Does FDI Contribute to Growth?
Evidence from the Capital Goods Sector in India

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This paper investigates if foreign direct investment contributes to the growth of industry by examining the spillover gains in the capital goods sector. It compares the performance of foreign and domestic firms in the sector between 1994-95 and 2009-10 by using the asset turnover ratio (ATO) and the return on capital employed (ROCE). The results indicate that except during the high growth period 2004-08, there is no significant difference between the ATOs of domestic and foreign firms and the ROCE of foreign firms is significantly higher than that of domestic firms. However, during this high growth period, the ATO of domestic firms is significantly higher than that of foreign firms and ROCE of foreign and domestic firms are same. Thus, the spillover effects are very slow to be realised and higher benefits from FDI have accrued to foreign firms. We do not find support for FDI as one of the key drivers for industrial growth in capital goods sector as claimed by the industry captains.

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1 Introduction

The Indian economy has slowed down over the last one year. One of the reasons put forward for this slowdown is the government's inability to implement economic reforms. Many of these economic reforms target higher levels of foreign direct investment (FDI) in different industries mainly in the airline, insurance, pension, defence and multi-brand retail. Industry stalwarts are continuously demanding an increase in FDI limits in industries where FDI is still restricted and easing of regulations for industries where the permitted FDI is 100% but permission from various government departments is necessary for foreign investment. The government responded to these demands in September 2012 by introducing FDI in multi-brand retail with a 51% cap. FDI levels have also been increased in the insurance, pension and aviation sectors to increase capitalisation and efficiency of these sectors. At the same time, these reforms are being opposed by various political parties as well as different groups having vested-interests in these industries.

The support for FDI stems from the expectation of spillover effect that has been propagated as a major benefit occurring from this form of investment. It is expected to help the domestic sector in obtaining sufficient foreign capital at lower costs as well as help it acquire sophisticated technology through association with foreign firms. Cheap foreign capital and sophisticated technology are expected to help domestic firms increase their operating efficiency and profitability (Gorg and Greenway 2004; Alfaro and Chen 2010). The critics of FDI put forward the competition effect to oppose FDI. The competition effect indicates an exit of domestic firms in the market due to the entry of foreign players. When developing economies are deregulated allowing FDI, foreign firms undertake offensive strategies so as to obtain a strong position in these newly developing economies. This approach by foreign firms makes continuation of business difficult for those domestic firms which lack size, capital efficiency or product quality (Ray and Venaik 2008; Akpolat and Inancli 2011). Prior studies in different countries[1] document a strong competition effect in the initial stages of FDI, but have found that in the later stages the spillover effect comes into play. The industry stalwarts have consistently leaned on the spillover effect to demand higher levels of and lenient regulations for FDI.

The study of FDI in India throws up some interesting facts. The contribution of foreign investment (FDI and foreign institutional investment both) to the gross fixed capital formation

Table 1: Growth in GDP and Foreign Investments in India (in %)

Year	GDP Growth	FI/GFCF	FDI/ GFCF	FDI/ Ind GFCF
1991-92	1.51	0.21	0.21	0.29
1992-93	5.15	0.96	0.54	0.83
1993-94	5.54	6.80	0.96	1.37
1994-95	6.21	7.06	1.81	2.48
1995-96	7.16	5.55	2.43	3.41
1996-97	7.53	6.64	3.05	4.24
1997-98	4.43	5.37	3.55	5.42
1998-99	6.44	2.37	2.43	4.09
1999-00	7.40	4.63	1.93	3.55
2000-01	4.21	6.26	3.72	6.99
2001-02	5.37	6.59	4.95	10.17
2002-03	3.91	4.84	4.05	8.08
2003-04	7.75	10.34	2.85	5.50
2004-05	6.74	7.42	2.92	5.23
2005-06	9.05	8.48	3.54	5.61
2006-07	9.14	10.05	7.69	11.81
2007-08	8.91	15.22	8.54	12.60
2008-09	6.51	6.05	9.54	16.41
2009-10	8.06	16.29	8.77	14.20
2010-11	8.06	12.09	5.94	10.89
Average				
1991-11	6.45	7.16	3.97	6.66
2001-11	7.35	9.74	5.88	10.05
2004-08	8.32	10.30	5.11	8.15
2009-11	7.54	11.48	8.08	13.83

The above figures are obtained from the RBI database. GFCF stands for gross fixed capital formation, FI stands for foreign investment, FDI stands for foreign direct investment, Ind. GFCF stands for industrial contribution to gross fixed capital formation.

(GFCF) of the country is on an average around 7% over the last 20 years and around 9.7% in the last 10 years (Table 1). Analysing FDI contribution towards GFCF by industrial sector in India we find that the contribution by FDI is on an average 6.7% over the last 20 years and around 10% in the last 10 years. It is clear that rather than FDI, it is the domestic investors (households as well as industry) who substantially contribute to GFCF in India. Interestingly, the FDI contribution to GFCF during the boom period of 2003-04 to 2007-08 is around 8% whereas during the crisis period of 2008-09 to 2010-11 it is around 13%. We find that FDI is not consistent and rises during periods such as 2008-09 to 2010-11 when the western economies slowed down. This certainly raises a question regarding the need for higher levels of FDI to bring back the Indian economy to a high growth trajectory. Industry bodies have held the restrictive policies of the Indian government responsible for lower levels of FDI in India. They have claimed that more open policies by the government will attract higher levels of FDI and support the growth of the Indian economy.

Most of the prior studies on FDI have analysed the efficiency of FDI at the country level, mostly in terms of an increase in international trade and exports. These studies focus on government policy, the reasons for such a policy and efficiency of government policy. Though these studies establish the importance of FDI, they are not for sufficiently long periods to examine the conflicting claims made by the supporters and critics of FDI. To evaluate these claims there is need to examine FDI effects over a longer period of time and under the ideal conditions demanded by the industry, viz, stable FDI policy with

permission for 100% investment by foreign firms and no interference by the government in the sector.

The capital goods[2] sector satisfies the above conditions effectively. It is one of the most open sectors in India in terms of international trade and foreign investment (CII 2005). The Second Five-Year Plan focused on the development of the capital goods industry in India through the Mahalanobis Model and establishment of public sector companies like HMT and BHEL in 1960s. As capital goods drive the manufacturing sector by providing the key technology and machinery required for growth, government felt a need for additional capital from different sources. Hence, de-licensing of this sector was initiated in 1975 resulting in reduced government controls. The sector was further opened up for 100% FDI in 1985, much earlier in comparison to other sectors which were opened up 1992 (Ramanna 2005).

The capital goods sector is highly capital-intensive and technology-intensive in nature. The sector produces machine tools and engines for industrial consumption. These goods are further used to produce products for consumption by retail customers. The demand for capital goods exists only if there is sustained demand for consumer goods over a long term. Investment in capital goods is generally for the long term and in the absence of consistent demand for the consumer goods, companies will avoid investing in capital goods. Demand for capital goods is a good indicator of economic growth (Cris Infac 2006; DHIPE 2011).

As retail customers are not directly affected by this industry, the government has long back opened this sector for foreign investment, not overly controlled this sector, nor modified the FDI policies related to this sector. This sector was opened up for FDI more than 25 years ago, and it still attracts significant amounts of FDI. An analysis of FDI over the 12-year period from 2000 to 2012 shows that the capital goods sector has attracted about 4% of the total FDI in India and has been ranked 10th amongst the 57 sectors attracting FDI (Table 2). Thus this sector is ideal for analysing the effect of FDI especially when there is no high level of intervention from the government.

The next section is the literature review and discusses hypothesis formulation. Section 3 describes the research methodology used in this study and Section 4 discusses the firms used in the study. Section 5 discusses the results and Section 6 concludes the paper.

Table 2: FDI (Rs billion) in Key Sectors 2000-12

Rank	Sector	FDI	FDI %
1	Services	1,457.64	18.81
2	Telecommunications	570.78	7.36
3	Construction activities	522.53	6.74
4	Computer and IT	501.18	6.47
5	Real estate	497.17	6.42
10	Capital goods	281.37	3.63
	Total (59 key sectors)	7,750.06	100

We club electrical equipment, industrial machinery, prime mover, machine tools and earth moving machinery sectors into the capital goods sector.
Source: *Fact Sheet on Foreign Direct Investment (FDI)* from April 2000 to March 2012, http://dipp.nic.in/ English/Publications/FDI_Statistics/ 2012/india_FDI_ March2012.pdf

2 Literature Review and Hypothesis Formulation

FDI has generally two conflicting effects on an industry in any emerging economy, viz, the competition effect and the spillover (positive market externalities) effect. The competition effect

indicates the exit of domestic firms in the market due to the entry of the foreign players. The spillover effect indicates the increase in the number of domestic players and increased efficiency of the domestic players.

Gorg and Greenway (2004) reviewed studies to analyse the effect of FDI on the development of the host country resulting from the spillover effects of the foreign investments. They identify the key sources of spillover but do not find significant empirical evidence to support the spillover effects. Barrios et al (2005) examined the performance of foreign firms and domestic firms in Ireland. They find that in the initial period of FDI, the competition effect is dominant but in the later stages the positive market externalities come into play and due to the knowledge spillover, increase is seen in the efficiency of the domestic firms and industry as a whole. A similar study conducted in China by Xu et al (2006) states that when the reforms started in China in 1978, the performance of foreign firms was far better than the Chinese firms. After 20 years of reform, the research has empirically proved that the Chinese firms have bridged the gap and are performing as well as the foreign firms.

Blalock and Simon (2009) study the effect of downstream FDI on the benefits accrued to domestic firms in Indonesia. They conclude that firms with higher levels of absorptive capacity (weaker production capabilities) and greater complimentary capabilities benefit from FDI. Alfaro and Chen (2010) examine the effect of the global financial crisis on the performance and efficiency of multinational firms and local firms in 53 countries. They find that multinational firms having vertical integration fared better in comparison to local firms in face of the crisis. Malik et al (2012) explore the link between FDI, multinational enterprises and spillover effects in developing economies. They find that the competitive advantage available with the foreign firm, if compatible with the local industry structure, results in the spillover effects otherwise it results in negative competition effects.

Sahoo and Mathiyazhagan (2003) study the relationship between economic growth and FDI by examining the enhancement in export promotion by Indian firms over a period of 21 years during 1980-2001. They find that exports play an important role in economic growth and hence suggest opening up of export-oriented sectors for FDI. Banga (2004) examined the impact of FDI from Japan and the US on the growth of Indian automobile, electrical, electronics and chemical industries. They find an overall positive impact of FDI but record higher impact by Japanese FDI in comparison to US FDI. Shahina (2011) compared the FDI inflows to China and India and concluded that higher FDI inflows to China are due to the friendly and business-oriented policies adopted by China. In a similar vein Ramakrishna (2011) compare the effect of FDI on the industrial output in China and India and concludes that FDI played an important role in higher industrial output and exports by China. They suggest that India should have more liberal policies to attract FDI.

Das (1997) states that when developing economies are deregulated allowing FDI, foreign firms undertake offensive strategies to obtain a strong position in these newly developing economies. The domestic firms get hurt by these strategies in the initial period, but if properly supported might respond to these offensive strategies by rejuvenating themselves through development in production processes and products so as to sustain this foreign onslaught. Mien (1999) examines the relationship between FDI and trade orientation in the Malaysian manufacturing sector and find that even though FDI has contributed to the growth of the Malaysian manufacturing sector, it has also resulted in higher levels of market concentration. A study by Khawar (2003) on Mexico concluded that foreign firms are more productive than the domestic firms and hence have better performance especially in the initial stages.

Wang and Li (2007) find curvilinear relationships between FDI and the spillover effects. They find that spillover effects (captured in the terms of increasing efficiency resulting from best-practices and new technologies) are positive in the initial period. At higher levels the spillover effects turn negative harming the domestic firms. Hence they advise strengthening the domestic firms while attracting FDI for growth. Akpolat and Inancli (2011) studied FDI patterns in Turkey and find that FDI is more concentrated in low employment sectors rather than high employment sectors. They have not been able to identify any spillover effects in Turkey.

India and China

Sapsford and Balasubramanyam (2007) compare the levels of FDI in India and China and conclude that even though FDI in India is lower than China, India may not require increased FDI due to our economic structure and factor endowments. Ray and Venaik (2008) study the contribution of the multinational corporations (MNCs) to the development of host countries through development of export orientation and royalties. They conclude that the contribution of MNCs to growth of exports and royalties in host countries is much lower when compared to the contribution of domestic firms. Hence they state that host countries should ensure that the interests of the domestic firms are not undermined in the zeal to obtain FDI.

Joseph and Reddy (2009) examined the impact of FDI through backward spillover arising from the buyer supplier linkages in the industry. They examine the impact of these backward spillovers on the export performance of the domestic firms. They conclude that domestic firms resort to exports due to increased competition and crowding-out of the domestic market by foreign firms. They also find that export efficiency of domestic firms does not increase from these foreign linkages. Kuntluru et al (2012) analysed the impact of FDI on export performance of the pharmaceutical industry in India and found a negative impact of foreign ownership on export performance. They conclude that foreign firms are more interested in focusing on the domestic market rather than the export market increasing competition in the domestic market.

Prior research throws up evidence for both the spillover effect as well as competition effect making it necessary to examine which of these two effects exist in the Indian capital goods sector. India allowed FDI in capital goods sector from 1985 and we expect the Indian firms to overcome the competition effect by 1994-95.

Hence we expect the spillover effect rather than the competition effect to be now prominent in the capital goods sector. The hypothesis based on the above discussion is given below.

Hypothesis: The performance of domestic firms is not inferior to that of the foreign firms on various performance criteria.

3 Methodology

The key objective of this study is to examine the effect of FDI on the performance efficiency of the domestic firms in the capital goods sector. To examine the same we compare the performance of domestic firms with that of foreign firms. As we expect the spillover effect to exist we do not expect any difference between their performances. FDI is long-term investment in physical and operating assets in the industry and is mostly aimed at developing the productive efficiency of the industry through spillover effects. The spillover happens through various channels, viz, transfer of new technology in terms of product development, transfer of new technology related to best operating practices in the industry resulting in higher efficiency and access to new markets (Gorg and Greenway 2004). To examine the same we measure the productive efficiency of the firms using two performance measures, viz, the asset turnover ratio (ATO) and the return on capital employed (ROCE).

The ATO which is a ratio of net sales to assets of the firm captures the top-line efficiency, i e, sales efficiency of the firm. Higher the amount of sales for a given capacity of the firm, higher will be the sales efficiency captured using ATO. Products of foreign firms are expected to be technologically superior and also possess better brand value. They demand a price premium over products of domestic firms. In case the domestic firms have gained from the spillover effect, then their products should also be technologically similar to that of foreign firms and the foreign firms should be unable to demand a premium. Hence if spillover exists then the ATO of both domestic and foreign firms should be similar. The return on capital employed which is a ratio of operating profit to long-term capital employed captures the efficiency of the firms' operations. Higher the operating profit for a given level of long-term investment in the firm, higher will be the ROCE. In case the domestic firms have gained from the best operating practices employed by the foreign firms then the operating efficiency, i e, ROCE of domestic firms should be equal to that of foreign firms. Thus, ATO and ROCE help us evaluate the spillover effect arising from FDI in capital goods sector in India.

In the first stage we compare the performance of the foreign firms and domestic firms using the estimated models (1) and (2). To capture the effect of FDI we use "DD" a dummy variable which classifies firms as foreign firms and domestic firms based on the Prowess classification.[3] DD takes value 0 in case the firm is a foreign firm and takes value 1 in case the firm is a domestic firm. As both ATO and ROCE are dependent on sales we control for the firm sales.

$$\text{ATO}_i = \beta_0 + \beta_1 \, \text{DD}_i + \beta_2 \, (\text{lnSales})_i + e_i \qquad \ldots(1)$$

$$\text{ROCE}_i = \beta_0 + \beta_1 \, \text{DD}_i + \beta_2 \, (\text{lnSales})_i + e_i \qquad \ldots(2)$$

We further compare the performance of foreign firms and domestic firms controlling for the firm specific variables which differentiate between foreign firms and domestic firms. The regression models (3) and (4) used for the cross-sectional analysis are provided below.

$$\text{ATO}_i = \beta_0 + \beta_1 \, \text{DD}_i + \beta_2 \, \text{lev}_i + \beta_3 \text{R\&D}_i + \beta_4 \, \text{Mkt}_i$$
$$+ \beta_5 \, \text{Export}_i + \beta_6 \, \text{Size}_i + \beta_7 \, \text{Age}_i + e_i \qquad \ldots(3)$$

$$\text{ROCE}_i = \beta_0 + \beta_1 \, \text{DD}_i + \beta_2 \, \text{lev}_i + \beta_3 \text{R\&D}_i + \beta_4 \, \text{Mkt}_i$$
$$+ \beta_5 \, \text{Export}_i + \beta_6 \, \text{Size}_i + \beta_7 \, \text{Age}_i + e_i \qquad \ldots(4)$$

We control for firm leverage, R&D intensity, marketing intensity, export intensity, size and age of the firm. In case the coefficient for DD is significant we can conclude that performance of foreign firms differs from the performance of domestic firms. The definition and structure of the various firm-specific variables used in analysis are provided in Annexure I (p 68). As a huge variation exists in the net sales and size (total assets) across the firms, we use the natural log of net sales and size in the regression rather than the actual values. As high correlation exists between firm sales and firm size, we do not include firm sales as an independent variable in equations (3) and (4) to avoid multicollinearity amongst variables.

In order to effectively examine the spillover effects we perform the analysis for a period of 16 years from 1994-95 to 2009-10. We further divide this period into five sub-periods, based on the macroeconomic situation existing during those periods to ensure that the comparison is free from external influence. The first sub-period is a three-year period from 1994-95 to 1996-97. The regulatory issues resulting from the decision to liberalise the economy had been settled and the effect of this decision is seen in the form of high GDP growth rate during this period. The second sub-period is a three-year period from 1997-98 to 1999-2000. The economic growth rate was reversed during this period due to the slow agricultural growth resulting from deficient rainfall during this period. FDI inflows also slowed down during this period due to the Asian financial crisis and "dot.com" stock market crash in 1999 (Datt and Mahajan 2012).

The third sub-period is a three-year period from 2000-01 to 2002-03. This GDP growth rate was low during this period resulting from high inflation, high fiscal deficit and low agricultural output. The government introduced new reforms relating to foreign investment during this period to attract FDI and revive the economy. The fourth sub-period is a five-year high-growth period from 2003-04 to 2007-08. This period is marked by a high GDP growth rate, low fiscal deficit, low inflation and higher levels of foreign investment in India. The last sub-period is a two-year period of 2008-09 and 2009-10 which is characterised by the aftermath of the financial crises of 2008. The growth rate slowed down during this period and the Indian firms faced problems as the exports dried up due to the slowdown in the developed countries (Datt and Mahajan 2012).

We follow the method prescribed by Rajan and Zingales (1995) to perform cross-sectional analysis for each of the five sub-periods. We calculate the weighted average of the firm's variable values for different years clubbed under a sub-period

to arrive at a firm's variable value for the sub-period. This helps us arrive at cross-section data applicable for each sub-period and takes care of the variations in firm variable values across the years clubbed under a sub-period.

4 Description of the Firms under Study

The objective of our study is to compare the performance of foreign firms and domestic firms in the capital goods sector. Based on the PwC report (2001) we club the electrical and power equipment, earthmoving and construction equipment, machine tools and process plant equipment industries in the capital goods sector. The firm-level financial data for our analysis has been obtained from the Prowess database maintained by the Centre for Monitoring of the Indian Economy (CMIE). The firm ownership categorisation has also been obtained from Prowess. Prowess classifies firms into foreign firms (having higher levels of FDI) and domestic firms based on the level of foreign ownership in the firm. As 100% FDI has been allowed in the capital goods sector, generally firms with more than 51% foreign ownership or firms with substantial foreign ownership clubbed with management by the foreign partner have been classified as foreign firms by Prowess.

Table 3: Profile of the Firms under Study

Variable	Data for		
	Total Firms	Deleted Firms	Final Study Firms
Total firms	800	482	318
Foreign firms	103	57	46
Domestic firms	697	425	272
Average total assets (Rs million)	3,509.4	2,540.0	4,971.1
Average total net sales (Rs million)	3,404.7	2,923.0	4,130.4
Average age (years)	38.7	43.7	31.2

This table provides the brief description of the total, deleted and final study firms obtained from Prowess database. Required data on 482 firms (projects) was not available for analysis. Final study firms indicate the structure of 318 firms used for analysis. Total assets and net sales of the firm are measured in Rs million.

Table 3 describes the process of firms under study. The raw data collected from the Prowess database consisted of 800 firms classified across four industries included in capital goods sector. Out of the 800 firms, 103 were foreign firms and the remaining 697 were domestic firms. The average firm size for all firms measured by total assets of the firm is around Rs 3,509.4 million. Similarly, the average sales for all firms are Rs 3,404.7 million. The average age of these firms is 38.7 years. As data required for the firm variables under analysis was not available for 482 firms, we deleted them from our study. The 482 firms consist of 57 foreign firms and 425 domestic firms. The deletion results in a study of 318 firms for our analysis. Thus, our study consists of 46 foreign firms and 272 domestic firms. The average size and net sales of the firms under study are Rs 4,971.1 million and Rs 4,130.4 million respectively. The average age is around 31.2 years. Thus most of the firms deleted due to unavailability of data are older in age and smaller in size and net sales.

Table 4 provides the description of the firms under study over the five sub-periods considered for analysis. The mean net sales have almost quadrupled over the 16-year-period from Rs 1,089.1 million to Rs 4,130.4 million indicating growth in the industry as a whole. The standard deviation of net sales

Table 4: Selected Descriptive Statistics

Variable	Measure	1995-1997	1998-2000	2001-2003	2004-2008	2009-2010
No of firms		199	209	204	226	318
Net sales (Rs million)	Mean	1,089.1	1,199.0	1,443.0	2,990.8	4,130.4
	Median	355.8	356.5	461.7	706.4	936.5
	Std Dev	3,483.6	4,470.5	5,483.2	11,107.6	19,260.5
Total assets (Rs million)	Mean	1,433.4	1,607.8	1,778.2	3,045.9	4,971.1
	Median	417.4	421.3	524.2	611.6	876.6
	Std Dev	5,779.2	6,788.6	8,079.9	16,767.3	31,631.9
ATO	Mean	0.87	0.81	0.87	1.17	1.13
	Median	0.81	0.76	0.86	1.14	1.05
	Std Dev	0.38	0.39	0.39	0.47	0.59
ROCE	Mean	0.64	0.43	0.37	0.77	0.78
	Median	0.51	0.37	0.32	0.61	0.55
	Std Dev	0.53	0.37	0.40	0.62	0.73
Leverage	Mean	0.28	0.27	0.29	0.22	0.24
	Median	0.28	0.27	0.28	0.17	0.21
	Std Dev	0.17	0.21	0.27	0.24	0.32
R&D Int	Mean	0.02	0.02	0.02	0.01	0.02
	Median	0.00	0.00	0.00	0.00	0.00
	Std Dev	0.04	0.05	0.05	0.03	0.04
Mkt Int	Mean	0.09	0.12	0.15	0.12	0.13
	Median	0.07	0.09	0.11	0.09	0.08
	Std Dev	0.09	0.11	0.13	0.10	0.18
Export Int	Mean	0.39	-0.02	1.92	-0.22	0.96
	Median	-0.03	0.00	0.00	0.00	0.00
	Std Dev	7.59	0.54	25.21	3.52	11.32
Age	Mean	27.3	27.1	29.7	30.7	31.2
	Median	23.0	24.0	26.0	25.0	25.0
	Std Dev	18.6	18.4	18.0	18.9	18.7

The table provide descriptive statistics for the variables being analysed in the study for the five periods. ATO stands for asset turnover ratio. ROCE indicates return on capital employed. Leverage captures debt capitalisation at the start of the year. R&D Int. stands for R&D intensity for the firm. Mkt Int stands for marketing intensity of the firm and Export Int. stands for export intensity of the firm. Age stands for age of the firm in years. Std Dev stands for Standard Deviation.

has increased six times during the same period resulting from higher variations in the net sales growth across firms. Similar to net sales, the mean total assets have more than tripled over the 16-year period from Rs 1,433.4 million to Rs 4,971.1 million indicating growth in the industry capacity. The standard deviation of total assets has increased by more than five times during the same period. The trend in net sales and total assets over the period indicates existence of large firms which are growing at a faster rate. This also indicates increasing market concentration.

The average ATO hovers around 0.85 for the first three periods till 2003 and then increases to 1.17 during the post-2003 period. This indicates the increase in net sales efficiency of the capital goods sector. On the other hand, the return on capital employed dips from 0.64 in 1995-97 to 0.37 in 2001-03 but then again increases to 0.77 during the high growth period. This reversal indicates an increase in operating efficiency of the sector during the high growth period. The mean leverage of the firms is around 28% till 2003 but then decreases to 24% in 2010 indicating higher funding through equity finance in the later periods.

The mean R&D intensity is around 2% across the periods. The median R&D intensity is 0 across all the sub-periods. The

low mean R&D intensity and 0 median clearly shows that R&D is not a key focus area in the capital goods sector in India. The marketing intensity is stable at around 10% to 12% for all the periods. The mean export intensity peaked during the 2001-03 period to 1.92 and turned negative for 2004-08. The government introduced a large number of export promotion schemes in 2001-03 resulting in higher levels of export in comparison to imports. During the 2004-08, when most of the firms in India undertook a huge amount of capital expenditures to sustain growth rate, the firms in the capital goods sector have resorted to imports to satisfy this large demand. Hence export intensity, is negative. The mean age is around 30 years.

5 Results

In order to understand whether the structure of foreign firms differs from the domestic firms during the period of analysis, we compare the firm variables using the independent sample t-tests. In case the mean of the firm variables is equal we can conclude that operating structure of the both classes of firms is similar. The convergence in the operating structure is an indication of the spillover effects. Table 5 provides the results for comparison between foreign firms and domestic firms. Sec A of Table 5 provides the results for comparison between variable means of foreign firms and domestic firms. This comparison is performed separately for each of the five sub-periods considered for analysis. The difference between the variable means for foreign firm and domestic firm is calculated as "Diff = foreign firm variable mean – domestic firm variable mean" in all the cases.

results indicate that foreign firms have recorded higher sales in comparison to domestic firms from 1997-98 onwards (Figure 1). Size is measured as the natural log of total assets to control heteroscedasticity in the total assets data. The comparison

Figure 1: Comparison between Trend in Average Net Sales and Average Total Assets of Foreign Firms and Domestic Firms (in Rs million)
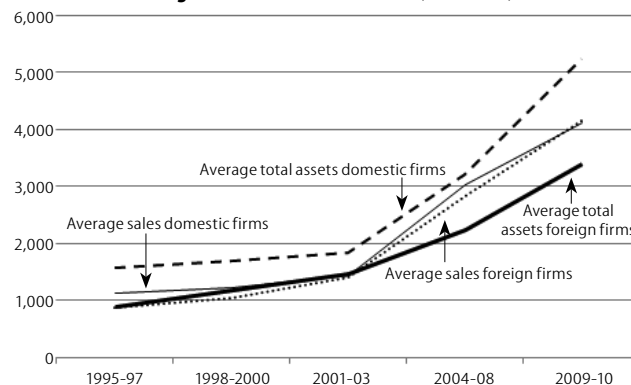
using size shows that average firm size for foreign firms is larger than the average firm size of domestic firms. The comparison of leverage shows that average leverage in case of foreign firms is lower than that of domestic firms. Foreign firms have better access to international capital markets and hence are not dependent on higher amount of debts for funding their operations. This trend changes for 2008-09 and 2009-10 when the international capital markets were hit with the 2008 financial crisis. We also find that R&D intensity of foreign firms is consistently higher than that of intensity of domestic firms. We do not find a significant difference between the marketing intensity, export intensity and age of foreign firms and domestic firms.

Sec B of Table 5 provides the results for comparison between the compound annual growth rates (CAGR) of foreign firms and domestic firms. The comparison of CAGR of net sales shows that even though the net sales of domestic firms grew at an impressive rate of 13% for the 16-year period from 1994-95 to 2009-10, the foreign firms grew at a significantly higher CAGR of 21%. Similarly, comparison of size also shows that foreign firms grew at a significantly higher CAGR of 24% in comparison to the CAGR of 16% recorded for the domestic firms. The comparative analysis clearly shows that even after 25 years of opening up of the capital goods sector, the structure of foreign firms and domestic firms is different indicating lack of convergence between the two. The higher growth rates recorded in case of foreign firms clearly indicate the competition effect or the market capturing tendency of the foreign firms at the cost of the domestic firms.

Table 5: Independent Sample t-tests to Compare Foreign Firms with Domestic Firms

Sec A: Comparison of firm variables means for different periods

Period	1995-97		1998-2000		2001-03		2004-08		2009-10	
Foreign firms	46		44		42		36		46	
Domestic firms	153		165		162		188		272	
Variable	Diff	t-stat	Diff	t-stat	Diff	t-stat	Diff	t-stat	Diff	t-stat
Ln (net sales)	0.31	1.28	0.64	2.85**	0.83	2.94**	0.91	3.61**	0.95	2.61**
Size	0.14	0.62	0.48	2.27*	0.63	2.91**	0.81	3.56**	0.80	3.38**
Leverage	-0.12	-4.31**	-0.09	-2.47*	-0.11	-2.35*	-0.09	-2.17*	-0.05	-0.88
R&D Int	0.03	4.50**	0.04	5.36**	0.04	4.26**	0.03	5.77**	0.03	5.91**
Mkt.Int	0.01	0.33	0.01	0.55	-0.03	-1.30	0.00	-0.19	-0.02	-0.75
Export Int	-0.94	-0.73	0.02	0.21	1.90	1.05	0.67	1.05	1.73	0.96
Age	-2.61	-0.83	-1.52	-0.49	-1.52	-0.49	-1.82	-0.53	-2.68	-0.90

Sec B: Growth rate comparisons for full period (1994-95 to 2009-10)

| Growth Rates	Foreign	Domestic	Difference	t-stat
Sales growth rate (CAGR)	0.21	0.13	0.08	2.33*
Assets growth rate (CAGR)	0.24	0.16	0.08	1.81a

**, *, a, denotes statistical significance at the 1%, 5% and 10% levels in a two tailed test, respectively.
This table provides the results for comparison between foreign firms and domestic firms. Sec A provides the results for comparison between variable means of foreign firms and domestic firms. This comparison is conducted separately for each of the five periods considered for analysis. Size is measured in terms of natural log of total assets at the start of the year. Leverage captures debt capitalisation at the start of the year. R&D Int stands for R&D intensity for the firm. Mkt Int stands for marketing intensity of the firm and Export Int. stands for export intensity of the firm. Age stands for age of the firm in years. 'Diff = foreign firm variable mean – domestic firm variable mean' and indicates the difference between the variable mean for foreign firm and domestic firm. 't-stat' stands for the t-statistic capturing the significance for the difference between the variable means using the independent sample t-test. Sec B provides the results for comparison between the variable growth rates of foreign firms and domestic firms. CAGR stands for compounded annual growth rates.

Actual net sales data has a high amount of variation across firms. To control heteroscedasticity we use the natural log transformation of net sales and compare mean ln (net sales) for foreign firms and domestic firms. The ln (net sales) comparison

In the next stage we compare the performance of foreign firms and domestic firms during the five sub-periods used for analysis. As both ATO and ROCE are dependent on sales a direct comparison is not proper. Rather than directly comparing the two performance measures of foreign and domestic firms we compare them after controlling for sales using the estimated models (1) and (2). The results of the estimated models are provided in Table 6.

Table 6: Performance Comparisons between Foreign Firms and Domestic Firms

Variables	1995-97	1998-2000	2001-03	2004-08	2009-10
No of firms	199	209	204	226	315
Comparison of ATO controlled for net sales (model 1)					
Constant	0.45**	0.31**	0.24*	0.41**	0.60**
Domestic dummy	-0.08	0.00	0.02	0.15*	0.11
Ln (net sales)	0.08**	0.08**	0.11**	0.10**	0.07**
R^2	0.11	0.12	0.19	0.21	0.09
F-stat	11.8**	13.8**	23.8**	19.3**	7.9**
Comparison of ROCE controlled for net sales (model 2)					
Constant	0.21	-0.03	0.12	-0.15	0.49
Domestic dummy	-0.37**	-0.17**	-0.31**	-0.14	-0.48**
Ln (net sales)	0.12**	0.10**	0.08**	0.17**	0.10**
R^2	0.22	0.26	0.27	0.26	0.17
F-stat	27.5**	36.3**	37.6**	39.7**	31.9**

**, *, a, denotes statistical significance at the 1%, 5% and 10% levels in a two-tailed test, respectively.
This table provides the results for performance comparison between foreign firms and domestic firms separately for the five periods under analysis. Performance is measured using two ratios viz, asset turnover ratio (ATO) and return on capital employed (ROCE). Domestic dummy captures ownership and takes value 1 for domestic firms and value 0 for foreign firms.

The results of the comparison of ATO of foreign firms and domestic firms show that there is no significant difference between the ATO of foreign firms and domestic firms till 2003 (Figure 2). During the high growth period of 2004-08 we find that the ATO of domestic firms is significantly higher than the ATO of foreign firms indicating higher sales efficiency of domestic firms in comparison to that of foreign firms during this period. This higher efficiency is again not seen during the post-2008 financial crisis period. The results of the comparison of ROCE of foreign firms and domestic firms show that ROCE of foreign firms is higher than the ROCE of domestic firms

till 2003. During the high growth period of 2004-08 we find that there is no significant difference between the ROCE of foreign firms and domestic firms. This claim over efficiency is lost in 2009-10 wherein the foreign firms are again better-off in comparison to domestic firms in terms of their operating efficiency. These results when clubbed with ATO indicate that even though it seemed that the domestic firms had achieved the capability and desired efficiency levels to compete with foreign firms by 2004-08, the results for the post-2008 financial crisis period show that foreign firms are still more efficient in comparison to domestic firms.

Figure 2: Comparison between the Trend in Average ATO and Average ROCE of Foreign Firms and Domestic Firms
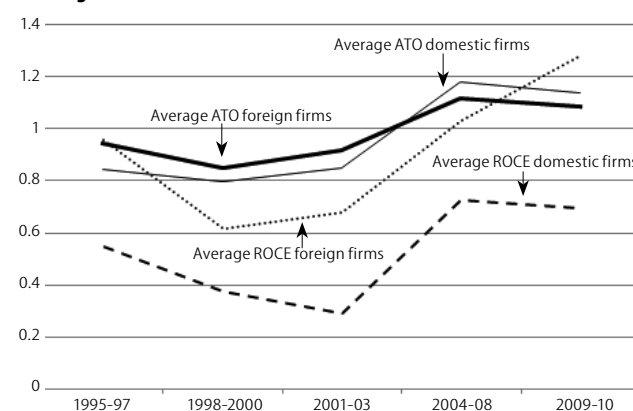
In the next stage we examine whether the performance comparison results provided in Table 6 are consistent when controlled for other firm specific characteristics such as firm size, leverage, R&D intensity, marketing intensity, export intensity and firm age. As there is high correlation between firm size and firm net sales, we do not include firm net sales in this regression equation to avoid multicollinearity in the variables.

Table 7 provides the results of the cross-sectional regression performed separately for the five sub-periods to compare the ATO of foreign firms and domestic firms after controlling for the firm-specific variables using model (3). We find that our

**Table 7: Regression Results Comparing Performance of Foreign Firms and Domestic Firms Using Asset Turnover Ratio**

Year	1995-97		1998-2000		2001-03		2004-08		2009-10	
No of firms	199		209		204		219		315	
Variable	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Constant	0.96	10.4**	0.91	11.5**	1.09	14.5**	1.32	13.6**	1.27	12.3**
Domestic dummy	-0.09	-1.49	-0.08	-1.44	0.04	1.09	0.08	1.76a	0.04	1.14
Leverage	-0.50	-2.82**	-0.26	-1.95*	-0.38	-4.19**	-0.28	-2.24**	0.02	0.12
R&D Intensity	-1.22	-2.88**	-0.68	-1.98*	-0.71	-2.58**	-1.84	-2.03*	-1.19	-1.80a
Mkt Intensity	0.09	0.06	-0.41	-1.54	-0.16	-0.79	-0.45	-1.50	-0.52	-2.65**
Exp Intensity	-0.01	-3.74**	-0.01	-0.31	-0.01	-4.06**	0.01	0.37	0.00	-1.00
Size	-0.03	-1.23	-0.01	-0.49	0.03	1.17	0.05	1.99*	-0.01	-0.46
Age	0.01	3.04**	0.01	2.17**	-0.01	-0.62	0.00	-1.54	0.00	-1.40
R^2	0.13		0.07		0.10		0.08		0.09	
SE	0.36		0.39		0.38		0.46		0.59	
F-stat	3.8**		2.9*		3.1**		3.0*		2.6*	

**, *, a, denotes statistical significance at the 1%, 5% and 10% levels in a two tailed test, respectively.
This table reports the OLS regression results to examine the effect of FDI (captured as foreign ownership) on the asset turnover ratio (ATO) of the firm. Regression results obtained separately for the five periods are reported. Domestic dummy indicates foreign ownership and takes value 1 for domestic firms and value 0 for foreign firms. Leverage captures debt capitalisation at the start of the year. R&D Int stands for research intensity for the firm. Mkt Intensity stands for marketing intensity of the firm and Exp Intensity stands for export intensity of the firm. Size denotes log (total assets) and total assets measured at the start of the year. Age stands for age of the firm in years. Heteroscedasticity has been controlled using the White's standard errors correction technique. Multicollinearity among variables is low with all the VIF values below 2.

results match the results provided in Table 6. We find that domestic dummy is not significant for the initial period till 2003. The sector was opened in 1985 for 100% foreign investment. Hence, the insignificant domestic dummy during the initial three sub-periods can be a result of the product technology spillover that might have accrued during the initial period post-1985. The positive and significant domestic dummy during the high growth period of 2003-04 to 2007-08 indicates that the sales efficiency of domestic firms increased above that of the foreign firms. As the domestic dummy is not significant for the 2008-09 and 2009-10 period, the efficiency gains over the foreign firms which have been obtained by the domestic firms in the previous period have not been sustained. At the same time even though these gains have not been sustained it is clear that the domestic firms have also not lost to the foreign firms. Thus we can say that domestic firms have achieved sales efficiency levels similar to that of foreign firms indicating gains from the spillover arising from foreign investments in capital goods sector.

We find that leverage has negative effect on the ATO during the initial periods till 2008 indicating that firms with higher leverage record lower level of scales. We also find that the R&D intensity of the firm has a negative impact on the asset turnover ratio. Even though R&D expenditure is expected to have a positive impact on the sales efficiency of the firms by helping firms to introduce newer products, as these firms can easily access new technology by importing new products, spending on R&D does not play an important role. We find that marketing intensity has a significant negative effect only during the last period of 2008-09 and 2009-10. The capital expenditure spending in the market post-2008 crisis had reduced. Capital goods firms were forced to spend more in terms of marketing expenses due to higher level of competition and smaller market size resulting in the negative effect.

Export intensity of the firms has a negative effect on the ATO only during 1995-97 and 2001-03 and is not significant during the other periods. This is a clear indication that firms take up exports due to crowding out in the domestic market. This result is in tandem with Joseph and Reddy (2009). We find that firm size has a significant positive effect on asset turnover ratio during the high growth period indicating that during this period large size firms had better opportunity in comparison with other firms. Age plays an important role during the initial periods when older firms had better access to the market and hence better opportunity in the market.

Table 8 provides the results of the estimated cross-sectional regressions performed to compare the ROCE of foreign firms and domestic firms after controlling for the firm-specific variables using model (4). We find that our results match the results provided in Table 6.

We find that domestic dummy is negative and significant during the first three sub-periods till 2003. The negative dummy coefficient till the year 2003 is an indication that foreign firms continued to retain better operating efficiency even after 18 years of opening up the sector for 100% FDI in 1985. The insignificant domestic dummy during the high growth period of 2003-04 to 2007-08 indicates that the operating efficiency of domestic firms is same as that of the foreign firms. As the domestic dummy is again negative and significant for the 2008-09 and 2009-10 period, the operating efficiency gains obtained by the domestic firms in the previous period have not been sustained. The post-2008 financial crisis period is characterised by reduced levels of capital expenditure in the Indian economy as well as abroad. The capital goods sector is highly dependent on these capital expenditure budgets for their revenue and growth. Performance during this period is the true test of efficiency and sustainability of the firms. The negative domestic dummy in this period is a clear indication that the operating efficiency of foreign firms is better than that of domestic firms and efficiency gains during the prior period may be a result of high market demand rather than firm efficiencies.

We also record that leverage has consistently negative effect on the ROCE of the firm. Unlike ATO, we find that R&D intensity

Table 8: Regression Results Comparing Performance of Foreign Firms and Domestic Firms Using Return on Capital Employed

Year	1995-1997		1998-2000		2001-2003		2004-2008		2009-2010	
No of firms	199		209		204		219		315	
Variable	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Constant	1.10	8.01**	0.71	9.10**	0.80	8.46**	1.16	8.71**	1.35	8.82**
Domestic dummy	-0.34	-2.84**	-0.20	-3.23**	-0.31	-3.47**	-0.12	-1.08	-0.55	-4.29**
Leverage	-0.78	-4.08**	-0.44	-3.90**	-0.43	-3.88**	-0.89	-7.08**	-0.47	-5.15**
R&D intensity	-1.06	-1.74a	-0.61	-1.30	-0.24	-0.61	-1.26	-1.32	-0.42	-0.38
Mkt intensity	-0.28	-0.57	-0.46	-2.14*	-0.42	-1.75a	-0.99	-3.39**	-0.68	-4.27**
Exp intensity	-0.01	-0.83	-0.02	-0.43	-0.01	-3.07**	0.00	-0.21	-0.01	-1.96*
Size	0.06	2.23*	0.08	4.31**	0.05	3.02**	0.14	5.30**	0.07	2.99**
Age	0.01	1.22	0.01	2.04*	0.01	0.67	0.00	-0.20	0.00	1.23
R2	0.22		0.27		0.31		0.34		0.23	
SE	0.48		0.33		0.34		0.51		0.62	
F-stat	6.7**		9.1**		10.7**		14.1**		11.5**	

**, *, a, denotes statistical significance at the 1%, 5% and 10% levels in a two-tailed test, respectively.
This table reports the OLS regression results to examine the effect of FDI (captured as foreign ownership) on the return on capital employed (ROCE) of the firm. Regression results obtained separately for the five periods are reported. Domestic dummy indicates foreign ownership and takes value 1 for domestic firms and value 0 for foreign firms. Leverage captures debt capitalisation at the start of the year. R&D Int. stands for research intensity for the firm. Mkt. Intensity stands for marketing intensity of the firm and Exp. Intensity stands for export intensity of the firm. Size denotes log(total assets) and total assets is measured at the start of the year. Age stands for age of the firm in years. Heteroscedasticity has been controlled using the White's standard errors correction technique. Multicollinearity among variables is low with all the VIF values below 2.

has a significant effect on ROCE only during the initial 1995-97 period and is insignificant thereafter. Marketing intensity has a significant negative effect on ROCE indicating higher levels of marketing expenditure required to sustain the operating profits of the firm. This result might be driven by the fact that foreign investment increases the competition in the market. We do not find consistent effect of exports on ROCE of the firm. Size has a significant positive effect indicating that larger size firms are more efficient in comparison to smaller firms. Large firms are preferred suppliers in case of big ticket capital expenditures and they are better capable of exploiting the economies of scale. We also find that age does not have a consistent effect on ROCE.

6 Conclusions

The salient conclusions of this study are

(i) Even after 25 years of FDI there is no convergence in the structure of the foreign firms and domestic firms. The average net sales of foreign firms are larger than that of domestic firms. The foreign firms are bigger than the domestic firms in terms of assets and capacity of the firm. Foreign firms have lower leverage in comparison to domestic firms providing them more flexibility in terms of risk taking and operations. Foreign firms spend more on the R&D in comparison to domestic firms. Unlike the foreign firms, many domestic firms import the technically sophisticated goods rather than spending on R&D to develop the goods indigenously. The growth rates of net sales and size of the foreign firms are significantly higher than those of domestic firms signifying that foreign firms are crowding out the domestic firms.

(ii) The sales efficiency of domestic firms is equivalent to or higher than that of the foreign firms. The products supplied by domestic firms are treated at par with that of foreign firms and foreign firms are unable to claim a premium in the market. The trend in ATO also indicates that domestic firms have consistently gained in the market as ATO of domestic firms was higher than that of foreign firms during the high growth period 2004-08.

(iii) Operating efficiency of foreign firms is higher than that of domestic firms in all the periods except during the high growth period 2004-08.

(iv) Even though the operating efficiency of domestic firms was equivalent to that of foreign firms during 2004-08, they were unable to sustain it during the post-2008 crisis period.

This study clearly indicates that even though domestic firms have gained from FDI in terms of sales efficiency, they have not gained in terms of best practices in the market and are still lacking in terms of operating efficiencies. Indian firms had supposedly achieved the required efficiencies to compete with foreign firms during the high growth period of 2004-08. But the post-2008 financial crisis period analysis shows that the domestic firms still lack in terms of these efficiencies. The study signifies that the gains for domestic firms from spillover effect arising from foreign investment are slow to realise. On the other hand, the foreign firms have gained from 100% FDI in terms of net sales, size and growth rates. The claims made by the industry captains that government should open up the economy for 100% FDI and reduce government controls to induce growth in the industry are not evident in case of the capital goods sector. It is necessary that the government should maintain its control and in its zeal to attract foreign investment should not ignore the domestic industry which is a major contributor to the gross domestic capital formation in this country.

NOTES

1 Gorg and Greenway (2004) studied 60 countries, Alfaro and Chen (2010) studied 53 countries, Akpolat and Inancli (2011) studied Turkey, Hossain and Hossain (2012) studied Bangladesh, Pakistan and India, Bissoon (2012) have studied around 25 developing countries.

2 We club electrical and power equipment companies, earthmoving and construction equipment companies, machine tools and process plant equipment in capital goods sector following the PwC report on global competitiveness of Indian capital goods industry, 2011. We exclude the textile sector as FDI is not allowed in this sector.

3 Prowess classifies firms into foreign firms (having higher levels of FDI) and domestic firms based on the level of foreign ownership in the firm.

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Annexure I: Variable Definition and Structure

Variable	Definition and Structure
Age	Age of the firm is the difference between current year and the incorporation year.
ATO	Asset turnover ratio: It is the ratio of net sales of the firm to total assets at the start of the year.

$$ATO_t = \frac{Net\ Sales_t}{Total\ Assets_{t-1}}$$

Export Intensity	Export Intensity: It is the ratio of net operating exports to gross profit for the year.

$$Exp.Int._t = \frac{Op.Exports_t - Op.Imports_t}{Gross\ Profit_t}$$

Leverage	We use the leverage at the start of the year in this analysis. Leverage is the ratio of total debt at the start of the year to total assets at the start of the year.

$$Lev_{t-1} = \frac{Total\ Debt_{t-1}}{Total\ Assets_{t-1}}$$

Marketing Intensity	Marketing intensity for the year is the ratio of marketing expenses incurred during the three years (current year and past two years) to the total sales during the year. The marketing expenditure on distribution, advertising, etc, is expected to generate longer term returns and hence we consider the marketing expenditure during the previous periods along with the current year.

$$Mkt.\ Int._t = \frac{\sum_{i=0}^{-2} Mkt.Exp_{it}}{Net\ Sales_t}$$

R&D Intensity	Research and Development intensity of the firm is the ratio of research expenses incurred applicable for the year to the total sales during the year. Research expenses applicable for the year include royalty payments, licensing fees for the current year and the sum of in-house research and development expenses incurred during the three years (current year and past two years).

$$R\&D\ Int._t = \frac{R\&D\ Exp._t}{Net\ Sales_t}$$

ROCE	Return on capital employed is the ratio of operating profit of the firm (EBITDA) to the long-term capital employed. The long-term capital employed is the difference between total assets of the firm and the current liabilities incurred during the period.

$$ROCE_t = \frac{EBITDA_t}{(Total\ Assets_t - CL_t)}$$

Sales	Net Sales for the year
Size	Natural Log of Total Assets in place at the start of the year.