand the causal mechanisms behind India's growth acceleration.

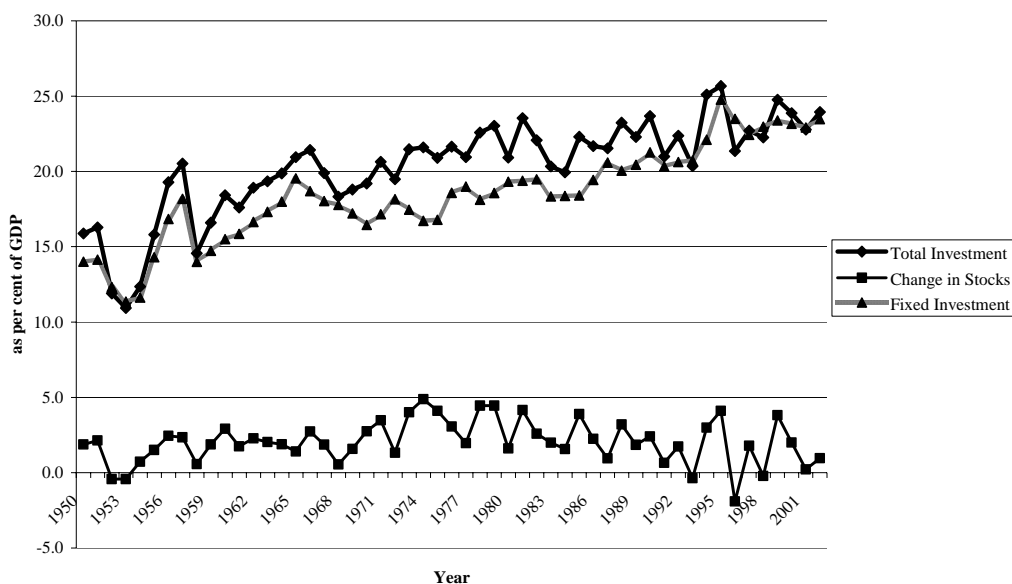
Both Kohli and RS have noted the impressive increase in the investment rate since the 1980s, and the first part of what we are going to say in this section is not new. However, as we start to systematically examine the disaggregated investment data, we will see that what was particularly

impressive was the increase in private equipment investment since the mid 1970s, which was the primary reason for the rapid increase in the gross investment rate over the same period. We will explore the economic implications of the rise of the private equipment rate in the next section, where we will argue that the sharp increase in private equipment investment played a significant, if not primary, role in India's growth acceleration. But first let us set out the 'stylised facts' on the patterns of investment in the Indian economy since the mid-1950s, with particular emphasis on the post-1975 period.

Stylised Fact 1: There has been a steady increase in the gross investment rate (gross domestic capital formation, GDCF, as a ratio of GDP) over the period 1955-2003; this increase is primarily due to a rise in gross fixed capital formation (GFCF) as a ratio of GDP, especially from the mid-1970s.

Figure 3 makes clear that the turn-around in the total fixed investment rate occurred around 1975, while inventory investment (change in stocks) does not show any clear trend over the period 1955-2003. This was the primary reason for the increase in the rate of gross domestic capital formation which stood at 23.7 per cent in 2000-2003, up from 17.4 per cent in 1955-59 (Table 2).

Figure 3. The Investment Rate and its Components



Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

Table 2. Gross Investment (GDCF) and its Components as a per cent of GDP^a

Average over Years	GDCF	Gross Fixed Capital Formation	Total Investment in Structures	Total Investment in Equipment
1955-59	17.4	15.6	8.8	6.8
1960-64	18.8	16.7	9.3	7.3
1965-69	19.9	18.3	11.3	7.0
1970-74	20.5	17.2	10.1	7.1
1975-79	21.8	18.2	10.2	8.0
1980-84	21.4	19.0	8.7	10.3
1985-89	22.2	19.8	7.7	12.1
1990-94	22.5	21.0	7.6	13.4
1995-99	23.3	23.4	7.0	16.4
2000-03	23.7	23.3	7.4	15.9

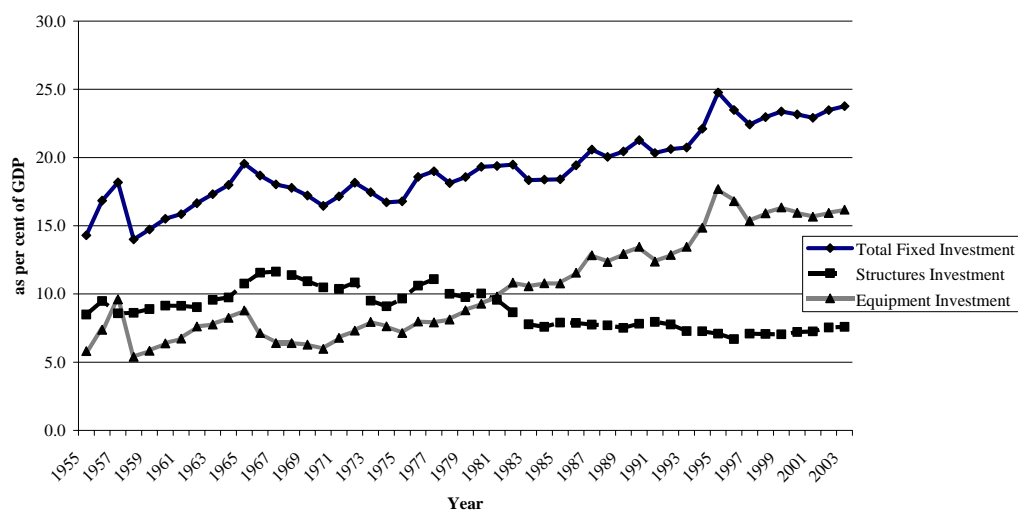
Note: a) GDP and Investment data are in constant prices.

Source: Central Statistical Organisation, *National Accounts Statistics*, various issues; our calculations.

Stylised Fact 2: The increase in fixed capital formation can be clearly attributed to the rapid increase in equipment (machinery) investment since the mid-1970s which increased from 7.1 per cent of GDP in 1970-74 to around 16 per cent by the end of the 1990s. Structures (construction) investment has, on the other hand, fallen from 10.1 per cent of GDP in 1970-74 to around 7 per cent by the late nineties.

From Figure 4, it is possible to pick out the increase in equipment investment clearly as having occurred from the mid-1970s. Furthermore, the trend in equipment investment is unmistakably significantly positive all the way to the early 2000s. Till the late 1970s, the investment rate in structures was higher than that in equipment. This changed from the 1980s onwards (Table 3).

Figure 4. Total Fixed Investment and its Components

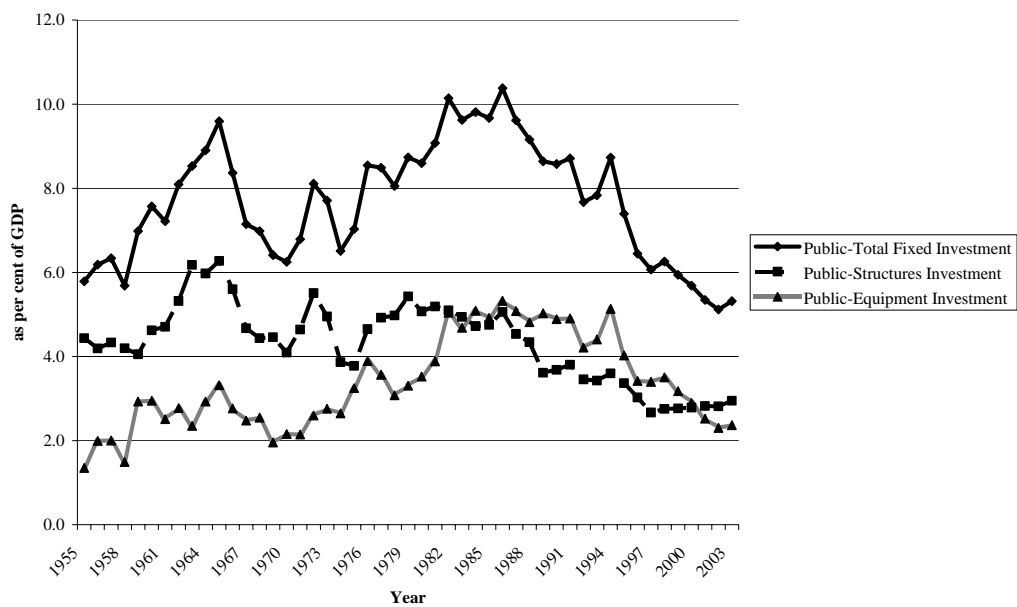


Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

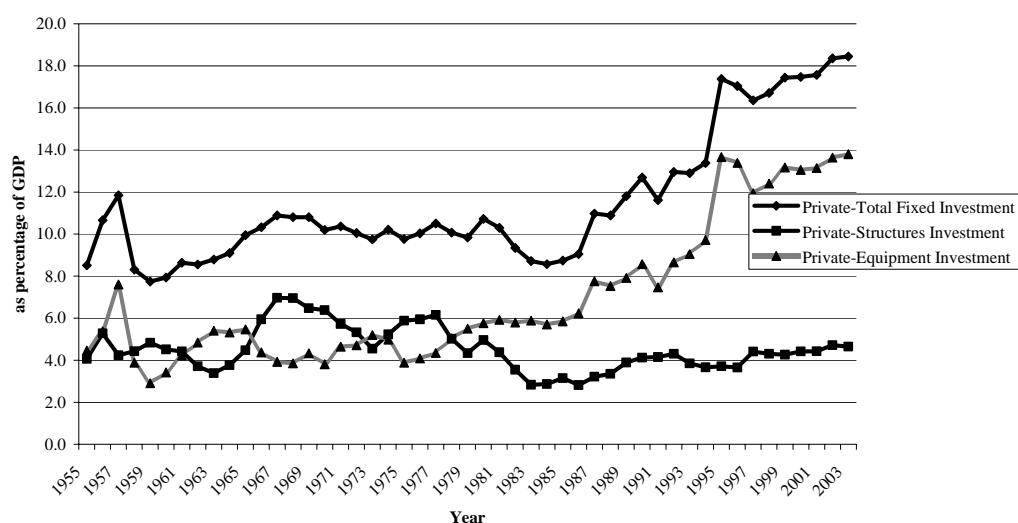
Stylised Fact 3: This increase in equipment investment is mainly due to an increase in the **private** equipment investment rate, which increased from 4.7 per cent in 1974-79 to 13.4 per cent in 2000-2003. The public equipment investment rate, on the other hand, fell from 5.0 per cent in 1985-89 to 2.5 per cent in 2000-2003.

Figures 5 and 6 show the behaviour of public and private fixed investment rate over the period 1955-2003. Public fixed investment fell from a high of 9.5 per cent of GDP in the 1980s to 5.4 per cent of GDP in 2000-2003 (Table 3). This was due to the fall in both the public equipment and structures investment rate since the 1980s. The private equipment investment rate, on the other hand, shows a remarkable increase since the mid-1970s, with a stagnation in the private structures investment rate.

Figure 5. Total Public Fixed Investment and its Components



Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

Figure 6. Total Private Fixed Investment and its Components

Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

Table 3. Components of Fixed Investment by Sector as a per cent of GDP^a

Average over Years	Public Total Fixed Investment	Public Investment in Structures	Public Investment in Equipment	Private Total Fixed Investment	Private Investment in Structures	Private Investment in Equipment
1955-59	6.2	4.2	2.0	9.4	4.6	4.8
1960-64	8.1	5.4	2.7	8.6	4.0	4.6
1965-69	7.7	5.1	2.6	10.6	6.2	4.4
1970-74	7.1	4.6	2.5	10.1	5.4	4.7
1975-79	8.2	4.8	3.4	10.0	5.5	4.6
1980-84	9.5	5.0	4.4	9.5	3.7	5.8
1985-89	9.5	4.5	5.0	10.3	3.3	7.1
1990-94	8.3	3.6	4.7	12.7	4.0	8.7
1995-99	6.4	2.9	3.5	17.0	4.1	12.9
2000-03	5.4	2.8	2.5	18.0	4.6	13.4

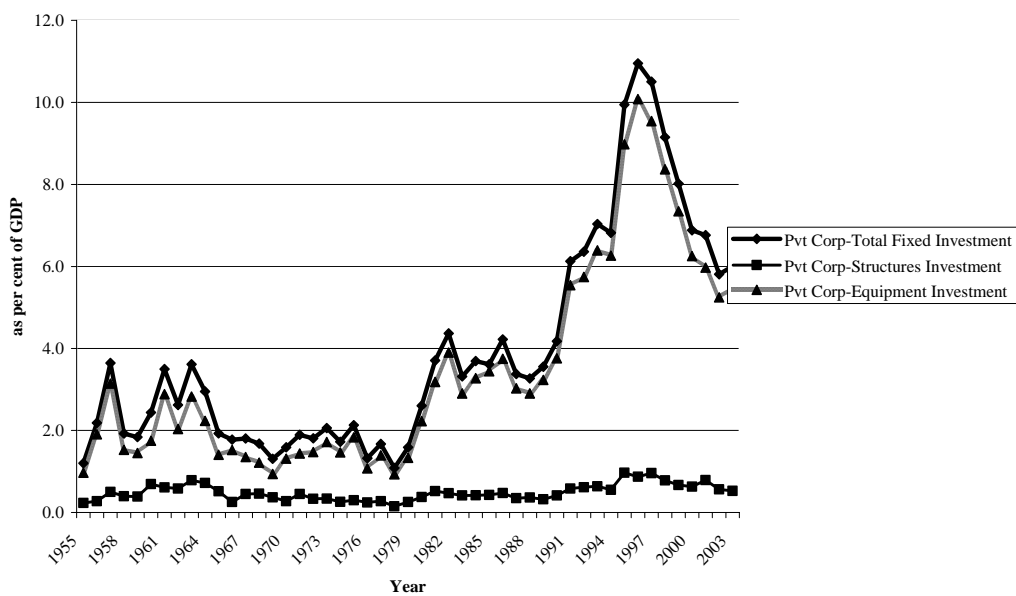
Note: a) GDP and Investment data are in constant prices.

Source: Central Statistical Organisation, *National Accounts Statistics*, various issues; our calculations.

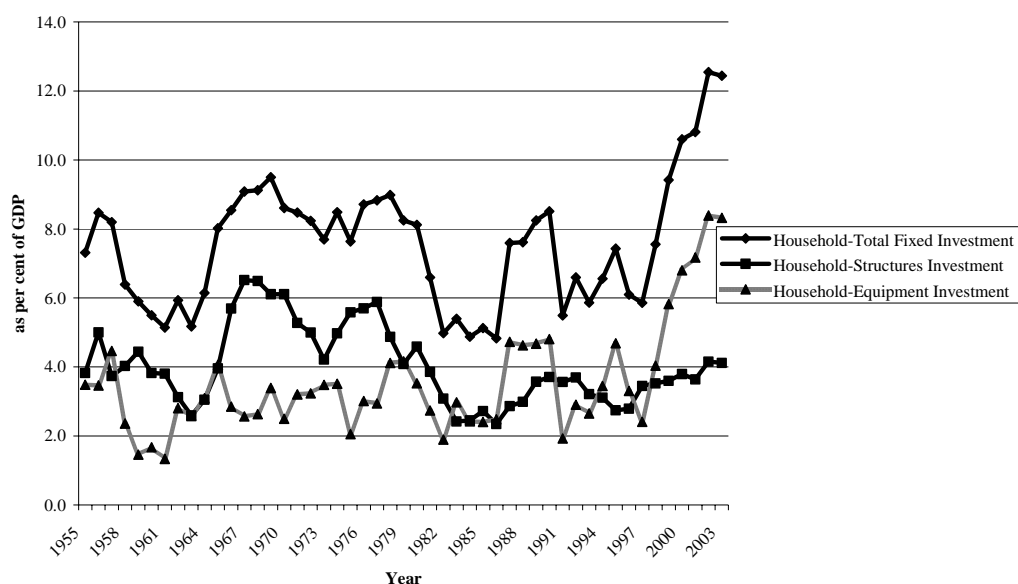
Stylised Fact 4: The increase in the private equipment rate is primarily due to an increase in the private corporate equipment investment rate, as opposed to the household equipment investment rate. The private corporate equipment investment rate increased from 1.3 per cent in 1970-74 to 5.7 per cent in 2000-2003. On the other hand, the household equipment investment rate remained constant at around 3-4 per cent of GDP for the 1980s and 1990s, increasing to 7.7 per cent in the very recent period (2000-2003).

It is clear from Figure 7 that private corporate equipment investment as a per cent of GDP showed a very large increase from the late 1970s. In the case of the household sector, investment in equipment shows an increase in the second half of the 1970s, followed by a decline. There is no clear trend from the early 1980s to the 1990s. In the period 2000-2003, there is a strong increase in the household equipment investment rate (Figure 8 and Table 4).ⁱⁱⁱ Household structures investment shows a significant decrease since the mid 1970s with a recovery since the late 1990s. Private corporate structures investment shows a very slight increase since the late 1970s.

Figure 7. Total Private Corporate Fixed Investment and its Components



Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

Figure 8. Total Household Fixed Investment and its Components

Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

Table 4. Components of Private Fixed Investment by Sector as a per cent of GDP^a

Average over Years	Private Corporate Total Fixed Investment	Private Corporate Investment in Structures	Private Corporate Investment in Equipment	Household Total Fixed Investment	Household Investment in Structures	Household Investment in Equipment
1955-59	2.2	0.4	1.8	7.3	4.2	3.0
1960-64	3.0	0.7	2.3	5.6	3.3	2.3
1965-69	1.7	0.4	1.3	8.9	5.8	3.1
1970-74	1.8	0.3	1.5	8.3	5.1	3.2
1975-79	1.6	0.2	1.3	8.5	5.2	3.3
1980-84	3.5	0.4	3.1	6.0	3.3	2.7
1985-89	3.6	0.4	3.3	6.7	2.9	3.8
1990-94	6.1	0.6	5.5	6.6	3.5	3.1
1995-99	9.7	0.9	8.9	7.3	3.2	4.1
2000-03	6.4	0.6	5.7	11.6	3.9	7.7

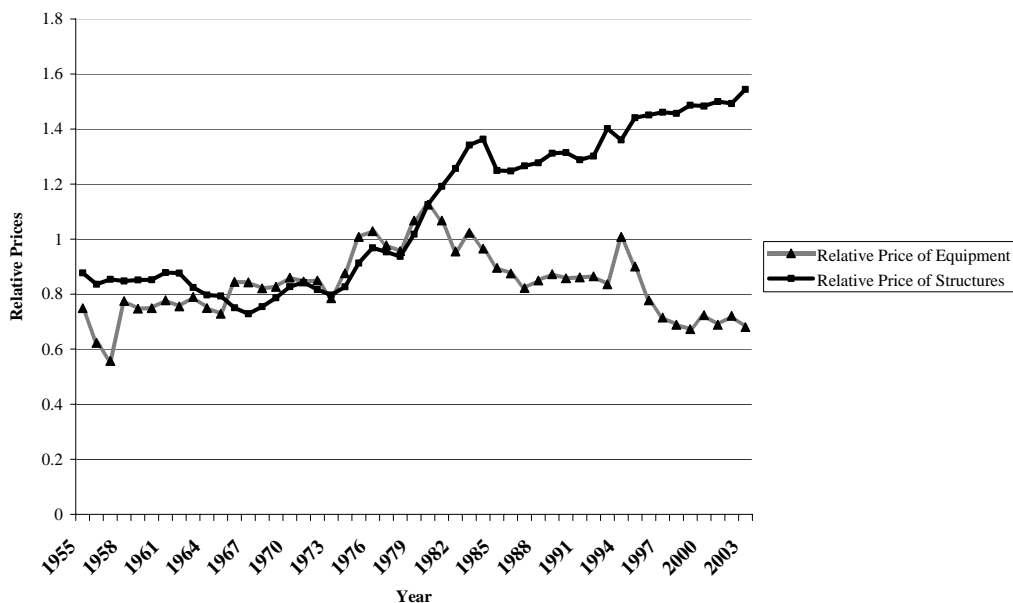
Note: a) GDP and Investment data are in constant prices.

Source: Central Statistical Organisation, *National Accounts Statistics*, various issues; our calculations.

Stylised Fact 5: The increase in the private equipment investment rate seems to have coincided with a fall in the relative price of equipment since the early 1980s.

Figure 9 makes clear that the relative price of equipment started falling in the early 1980s, and has maintained its decline for much of the 1990s and early 2000s. The relative price of structures investment, on other hand, shows a steady increase since the late 1970s.

Figure 9. The Relative Price of Equipment and Structures



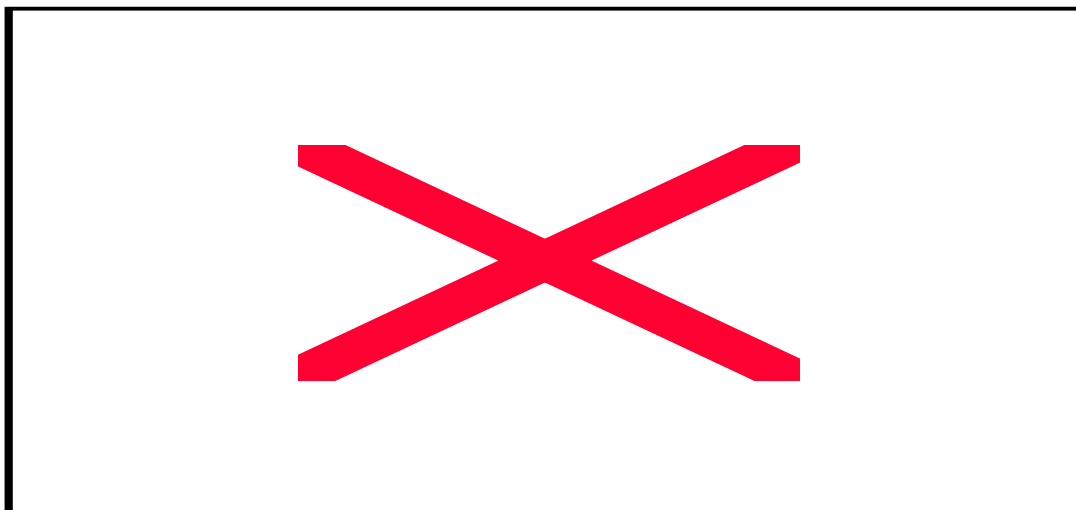
Source: Central Statistical Organisation, *National Accounts Statistics*, various issues.

To sum up, the behaviour of gross fixed investment in India suggest a clear upward trend in the series as a ratio of GDP since the mid 1970s, driven primarily by a spectacular increase in the **private equipment investment rate**, in spite of stagnant or declining rates of public and private investment in structures and public investment in equipment. At the same time, as we have noted in Section 2, there has been an increase in the average annual growth rate of output (and in TFP growth) since the mid 1970s. There also has been a fall in the relative price of equipment in the same period. In the next section, we will explore more rigorously whether the increase in the growth rate of the economy and the increase in rate of private equipment investment can be causally linked. We also examine the reasons for the increase in the private equipment investment rate, and in particular, the role of the relative price of equipment.

4. Establishing Some Simple Empirical Relationships

There has been an explosion of cross-country econometric research in recent years on the determinants of economic growth. Among the various factors studied in the literature, the one variable that is robust to most specification and sample size changes is the investment rate (Levine and Renelt 1992). And among the different types of investment, the rate of investment that seems to really matter for economic growth is equipment (or machinery) investment (De Long and Summers 1991, 1992, 1993). As De Long and Summers (1993) note, "rapid growth is found where equipment investment is high and slow growth where equipment investment is low" (p. 396). De Long and Summers find that the cross-economy positive association between output per worker and investment in machinery and equipment is particularly true for developing countries. In addition, "historical accounts of economic growth invariably assign a central role to mechanization" (De Long and Summers 1991, p. 447). The reason why equipment investment matters for economic growth than other types of investment could be that the role of external economies is greater for equipment investment than for structures investment, due to the greater amount of research and development expenditures in the machinery sector. Among the countries in the De Long and Summers sample, India has had one of lowest rates of equipment investment for the period 1960-1985. India also had one of the lowest levels of income per capita in 1980 in the same sample of countries (Figure 10).^{iv} De Long and Summers show that an increase an extra 1 percentage point devoted to equipment investment is associated with an 0.302 percentage point increase in the annual GDP per worker growth rate.^v

Figure 10. The Cross-country Relationship between GDP per capita and Equipment Investment



Source: De Long and Summers (1991)

The relationship between the private equipment investment rate and economic growth

The fact that the private equipment investment rate began to increase from the mid 1970s when economic growth in India starting picking up along with the primacy of equipment investment in explaining economic growth in cross-country studies suggests that there well may be a causal relationship between private equipment investment and economic growth in India, certainly since the mid 1970s. To assess the impact of equipment investment on the growth rate of per capita output in the Indian case, we use a simple empirical formulation similar to that used by De Long and Summers. As they do, we take the growth rate of output to be a linear function of the rates of equipment and structures investment, along with the third component of gross investment – inventory investment (changes in stocks). However, in our context, it would be useful to take the rate of private equipment investment separate to the rate of public equipment investment in the output growth equation. This is for two reasons. Firstly, the rate of return on private equipment investment may be different from that on public equipment investment. Secondly, as we have seen in our previous section, the increase in equipment investment since the mid 1970s to the late 1990s occurred primarily in private equipment investment, with stagnation in the public investment rate since the mid 1980s.

Our specification is as follows:^{vi}

$$GY = a_1PVEQI + a_2PBEQI + a_3STI + a_4CST \quad (1)$$

where: GY = growth rate of GDP per capita;

PVEQI = ratio of private sector investment in equipment to GDP;

PBEQI = ratio of public sector investment in equipment to GDP;

STI = ratio of investment (both private and public) in structures to GDP.

CST = ratio of changes in stocks (inventories) to GDP.

The determinants of private equipment investment

We now need to estimate an investment function for private equipment investment to better understand what may have driven the rise in the latter. The neoclassical theory of investment behaviour provides a starting point – neoclassical theory takes the rate of investment to be a function of relative price of capital and the real interest rate (Jorgenson 1967) Such a simple view of investment behaviour can be seen to be inadequate in the case of India, with significant constraints on the availability of credit for investment purposes and the complementary role that public investment can play in increasing private investment. Financial deepening is expected to have a positive effect on the availability of credit as the spread of organised finance can help overcome indivisibilities in investment through the mobilisation of otherwise unproductive resources (Gurley and Shaw 1955). We augment the simple neoclassical investment function with variables capturing financial deepening and the public investment rate.

We are also interested in understanding whether the increase in equipment investment can be explained by the response of the private sector to the ‘pro-business’ attitudinal shift of the state, independently of the role of policies and ‘macroeconomic fundamentals’. We capture the effect of the attitudinal shift of the state towards the private sector by the means of an intercept dummy, taking the value one for the years when the state’s attitude turned ‘pro-business’ according to Kohli and RS. We initially use the year 1980 as the ‘change in attitude’ year but sequentially introduce year dummies in the same manner, ending with 1985. By capturing the effect of the ‘attitudinal shift’ on investment in this manner, we treat the effect as autonomous of the variables in the specification (2) above. This is similar to assuming that the ‘attitudinal shift’ had a positive effect on the ‘animal spirits’ of investors and is consistent with the account of RS and De Long that the growth acceleration was purely due to the positive effect that the state’s ‘attitudinal shift’ had on investors’ psychology.

We model the rate of equipment investment by the private sector as follows:

$$PVEQI = b_1RPE + b_2FINT + b_3RI + b_4PBI + b_5 ATD + b_6 D91 + b_7PVEQI(-1) \quad (2)$$

where: RPE = Logarithm of relative price of equipment (price deflator for equipment investment as a ratio of the GDP deflator);

FINT = financial deepening, measured by real domestic credit to the private sector;

RI = the real interest rate (the bank lending rate minus the inflation rate);

PBI = Total public fixed investment as a ratio of GDP;

ATT = Dummy variable to capture ‘attitudinal change’ as an one-off level shift up of the investment function, which takes value 1 for post-1980 years and 0 otherwise, sequentially one year at a time, till 1985.

D91 = Dummy variable to capture possible effects of the 1991 reforms;

We would expect from theory that the sign of the coefficient for the relative price of equipment, b_1 , will be negative – an increase in the latter will decrease the rate of equipment investment in the economy. As argued, financial deepening is expected to have a positive impact on equipment investment.^{vii} Following Rousseau and Bell, we use the ratio of real bank credit to the private sector to GDP as our preferred measure of financial deepening (FINT).^{viii}

An increase in the real interest rate (RI) is expected to have a negative effect on the rate of equipment investment via an increase in the cost of capital. Public investment (PBI) may affect private investment both via supply and demand sides. On the supply side, the private sector relies on public investment for most of the infrastructure, because this is either a natural or a legal monopoly of the government. Public infrastructural investment can affect private equipment investment by influencing its rate of return - poor roads, an erratic supply of electricity or inadequate communication facilities can negatively affect the amount of output that is possible to obtain from a given amount of investment. Thus public investment in infrastructure and private investment should be complementary (Blejer and Khan 1984). On the demand side, the relationship is ambiguous. If there is some slack in the economy one would expect a change in public investment to push private investment in the same direction. Otherwise, some private investment will probably have to be “crowded out”. The evidence seems to suggest, however, that public investment has a complementary effect on private investment in India, rather than a crowding out effect (Bardhan 1984, Athukorala and Sen 2002).

Finally, to capture the costs to adjusting the capital stock and gestation lags in the adjustment process, which would imply that firms gradually respond to changes in the desired capital stock.(as is standard in the neoclassical model of investment behaviour), we include the one-period lagged private equipment investment rate. We also include a dummy variable taking the value one from 1991 onwards (D91) to capture the effects of the 1991 reforms.

Results

We present our results in Table 5.^{ix} We first estimate equation (1) using Ordinary Least Squares (OLS). There is a possibility that equation (1) may be subject to simultaneity bias as we have equipment and structures investment rates as explanatory variables in the regression. This is because positive and significant coefficients on the rates of private equipment investment and

structures investment could imply that higher investment rates are the result of economic growth, not the other way around. Therefore, we re-estimate equation (1) using Two Stage Least Squares (TSLS) and instrument private equipment and structures investment with the real interest, relative prices of equipment and structures and financial deepening. In both the OLS and TSLS estimates (cols (1) and (2) respectively), we find that the coefficient on private equipment investment rate is positive and statistically significant at the 5 per cent level. In contrast, the coefficient of public equipment investment is not statistically significant in either the OLS or TSLS estimates. The coefficients on structures and inventory investment are also not different from zero. Therefore, apart from private equipment investment, all other types of investment do not have a significant impact on economic growth. Our finding that an increase in the rate of private equipment investment has a far stronger positive impact on the growth of output than an increase in the rate of structures investment is consistent to what has been observed in the cross-country studies. Interestingly, the magnitude of the effect as evident in our coefficient of 0.28 on the private equipment investment rate in the TSLS estimate is similar in magnitude to that found by De Long and Summers (1993) - a coefficient of 0.30 - in their cross-national study of the relationship between economic growth and equipment investment for a sample of 88 countries.

We now move to the estimate of equation (2), and the results are presented in col. (3). In the case of private equipment investment, the relative price of equipment plays a decisive role in its determination – its coefficient is negative and significant at the 5 per cent level. The coefficient on the relative price of capital is -2.30. Financial deepening has also been a key determinant of the private equipment investment rate in India – the coefficient on FINT is positive and significant.^x Public fixed investment has had a strong complementary effect on private equipment investment – the coefficient on PBI is positive and significant at the 1 per cent level. In addition, the dummy for the post-1991 period indicates a clear increase in equipment investment associated with that period. We found that the coefficient on the real interest rate was not significant in all experimental runs of equation (2) and was omitted from the final specification. We also find that there are high adjustment costs to changing the private capital stock, as indicated by the coefficient of 0.52 on lagged private equipment investment, which is significant at the 1 per cent level.

To capture the RS-De Long argument, we include time dummies, one year at a time, from 1980 to 1985 to pick up increases in private equipment investment due to the ‘attitudinal shift’ of the state towards the private sector. However, we do not find that these dummies are significant at conventional levels of significance. Thus, in so far as the simple intercept dummies can capture the

surge in investor behaviour under more favourable state-business relations, we do not find evidence to support RS and De Long.

Such an approach may not be appropriate if the effect of the state's attitudinal shift on investors' psychology is not one-off but incremental over time. This would suggest that the cumulative effect of these incremental changes could be strongly positive on the rate of investment. In this case, our approach to use intercept dummies to capture the change in investors' psychology may be under-estimating the effects of the effect of state's attitudinal shift on investment. To redress this limitation of our approach, we construct a series generated by the prediction of the rate of equipment investment using our estimated investment function and compare it with the actual investment rate for the 1980s. If there is significant under-prediction of actual investment using our investment function, this would suggest that other factors not captured in our investment function, possibly related to shifts in investors' psychology, are also important in explaining the behaviour of equipment investment over the 1980s. We present this comparison in Figure 11. We see that there is little evidence of under-prediction of actual investment over the 1970s and 1980s and that this is particularly true in the 1980s. Therefore, our variables of interest – financial deepening, public fixed investment and the relative price of equipment investment – seem to do pretty well in explaining the behaviour of private equipment investment in the 1980s.

Our refutation of the argument that the state's signalling of its positive intentions towards of the business sector in the 1980s was the primary cause of India's growth acceleration should not be taken to mean that the state's signalling a change in its attitudes had *no positive effect* on private equipment investment. Investment expenditures are to a large extent irreversible and this particularly holds true for equipment investment. Sunk costs cannot be recovered so easily from investments made in machinery and equipment, which would imply that firms would be reluctant to commit to these investments unless they are confident that the future payoffs from the investments would more than compensate for these initial fixed costs (Rodrik 1991, Pindyck and Solimano 1993). The various policy actions in support of private sector growth that the national government took from the mid 1970s onwards would have sent a strong positive signal to Indian entrepreneurs in India and certainly explains in part the rapid rise in private corporate equipment investment that occurred from the early 1980s onwards.

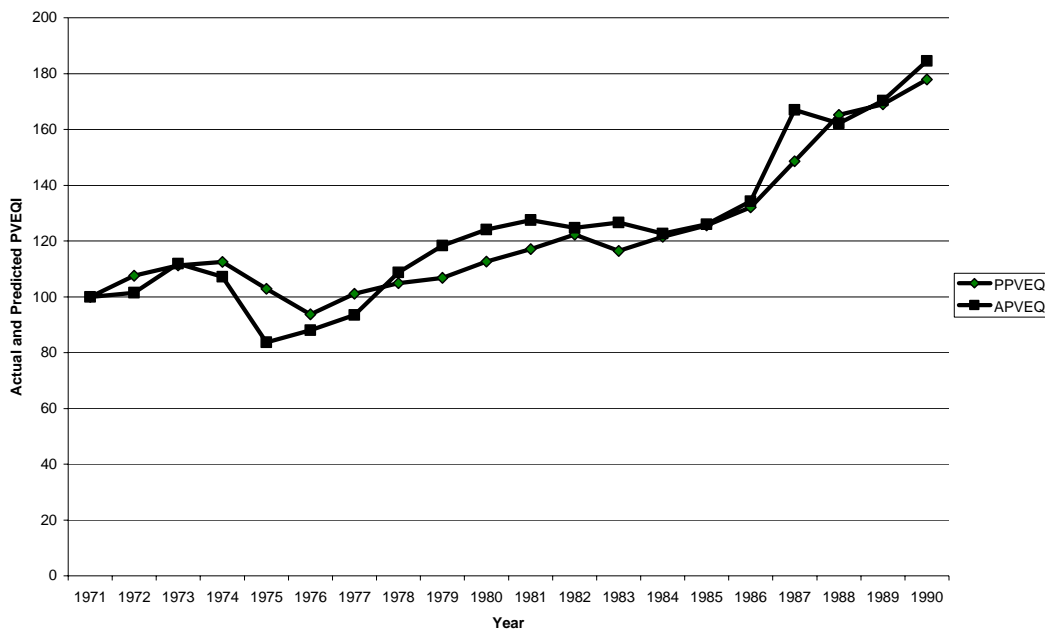
Table 5. Regression Results

Independent Variables	Dependent Variables		
		GYPC	GYPC

	Col. (1)	Col. (2)	Col. (3)
Intercept	---	---	---
PBEQI	0.37 (1.02)	0.30 (0.83)	---
PVEQI	0.26** (2.14)	0.28** (2.20)	---
STI	-0.05 (0.37)	-0.04 (0.26)	---
CST	-0.06 (0.16)	-0.07 (0.21)	---
PBI	---	---	0.21*** (3.79)
RPE	---	----	-2.30** (2.26)
FINT	---	---	0.05*** (2.94)
D91			1.46** (2.33)
PVEQI(-1)	---	---	0.52*** (4.40)
R-square	0.12	0.12	0.93
Durbin Watson statistic (Durbin's h statistic for Col. (4))	2.44	2.43	1.79
Estimation Method	OLS	TSLS	OLS
Instruments used	---	RI, FINT, RPE, RPS	---

Notes: GYPC = Growth Rate of Real GDP per capita; PBI = Total Public Investment (ratio of GDP); PBEQI= Public Investment in Equipment (ratio of GDP); PVEQI= Private Investment in Equipment (ratio of GDP); STI = Total Investment in Structures (ratio of GDP); CST= Inventory Investment (ratio of GDP); RPE = Relative Price of Equipment (in logs); RPS = Relative Price of Structures (in logs); FINT = Real Bank Credit to the Private Sector (ratio of GDP); RI = Real Interest Rate. OLS= Ordinary Least Squares; TSLS = Two Stage Least Squares; t-ratios in Brackets; ***, ** and * denote significance at the 1, 5 and 10 per cent levels.

Figure 11. Predicted and Estimated Private Equipment Investment^a



Note: a) PPVEQI is the predicted private equipment investment rate and APEQI is the actual private equipment investment rate. The predicted rate is arrived by using the coefficient estimates presented in Col. (3) of Table 5 and actual data for the independent variables.

Source: our calculations.

5. Putting It All Together

If the state's attitudinal shift towards the business sector cannot be seen as the primary reason for India's growth acceleration, then what caused the latter? The answer to this clearly lies in the behaviour of the three variables which we have found to be the key determinants of private equipment investment over the mid 1970s to late 1980s. These variables are financial deepening, public fixed investment and the relative price of equipment. These three variables are either policy determined (as in the case of public fixed investment) or policy influenced (financial deepening is influenced by financial sector policies and the relative price of equipment by trade policies). Hence, the ultimate causes of India's growth acceleration can be traced to the implementation of certain economic policies, which had a direct or an indirect effect on India's growth rate. However, the three variables in question did not play an equal part in India's growth acceleration across the entire period beginning from the mid 1970s and ending with the late 1980s. Their effects differed over these fifteen years and we need to understand why this was the case.

We divide by the period mid 1970s to the late 1980s into two sub-periods: i) mid 1970s to early 1980s, and ii) early to late 1980s, and analyse the behaviour of financial deepening, public fixed investment and the relative price of equipment investment in these two sub-periods in turn.^{xi}

The first phase – mid 1970s to the early 1980s

In 1969, fourteen of India's largest commercial banks were nationalised by the government of the day, which was headed by Indira Gandhi in her first stint as the Prime Minister of the country. As commercial banks came under 'social control', these newly nationalised banks were asked to mobilise resources on a massive scale by opening branches in rural and semi-urban areas (Sen and Vaidya 1997). This objective was largely realised. Deposits as a percentage of national income increased from 15.2 per cent in 1969 to 37.9 per cent in 1984, while population per bank office – a measure of bank density – fell from 65 thousand in 1969 to 15 thousand in 1984. The increase in bank density had a significant positive effect on private saving – Athukorala and Sen (2002) estimate that a 1 per cent increase in bank density had a 0.03 per cent increase in the private saving rate. This large amount of resources in the Indian banking sector made its way to firms and producer-households as loanable funds for investment in two ways. The first was a direct route. With the introduction of 'priority sector lending requirements' as commercial banks came under social control, banks had to lend a large proportion of this increased level of deposits to producer-households in the industrial and agricultural sectors. As we have noted in Section 3, household equipment investment increased in the second half of the 1970s. The second route was an indirect one. As commercial banks found their deposit base increasing, they invested in bonds and debentures of term-lending institutions and state-owned insurance and mutual funds companies. These resources then made their way to the private corporate sector via loans from term-lending institutions and investment in shares and bonds of corporate firms by the state-owned insurance and mutual funds companies. The share of commercial banks' investments in the bonds and debentures of term-lending institutions and insurance/mutual funds companies as a source of funds for the latter set of institutions increased from 5.9 per cent in 1971-75 to 12.1 per cent in 1976-80, and remained at around that level in 1981-85 (Sen and Vaidya 1997). The share of funds going from these institutions to the private corporate sector increased from 12.9 per cent of the total use of funds by these institutions in 1971-75 to 21.1 per cent in 1981-85. Thus, the net result of the bank nationalisation was a significant increase in financial deepening, particularly since the mid 1970s.

The positive effect of financial deepening on private equipment investment was accentuated by a sharp increase in the public fixed investment rate from the mid 1970s, as we have observed in

Figure 5. The increase in public investment was mostly in the infrastructural industries – petroleum, electricity and railways (Ahluwalia 1991).^{xii} The private sector responded strongly to the larger amount of funds available to it for investment purposes and both the demand side and supply side stimuli of public investment, and investment in equipment increased strongly from the mid 1970s onwards. This provides an explanation of the growth spurt that occurred in the Indian economy in this period.

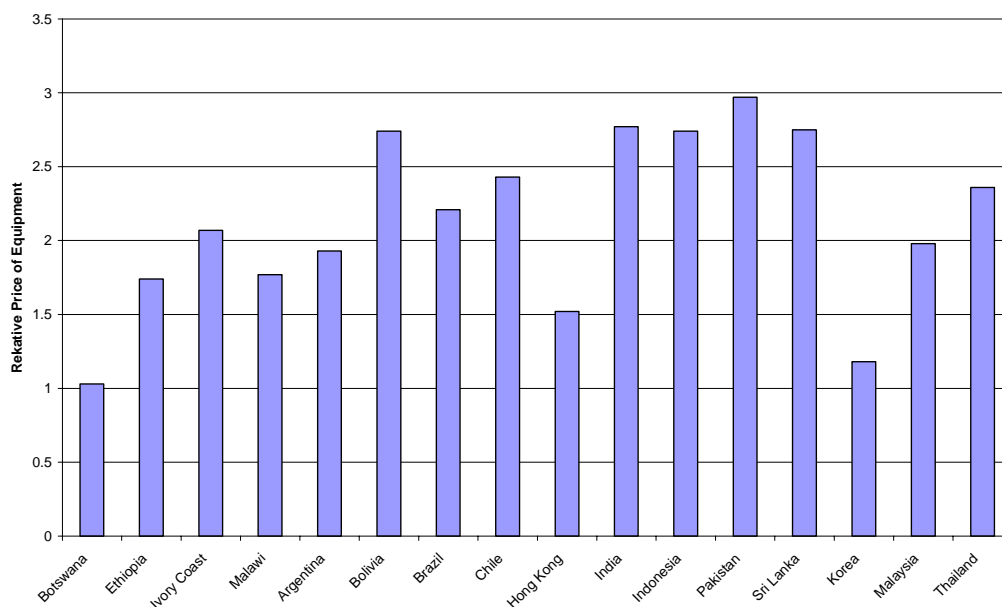
The second phase – the early 1980s to the late 1980s

By the mid to late 1980s, public fixed investment and financial deepening were no longer the prime drivers of private equipment investment, and hence, of economic growth. The main reason for this was the increase in fiscal imbalances that started occurring over the 1980s (Joshi and Little 1994). With increasing fiscal deficits, capital expenditures undertaken by the state were a casualty and public fixed investment rates started to decline (see Figure 5).^{xiii} In addition, the government increasingly used the banking sector for a captive market for government securities via increases in the statutory liquidity ratio to meet its deficits, nullifying the positive effects of financial deepening on private investment that was evident in the earlier period (Sen and Vaidya 1997).

However, by the early 1980s, another factor became increasingly important in maintaining the rise in private equipment investment and this was the fall in the relative price of equipment investment. At the beginning of the 1980s, India had one of the highest levels of the relative price of equipment investment among developing countries (Figure 12).^{xiv} The relaxation of import controls, and the move from quotas to tariffs, that had started with the export-import policy of 1977-78 gained momentum in the 1980s. There was a steady increase in the availability of capital and intermediate goods as imports via an expanding Open General License list. Though these goods were not direct substitutes of domestically produced capital and intermediate goods in most instances, they were imperfect substitutes (Pursell 1992). The resultant competitive pressure on the domestic capital and intermediate goods sectors explains to a large extent why the relative price of equipment started falling steadily since the 1980s (as we have seen in Figure 9). The move from quotas to tariffs was accelerated by the Rajiv Gandhi government that came to power in 1985.

Though the changes in trade policy in the 1980s seem relatively minor compared to the 1991 reforms which abolished most quotas on capital and intermediate goods and reduced tariffs on these goods, they had a profound influence on Indian firms, especially those in the previously highly protected capital goods sector. For the first time since the onset of the second Five Year Plan in

1956, these firms had to face external competition. For firms in the consumer goods sector, they increasingly had access to specialised capital and intermediate goods from abroad, and along with the export subsidies that were on offer at that time, began to explore hitherto unexplored export markets.^{xv} For this reason, the trade policy changes of the 1980s should be seen as a significant alteration of ‘the rules of the game’ for *all* Indian firms with respect to their relationship with the world economy.

Figure 12. The Relative Price of Equipment in 1980 for India and Other Developing Countries

Source: Jones (1994), data available in <http://elsa.berkeley.edu/~chad/datasets.html>.

To what extent can the policies we have argued as being crucial for India’s growth acceleration be attributed to a pro-business attitudinal shift of the state? The bank nationalisation episode of 1969 was motivated by Indira Gandhi’s attempt to win political support for her *Garibi Hatao* campaign and to be seen as ‘an angel of the poor’ (Patel 2002, p. 136). The motive for the increase in public investment from the mid-1970s is less clear, but it had do in some measure with a redress of the under-investment in the public sector that had occurred from the mid 1960s to the mid 1970s. With respect to the trade policy reforms, as Joshi and Little (1994, p. 273) argue, “from 1975 onward the attitude to import controls changed. They continued to be important but they were never again significantly tightened to control the balance of payments”. Therefore, among the key growth-enhancing policies, it was the set of policies pertaining to international trade that can be unambiguously linked to ‘the abandonment of left-leaning anti-capitalist rhetoric and policies, and prioritising of economic growth’ (Kohli 2006, p. 1252).

The increase in total factor productivity growth

We now turn to the final missing piece in the puzzle – why did TFP increase since the mid 1970s onwards? As we have seen earlier, this is the same period when private equipment investment increased. De Long and Summers (1993) show that the main reason why equipment investment boosts economic growth is via an increase in TFP growth – they find that there is a strong correlation between equipment investment and TFP growth in their sample of countries. The reason for this is that equipment investment has high social rates of return (in the range of 25 per cent in their estimates) that far exceed private rates of return to capital. Equipment investment can trigger an increase in TFP growth both by learning by doing as ‘new equipment is brought on line and workers and organizations learn the skills necessary to use it efficiently’ (*ibid.*, p. 412) and also via the adoption of state-of-the-art technology embodied in new capital goods (Hendricks 2000). In our case, we find that the correlation coefficient between aggregate TFP (as calculated by Bosworth, Collins and Virmani (2006)) and private equipment investment is 0.96 for the period 1960-2003 (on the other hand, the correlation coefficients between TFP and public equipment investment is -0.56 and between TFP and structures investment is -0.78). Therefore, the answer to the mystery of why TFP increased since the mid 1970s can be found in the rapid increase in private equipment investment in the same period.^{xvi}

6. Concluding Remarks

It is commonly believed India’s growth acceleration was mainly due to a change in the state’s *attitude* towards the business sector from being anti-business to being pro-business in the early 1980s and less to do with changes in economic policies. In this paper, we re-examine this argument. We find little empirical support for the argument that the state’s attitudinal shift to the private sector in the 1980s was the primary cause of India’s growth acceleration. We argue that the effect of the attitudinal shift of the state towards the private sector on India’s growth acceleration was second order, and if it did have an effect on growth at all, it was only through changes in economic policies, rather than independently of the latter.^{xvii}

We favour a ‘back to basics’ story of India’s growth acceleration. The increase in economic growth, in our view, occurred due to three policy- influenced fundamentals – financial deepening, a rise in public investment and a fall in the relative price of equipment. In the period mid 1970s to the early 1980s, financial deepening which was a consequence of the bank nationalisation of 1969 along with an increase in public fixed investment were the key factors for India’s growth acceleration. Growth

was sustained from the early 1980s onwards by the fall in the relative price of equipment investment brought about by trade reforms targeting the capital and intermediate goods sectors. Thus, India's growth acceleration can be attributed in its early phase to a classically statist model of development and in its later phase, to economic reforms which significantly altered the rules of the game with respect to the integration of Indian firms with the world economy.

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ⁱ It is important to make a distinction between Kohli's account of the 'attitudinal shift' story versus the RS and De Long account. Kohli presents a more nuanced view of how the state's attitudinal shift may have affected economic growth, arguing that it principally occurred through 'concrete policy changes' that were implemented in the first half of the 1980s. We agree with Kohli that policy factors were more important for India's growth acceleration rather than mere 'signalling' by the state. We disagree with him on the timing of the acceleration, on the actual policies that contributed to the growth acceleration, and on the importance of state's attitudinal shift in bring about these policy changes.

ⁱⁱ RS also use gravity model and conditional convergence estimates (in the latter case, both national and subnational data) to time India's growth acceleration. However, the use of decadal dummies to capture the growth acceleration creates a problem in the interpretation of the results since growth rates for the Indian economy in the first half of the 1970s were lower than the second half of the 1970s excluding 1979.

ⁱⁱⁱ The household sector includes unincorporated small and medium enterprises in the manufacturing and services sectors and producer-households in the agricultural sector.

^{iv} The reason for India's low equipment investment rate in the 1960s and 1970s can be attributed to the strong restrictions on capital goods imports during this period, which led a high relative price of equipment. As De Long and Summers (1993, p. 399) point out, "India's policies have managed to enrich industrialists instead of encouraging industry".

^v Unfortunately, we do not have disaggregated investment data in PPP terms from the Summers-Heston data-base to see if India's rate of equipment investment relative to other countries was different in the late 1990s as compared to the early 1980s.

^{vi} We omit the constant term, as in the standard growth models (both in the neoclassical and endogenous growth traditions), growth of output will be zero if the investment rate is zero.

^{vii} In the Indian case, Bell and Rousseau (2001) find conclusive evidence of the positive impact of financial deepening on gross domestic fixed investment in the post-1950 period.

^{viii} Real domestic credit to the private sector is obtained by deflating nominal domestic credit to the private sector by the price deflator for fixed investment.

^{ix} Our period of analysis is 1955/56 to 2003/2004.

^x The possibility of simultaneity bias also exists in the case of OLS estimates of equation (2) as the investment rate is an important demand-side determinant of both the relative price of capital and bank credit to GDP ratio and so the coefficients on these two explanatory variables in the regression may be biased upwards. However, simultaneity bias should lead to a positive coefficient on the relative price of equipment as the demand for capital should drive up the relative price of capital, while we obtain a negative coefficient. With respect to financial deepening, we attempted to instrument the bank credit to GDP ratio by bank density (changes in which were mostly policy determined) with no change in the results.

^{xi} This sub-periodisation of India's growth experience is to a large extent artificial, and we do it only to make clear that the relative importance of the three variables of interest – financial deepening, public fixed investment and the relative price of equipment – *was not the same* over the period from the mid 1970s to the late 1980s. Furthermore, though we end our analysis of India's growth experience in the late 1980s, clearly the maintenance of India's rapid economic growth in the 1990s owes a lot to the continued increase in private equipment investment over this period. The prime reason for the latter, in our view, was the sustained decline in the relative price of equipment that occurred due to further trade reforms targeting capital and intermediate goods in 1991.

^{xii} According to Ahluwalia (1991), the annual average rate of growth of infrastructural investment increased from 4.2 per cent in 1965-75 to 9.7 per cent in 1979-84.

^{xiii} Examining the sectoral data on public investment, we find that public investment in agriculture started declining from 1979/80 onwards, which may explain the stagnancy in household equipment investment in the 1980s. The complementarity of public and private investment is particularly strong in the case of the agricultural sector.

^{xiv} Jones (1994) shows that there is a strong negative relationship between the relative price of equipment and economic growth, using a cross-section of 65 countries over the period 1960-85.

^{xv} Chand and Sen (1999, 2002) find that trade liberalisation in the 1980s had a dampening effect on domestic prices and a strong positive effect on total factor productivity growth in Indian manufacturing.

^{xvi} TFP estimates from Bosworth-Collins-Virmani (2006) disaggregated by sector also support our argument. TFP growth acceleration occurred initially in the agricultural sector in the second half of the 1970s, and we have seen that among the two components of private equipment investment, it was the household sector (farmers, in this instance) which increased its investment in machinery in the same period. TFP growth in the registered manufacturing sector started picking up in the 1980s, when the private corporate equipment investment rate rapidly increased.

^{xvii} At a more general level, our reading of India's growth experience makes us sceptical of 'political economy' accounts of growth accelerations that stress the primacy of informal institutional changes such as those evident in changes in beliefs and attitudes over formal institutional reforms as being causal to economic growth. Informal institutional change can be complementary to formal institutional change in bringing about economic growth, but cannot be a substitute for the latter.