

**Working Paper 247**

**Spillover Effects from  
Multinational Corporations:  
Evidence From West Bengal  
Engineering Industries**

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ISBN 978-81-7791-103-9

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# **SILLOVER EFFECTS FROM MULTINATIONAL CORPORATIONS: EVIDENCE FROM WEST BENGAL ENGINEERING INDUSTRIES**

**Rajdeep Singha<sup>1</sup>, K Gayithri<sup>2</sup>**

*"Today's policy literature is filled with extravagant claims about positive spillover from FDI but the evidence is sobering."*

Dani Rodrik (1999)

## **Abstract**

*This paper attempts a critical review of existing spillover analysis and advances an alternative framework for examining spillover effects in a manufacturing industry context. It enables us to determine the extent of spillover effects in the presence of multinational companies in a host country. Using the primary survey data of the engineering industries from West Bengal, the paper analyzes spillover effects, and identifies the factors and conditions under which spillovers occur.*

**Keyword:** Multination Corporation, Spillover Effects, Learning and Capability building and West Bengal Engineering Industries

## **Introduction**

Multinational Corporations (MNCs) play a crucial role in the development of economies of the developing countries. In that they supplement the host country's resource base and make a value addition to the capital formation process. There are a signs of a rising expectation all over the world, especially in the developing countries, that they can come closer to the developed world through Multinational corporations. This can be seen by the extent of rise in FDI flows in the developing world. For instance, between 1990 and 2007 the flows of FDI in developing countries increased from \$ 41.7 million to \$ 499.75 million. Remarkably, such a rise in inflows has several implications. First, an increase in the country's output is accounted for by MNCs. Second, FDI can play a crucial role in industrial development by playing a supportive or complementary role by the domestic investments through direct or indirect channels such as investment in production units and positive spillover occurrences.

The proponents of new growth theory – endogenous technological change, accumulation of human capital and openness to international trade and investment – particularly focus on the spillover effects in the long run economic growth and development (Lucas, 1988; Romer, 1990; Aghion and Howitt, 1990; Coe and Helpman, 1995; Grossman and Helpman, 1995). Spillover effects, resulting from

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We are grateful to Ms. B P Vani and Mr. Sabuj Kumar Mandal for their valuable suggestions. Thanks are also due to anonymous referee for constructive comments.

the presence of multinational corporations, on the national economy may increase the productivity and efficiency of the domestic firms (Caves, 1974). A cave (1974) refers to them as productivity spillovers classified into allocative efficiency, technical efficiency and technological transfers. Allocative efficiency occurs because of the fact that MNCs can introduce an element of competition into the domestic market by breaking the monopoly setup. While technical efficiency gains through MNCs' competition pressures and demonstration effects. Lastly, technology transfer occurs due to the fact that MNCs may speed up their technology transfers more efficiently than domestic firms because they have the capacity. Several case studies have shown that spillovers generally get transferred from MNCs to Domestic firms through different channels such as competition, human capital- labour turnover, linkages and demonstration (imitation) effects.

However, in many studies, channels of spillover effects are hypothetical and controversial also. The channels of spillover effects have remained a subject of research debate for long times (Gachino, 2007). The existing methodological approaches are inadequate to explain the debate. The present paper makes an attempt to devise an alternative methodological approach for analyzing the complex issue.

With the above background in view, the paper is organized as follows. Section 2 presents a brief literature review and a summary of emerging issues. Section 3 introduces an alternative theoretical framework while section 4 presents data and methodology for the analysis. Results and discussion are highlighted in section 5, and section 6 discusses the determinants of spillover occurrence followed by summary and concluding remarks in section 7.

## **A Brief Review of Literature**

In this section, we examine a few selected studies on multinational corporations and their spillover effects for two main reasons. First to understand the methodological approach employed in the studies. The second is to identify the shortcoming in the available literature. Caves (1974) examined the spillover occurrence by employing a production function approach based on the aggregate data of Australian manufacturing sector. The study finds that the presence of foreign firms in Australia enhanced the domestic firms' technical efficiency. Similar findings were obtained by Globerman (1979), in that he found a positive effect of MNCs in the Canadian manufacturing sector. In the analysis, the study employed the same methodology and specification as by Caves. Following the same approach, Blomstrom and Pearson (1983) used industry level data to investigate the correlation between technical efficiency of Mexican firms and spillover effects associated with FDI. Employing the ordinary least squares they found a positive correlation between foreign firms' presence and labour productivity.

Similar results were obtained for Indonesia by Blomstrom and Sjöholm (1999) by using Indonesian establishment data. The study tried to analyze the impacts of foreign ownership on productivity and the degree of spillover occurrence. The study proceeded by conducting linear regression estimations by taking labour productivity as a proxy for technological efficiency of domestic firms. Results showed that foreign firms had demonstrated a higher labour productivity than domestic firms. The labour productivity of domestic firms varied with the degree of foreign firms' presence.

Sjoholm, 1997 and Takii, 2001 are additional studies on Indonesian manufacturing units' employing similar methodology and obtaining similar results as Caves (1974) did.

Nevertheless, the finding of positive spillover occurrence in the above studies can be challenged. The positive spillover could be the result of the disappearance of weak and inefficient domestic firms. In other words, due to competition from with more advanced firms (foreign firms), domestic weak firms might have stopped production. None of the above studies made any effort to examine that aspect. Also an in-depth investigation showed that data used in most studies was very limited in terms of time span. Another issue relating to these studies is they used the data in an aggregate format, treating industries and sectors as homogeneous. But, in reality, industries and sectors are characterized by a high level of heterogeneity with different technological capabilities and capacity to improve etc. Lastly, Caves (1974) and others fail to examine the channels of spillover occurrence and diffusion across domestic firms i.e. how domestic firms are benefited in their development from MNCs presence.

Contrary to the above studies, some studies do not find spillovers despite being based on productivity approach suggesting that the foreign presence is not always beneficial (Aitken and Harrison, 1992; Haddad and Harrison, 1993; Aitken, Hanson and Harrison, 1997; Aitken and Harrison, 1999). All these studies attempt to advance their analysis by incorporating industry and regional dummy, support infrastructure and general firm level specifications.

The present study examines a few of such studies with two main criterions: first the study employs a comprehensive firm level data set, and second collects a detailed information about the external factors which can influence the spillover occurrence. Haddad and Harrison (1993) analyze firm level data set for the Morocco over several years. The hypothesis of the study was, that knowledge or new technology embodied in foreign firms would get transmitted<sup>1</sup> to domestic firms resulting in higher productivity and growth of the local firms in the sector with a large foreign firms' presence. The results of the study showed that foreign investment as an output growth determinant at the sector level was negative. Hence, the hypothesis that foreign firms' presence accelerated productivity growth in domestic firms was challenged.

Aitken and Harrison (1999) used census data on over 4000 Venezuelan firms to measure the productivity effects of foreign ownership of firms. This study was different from earlier studies in the sense that it attempted to overcome the identification problem – where foreign investment was likely in the most profitable sectors of an economy. In such a case, productivity of domestic firms would be overstated. According to them a rise in the foreign share of ownership in a sector reduces the output of individual domestically owned establishments and their total factor productivity over one to three year periods. The first year negative effect was particularly severe for small domestically owned plants, suggesting the increasing efficiency associated with a rise in foreign ownerships. The study employed log-linear production function to estimate two basic propositions: foreign equity participation could be associated with high productivity and, whether the foreign ownership in an industry affected the domestic firms' productivity. The study finds that the productivity of domestic firms in the sector with more foreign firms was significantly less than those with low foreign firms' presence. In other words, the study finds a negative spillover from foreign to domestic firms. The Study suggests that the possible

reason behind this negative spillover effect might be 'negative stealing effect' i.e. foreign firms' competition might have forced the domestic firms to lower their output level, thereby foregoing economies of scale. Nevertheless, the total value of own plant positive effect and negative spillover effect was marginally positive.

In the context of Czech Republic, Djankov and Hoekman (1998) studied the impact of foreign investment on the productivity of domestic firms. The study estimated a production function using total factor productivity as a proxy for technology transfer. They found negative spillover effect i.e. greater foreign firms' presence in an industry had a significant negative effect.

A close observation of the studies reveals that though there is an improvement in the estimation techniques, the basic concept of Caves (1974) is still being followed by researchers are following. The gaps identified are discussed below as emerging issues.

### Emerging issues

The above review demonstrates existing contradictions in spillover analysis. Contradictions may arise from the conceptualization of spillover as well as from different methodologies used in examining the spillover. Three main shortcomings are discussed here one by one.

**Single factor dependence:** Almost all studies excepting Aitken and Harrison (1999) consider foreign firm presence as the only factor which influences productivity and efficiency of domestic firms. Only in Aitken and Harrison (1999) study, they consider the impact of a firm's internal and external variables as a deciding factor for the firm's efficiency.

**Exogeneity problem:** Above reviewed studies assume that spillover would occur automatically. The assumption implies the ignorance of the entire process of spillover occurrence. This explains why, these studies fail to explain the mechanism through which spillover is happens.

**Narrow conceptualization of spillover:** As mentioned above, the presence of multinational firms is considered as the only factor for spillover, disregarding other factors like institutional factors, supportive structure etc. May be some firms are situated in such a condition where there is no supportive institution or at least minimum basic facilities to explore the spillover effect.

On the basis of above observations, it is very much necessary to build an alternative approach with qualitative and quantitative information from the firms. Qualitative information is important here, because to build an alternative approach one has to know what influence the production, investment, linkage capability exert in the context of spillover occurrence. To understand actual effect and real occurrence mechanisms, secondary data alone is not sufficient.

### Sample Selection and basic features of data

A three stage sampling design was used in the selection of states, Districts and firms. The survey purposively collected information from 40 respondents in two states. For each state within the 40 firms, there were 20 firms from the electrical sector (NIC 31) and 20 firms from the non-electrical sector (NIC 29). A mix of quantitative as well as qualitative research techniques were used in the data collection including in-depth interview and structured interview schedule.

In West Bengal four districts (Howrah, South 24-Parganas, North 24-parganas and Kolkata) were selected on the basis of the distribution of units. And lastly, on the basis a of the distribution of units, we selected units in different districts (Table1)

**Table1: Distribution of Sample Firms Across Districts**

State	Name of District	NIC 29	NIC 31	Total Sample Size
West Bengal	Howrah	7	2	9
	South 24 Parganas	6	10	16
	North 24 Parganas	6	5	11
	Kolkata	1	3	4

Source: Author's Calculation

Table 2 is based on the primary data for the year 2007-08. The Table shows around 15 percent of the firms supplying products to foreign firms as against 10 percent to domestic private firms, 22.5 percent firms to government sector and 45 percent to a combination of the above. In the sample, there are 7.5 percent firms exporting their products. In term of the age distribution of firms, 57.5 percent of the sample firms are between 11 to 25 years old and 15 percent less than 10 years old and 27.5 percent firms more than 25 years old. In the sample, there are nine (22.5 percent) firms coming under foreign ownership. The number of foreign firms may be few because one of biggest problems we encountered was that they could not spare some time for us nor was there any proper data available on foreign firms in terms of number and location. Another important feature of the sample is that, there are about 48 percent of firms operating their business without collaborating with other firms. However, among the collaborating firms, the number of foreign firms (22.5 percent) is more than domestic firms (10 percent).

**Table 2: Distribution of Sample Firms by Type and Category**

Type	Category	Percentage of sample
Age	1 to 10 years	15.00
	11 to 25 years	57.50
	More than 25 years	27.50
Ownership	Foreign	22.50
	Domestic	77.50
Supply Relation	Domestic private Firms	10.00
	Government Sectors	22.50
	Foreign firms	15.00
	Export	7.50
	Combinations of above	45.00
Nature of Collaboration	With Foreign firms	22.50
	With Domestic firms	10.00
	Both	20.00
	None	47.50

Source: Author's Calculation

## Theoretical Framework: Spillover occurrence

Contrary to the traditional technique, where spillovers are conceptualized in terms of production gains, the present study conceptualizes spillover effects in terms of learning and capability building (see also Geoffrey, 2007). Firms' spillover largely depends on the dynamic process where firms are continuously learning and accumulating the effects. The study assumes that in the presence of foreign firms, domestic firms learn, over a period about the production process and also how to market their products. Besides spillover, there are many other factors which can affect the capability of a firm.

Figure 1 shows firm level capability categorized into production, investment and linkages (such as innovation, organization and marketing capabilities). Production capability includes quality control, operation and maintenance. Investment capability includes project identification, preparation, design and modernization of existing ones. Linkage capability is also important when firms form 'horizontal' and 'vertical' linkages. It increases the absorption capacity of firms. This study however, focuses only on production capability. The study tries to identify these prevailing spillover effects and also study how domestic firms are putting in their efforts to absorb the same.

## Methodology

### Technical Efficiency

The importance of efficient use of resources has been long recognized, but the mainstream neoclassical economics assumes that a producer of an economy produces always efficiently. In reality, however, all producers are not always efficient. Two identical firms never produce similar product, and besides costs and profits are also not the same. This difference in output, cost and profit can be explained in terms of technical and allocative inefficiency. Given the resources, a firm is said to be technically inefficient if it fails to produce a maximum possible output.

The technical efficiency scores for firms are arrived at by estimating a stochastic frontier production function (SFPF), using parametric techniques. SFPF, independently proposed by Aigner, Lovell, and Schmidt(1977) and Meeusen and Van Den Broeck (1977), includes an additional random error term to frontier production function and therefore, captures the random factors in addition to the deterministic components(labour , capital and material). The parameter of SFPF can be estimated using the maximum likelihood method.

This study estimates the dataset using translog stochastic production function. This model is equivalent to the Khumbhakar, Ghose and McGukin (1991) specification. The Battese and Coelli (1995) model specification may be expressed as:

$$Y_i = X_i + (V_i - U_i) \quad i = 1, \dots, N,$$

Where,  $Y_{it}$  is the log of production of  $i$ th firm in the  $t$ th time period,  $X_i$  is a (  $k \times 1$ ) vector of log input quantities of the  $i$ th firm. The  $V_{it}$  are random variables assumed to iid,  $N(0, \sigma^2)$  and independent of the  $U_{it}$  which is non-negative random variable, assumed to account for technical inefficiency in production. Moreover, by this, we can explain the reason behind the inter firm variations in technical efficiency. The computer program "FRONTIER 4.1" developed by Coelli (1996) has been used to estimate SFPF.

## Spillover Occurrence Index

For each of the spillover occurrence channel considered, five types of changes associated with production capability are identified (Table 3). Production capability is considered for simplicity since it is not possible to consider all forms of capability here. Therefore, under production capability, production changes, process changes, industrial engineering, new marketing strategies and management and organization change are considered as proxies for spillover occurrence. The degree to which each change takes place would be determined subjectively across firms on a continuous ordinal scale ranging from a maximum score of one representing highest to a minimum score six which means nothing is happening. On the basis of this scale, an index can be computed which is then used in the quantitative determination of spillover occurrences. It should, however, be acknowledged that the index suffers largely on from firms' own subjective assessments.

**Table 3: Response to competitive pressure**

Reaction to Competitive Pressure	Ranking by Importance
Improving our products, develop new ones or copy ( <b>Pd<sub>c</sub></b> )	1 2 ...6
Improve processing techniques, raw material and quality control, upgrade our technology and equipment to raise productivity ( <b>Pr<sub>c</sub></b> )	1 2 ...6
Repair and Maintenance of Physical Capital, inventory control ( <b>Rm<sub>c</sub></b> )	1 2 ...6
Improve and Strengthen our marketing department ( <b>Ms<sub>c</sub></b> )	1 2 ...6
Undertake organizational changes for better management and implementation of production & other routine activities that enhance the firms efficiency ( <b>Mo<sub>c</sub></b> )	1 2 ...6
Others (please specify)	1 2 ...6

For example, on the competition mode of spillover occurrence, firms are bound to react by undertaking changes, which can range from production to organization. The change can be classified under five components mentioned in table 3. For each of the five changes, a firm would have to indicate subjectively the degree of change.

Assume a particular firm introduces a product in responses competition pressure and rates this change as a score of 2. Then score 2 is taken as Pdc as shown in table 4. Similarly, all other scores can be identified. On the basis of scores awarded, an weighted index for Competition (c), Linkages (L), Labour mobility (M), Imitation (I), can be computed.

**Table 4: Computation of Spillover Index**

Spillover Conceptualization	Competition (c)	Linkages (l)	Labour Mobility (m)	Imitation (i)	Average Score
Product Changes (Pd)	Pd <sub>c</sub>	Pd <sub>l</sub>	Pd <sub>m</sub>	Pd <sub>i</sub>	<b>PD</b>
Process Changes (Pr)	Pr <sub>c</sub>	Pr <sub>l</sub>	Pr <sub>m</sub>	Pr <sub>i</sub>	<b>PR</b>
Repair & Maintenance (Rm)	Rm <sub>c</sub>	Rm <sub>l</sub>	Rm <sub>m</sub>	Rm <sub>i</sub>	<b>RM</b>
Marketing Strategy(Ms)	Ms <sub>c</sub>	Ms <sub>l</sub>	Ms <sub>m</sub>	Ms <sub>i</sub>	<b>MS</b>
Management & Organization (Mo)	Mo <sub>c</sub>	Mo <sub>l</sub>	Mo <sub>m</sub>	Mo <sub>i</sub>	<b>MO</b>
<b>Score</b>	<b>C</b>	<b>L</b>	<b>M</b>	<b>I</b>	<b>S-Index</b>

The spillover index can be expressed in two ways

1. By giving equal weight (vertically)
2. By giving different weight (vertically)

In this study, although we have calculated S-Index by using both ways, we prefer different weight method to same weight because all the five types are not equally likely to happen. Different weight can be identified by the degree of difficulties i.e. if the spillover is more difficult to happen we will give more weight than others. During discussions with firms we have come to understand that product change and process change are the most difficult things to take place. Next difficult task is changing the Marketing strategy and management and organization; Repair and maintenance are comparatively easy. To construct C we use the following expression:

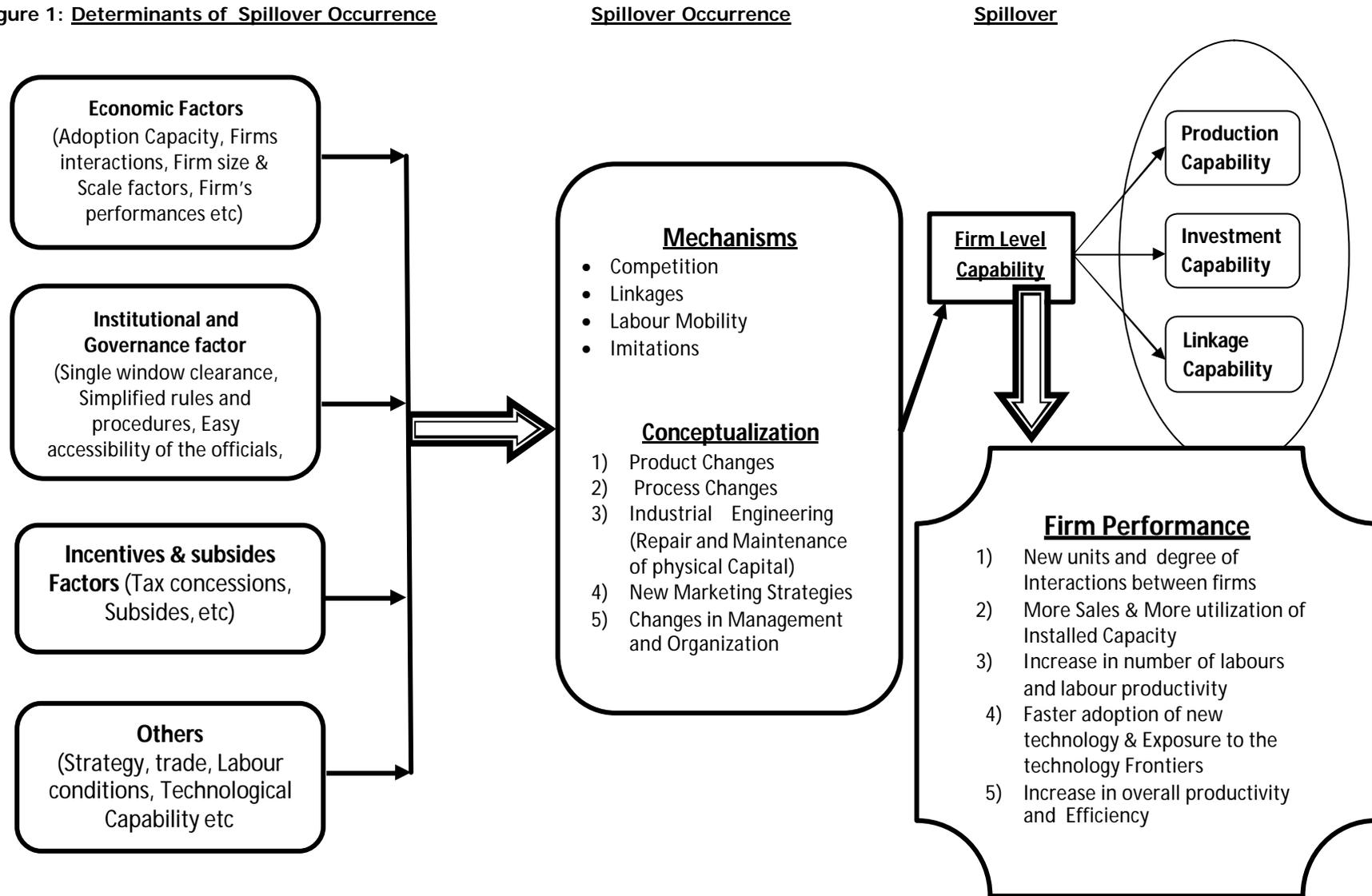
$$C = W_1 Pd_c + W_2 Pr_c + W_3 Rm_c + W_4 Ms_c + W_5 Mo_c$$

Where  $W_i$  = weights and  $W_1 = W_2 > W_4 = W_5 > W_3$

Similarly we can construct L, M and I. Here another important issue is the values of  $W_i$ . The value of is chosen arbitrarily, and different combinations can be used to see the robustness. Eventually, the composite spillover index (S-index) can be constructed by using simple arithmetic average of all the four channels as shown in the following expression:

$$\text{S-index} = \text{Composite Average (C, L, M, I)}$$

Figure 1: Determinants of Spillover Occurrence



## Results and discussion

### Results of Efficiency analysis

The results of efficiency are presented in table 5. Only 35 percent of firms are in the higher efficiency range (i.e. more than 0.75). Almost 37.5 percent of firms in west Bengal range between 0.75 to 0.50 score and 27.5 percent firms are in the range of below 0.50.

Among the firms linked with foreign firms 83.33 percent are in the higher range of efficiency. In the same range only 25 percent of firms are linked with domestic firms and 22.22 percent of the firms with the Government sector. In the case of firms linked with government and domestic firms, most of them are operating in medium or low efficiency range. These observations indicate that firms are more efficient than others if linked with foreign firms. Here, the important issue is the above results are any way linked with spillover effects from foreign firms.

**Table 5: Distribution of Sample Firms According to Technical Efficiency Scores**

Technical Efficiency	High (More than 0.75)	Medium (0.75 to 0.50)	Low (Less than 0.50)	Total
Domestic	1 (25)	2 (50)	1 (25)	4 (100)
Foreign	5 (83.33)	0 (0)	1 (16.67)	6 (100)
Government	2 (22.22)	3 (33.33)	4 (44.44)	9 (100)
Direct export	0 (0)	3 (100)	0 (0)	3 (100)
Combination	6 (33.33)	7 (38.89)	5 (27.78)	18 (100)
<b>Total</b>	<b>14 (35.00)</b>	<b>15 (37.50)</b>	<b>11 (27.50)</b>	<b>40 (100)</b>

**Note:** Figures in the parentheses indicate percentage to total in each category

**Source:** Author's Calculation

### Spillover index

As proposed in section 4, we have constructed the S-index<sup>ji</sup> as presented in table 6. While analyzing the table, one has to remember that low spillover index means high spillover occurrences.

**Table 6: Spillover Index by Type of Firms**

Type of firms	S-Index Value (Same Weight)	S-Index Value (Different Weight)
Domestic	3.25	3.26
Foreign	2.80	2.89
Government	3.10	3.11
Direct export	3.65	3.43
Combination	3.05	2.99
All firms	3.17	3.14

**Source:** Author's Calculation

In table 6, it is very important to notice that the orders of the S-index with weight and without weight are the same. Here, the study is concerned with the rank and not the values of S-Index; so the value of the weight does not matter much. The table shows firms operating with foreign firms with a

lower spillover index than other groups (Domestic firm's supplier, government sector supplier etc.). This signifies that firms are receiving more spillovers from foreign firms. Among the domestic firms, those coming under the government sector are getting more benefits than others. This result also corroborates the efficiency analysis. By comparing table 5 and 6, one can say that the numbers of foreign linked efficient firms are more on the account that they are getting more spillover benefits than others. Similar kind of inferences can be drawn by comparing domestic firms and government sectors firms. Government sector has more spillover effects than the domestic private sector. Here, important is to discuss the factors that determine spillover occurrences. In the next section we shall discuss the factors (which we have already identified in the framework) that can influence on the spillover effects.

### **Determinants of spillover occurrence**

Spillover occurrence is a function of individual firm's resource endowment and its interactions with socio-economic agents; it can be assumed that spillover occurrence is determined by a number of factors encapsulated in structure-conduct-performance framework (Bain, 1968; Scherer, 1973 & 1980). According to this framework, various elements of market structure determine a firm's conduct, and the structure and conduct together determine market performance. The major components of structure are organization structure of firms, i.e. whether they are linked with other firms or they are export oriented etc; the main elements of conduct were human capital development, product development strategy, coordination with other firms etc. Although R&D also is included in conduct group, in the study area (West Bengal) no domestic firms are found with R&D programs.

An institutional environment is included into the framework because; it can influence a firm's structure and conduct. This is inspired by the works of institutional economists like Williamson (1985), Richardson (1972) and North (1992). In Douglas North's (1992) words, "... *Institutions and the way they evolve shape economic performance.*" Under an institutional environment, several factors play an important role, directly or indirectly, in a firm's performance. Factors include basic infrastructures, prevailing government policies and political climate like Single window clearance etc.

From the framework, determinants of spillover occurrences can be outlined in a broad context. That is in a developing country like India, the spillover occurrences not only depend on the presence of multinational corporations, but also on the absorptive capacity, presence of supportive structure and institutions, interactions between firms. Other includes firm size, age. We shall discuss each one of them as follows.

## **Economic Factors**

### **Absorption Capacity**

For spillover to occur there must be a high absorption capacity. Spillovers depend on the ability and efforts of the receiver parts to take advantage of spillover effects. A firm's internal absorption capacity can be viewed as accumulated knowledge over time. Age<sup>iii</sup> can be used as a proxy for the absorption capacity. In other words we hypothesize that firms with longer experience enjoy greater experiential and tacit knowledge than others, the more likely to spillover occurrences.

**Table 7: Spillover Index by Age Group of Firms**

Type of firms \ Age	1 to 10 year	11 to 25 years	more than 25 years
Domestic	3.1	3.42	NA
Foreign	NA	3.23	2.55
Government	3.15	3.13	3.05
Direct export	3.19	3.25	3.85
Combination	3.25	3.07	2.65
All firms	3.17	3.22	3.03

Source: Author's Calculation

Form table 7 it is clear that there is a certain association between age of firms and spillover occurrence. In the case of foreign firms' association, there is no firm found operating below 10 years but the index improves as age of firms increase. Except directly exporting firms, this phenomenon is true.

### Importance of Firms Interactions

According to Freeman (1991) and Lundvall (1992), a strong network is very important in terms of generating and diffusing knowledge. Interactions are regarded as an important means through which information and technology can be exchanged or jointly exploited for the production purpose. Kinds of collaborations are very important for spillover occurrence. Mytelka and Farinelli (2000) and Saxenian (1991) offer a detailed discussion on the importance of collaborations in promoting new product development, joint problem solving between firms in the industry etc. From table 8, it can be identified that firms experience more spillover effects if they are collaborate with foreign firms or foreign and domestic firms both. But, overall, any kind of collaboration is good as compared to no collaboration.

**Table 8: Spillover Index by Type of Collaborations**

Nature of collaborations	S-Index
Foreign firm	3.05
Domestic firms	3.25
Both	3.05
None	3.45

Source: Author's Calculation

### Firms Size – Scale Factors

There exists a long debate in the industrial organizations on the importance of size of a firm's competitiveness and also now in spillover effects literature. Scherer (1973, 1980) and Pratten (1971) argue that a firm achieves competitiveness once it attains a certain minimum efficiency scale (MES). MES is the lowest level of output where the minimum average cost (MAC) is required to exhaust scale economies in manufacturing. MES tends to vary from industry to industry. Generally engineering industries are characterized by high scale economies. To a large extent, large firms may be at an advantage position in terms of spillover occurrence because of their ability to mobilize productive

resources and other services. Large firms usually possess more specialized manpower, formal information gathering system, access to external resources etc. that help them enjoy spillover effect.

**Table 9: Spillover Index by Size (Sales in Lakhs) of Firms**

Sales	Domestic firms	Foreign firm	Government	Direct Export	Combination	All firms
01 to117	3.27	3.52	2.80	3.43	3.04	3.21
117.1 to 420	3.26	3.05	3.27	3.23	3.04	3.22
More than 420	3.25	2.10	3.27	3.63	2.89	3.08
<b>Total</b>	<b>3.26</b>	<b>2.89</b>	<b>3.11</b>	<b>3.43</b>	<b>2.99</b>	<b>3.17</b>

Source: Author's Calculation

From table 9, it can be observed that the relation between spillover index and sales is not uniform. In the case of foreign firms, association between two is visible, but in the case of others this kind of relation is not prevailing.

### Firm's Performance

Performance level of a firm is also another determinant of spillover occurrence. A firm is able to perform well if it has developed a substantial amount of technological capability. Such a firm is characterized by high capacity utilization, higher output performance in terms of sales and profits. These arguments are well articulated in the industrial organizations related literature (Bain, 1968; Scherer, 1973 & 1980), in that a firm's performance is a function of its own endowments, conducts and the socio-economic environment. This has a direct implication that a firm with higher performance can have more space for absorptive capacity, acquisition of knowledge (internal or external) which increases spillover effects.

In the present analysis, the study considers capacity utilization as an indicator of a firm's performance. From table 10, it can be seen that firms are getting more benefits if they utilize their capacity more. This spillover index is low for foreign firms' associations. That means associations with foreign firms fetch more benefits than others. But here one can argue reversely, in that because of positive spillover effects firms tend to utilize their installed capacity to a large extent.

**Table 10: Spillover Index by Level of Capacity Utilization (%) by Firms**

Capacity Utilization	Domestic firms	Foreign firm	Government	Direct Export	Combination	All firms
1% to 49%	3.45	NA	3.25	3.33	3.16	3.38
50% to 75%	3.23	3.19	3.13	3.42	3.22	3.26
More than 75%	3.10	2.59	2.95	3.54	2.59	3.19
<b>Total</b>	<b>3.26</b>	<b>2.89</b>	<b>3.11</b>	<b>3.43</b>	<b>2.99</b>	<b>3.28</b>

Source: Author's Calculation

### Institutional Support

Occurrences and impact of spillovers are not an automatic process. As mentioned above, the role of Institutional support structure is an important factor for spillover occurrence. Examples include institutions like technology transfer bodies, training centers, investment promotion councils etc. But in a

country like India government plays a very important role in providing all kinds of support. The delivery depends on many factors like single window clearance, simplified rules and procedures, easy accessibility to officials, etc.

**Table 11: Rank (Mode) of Institutional Factors in Firms' Decisions**

Institutional Factors	Domestic firms	Government sector	Foreign firms	Export	Combination
Single window clearance	5	3	4	2	1
Custom clearance	4	5	5	1	5
Simplified rules and procedures	2	1	1	2	4
Easy accessibility to the officials	3	2	2	3	3
Availability of easy information	1	3	3	1	3

**Source:** Author's Calculation

As regards institutional factors, from table 11 it is very much clear that, to collaborate with foreign firms, simplified rules and procedures are the most important factor but to link with domestic firms' availability of easy information is the most important factor. But for direct exporting firms, custom clearance is the most dominating factor. It is clear that the industrial sector reforms are not properly implemented in west Bengal. This is because along with other states West Bengal has also undergone extensive changes in industrial policy, which have failed to deliver. This is also evident from the discussions held with firms that policy awareness among them is very low, and most of them do not sense that there could be improvements in their situation with policy changes.

## Incentives and Subsidies

Another important factor which induces the spillover occurrence further is incentives and subsidies. According UNCTAD (1998), "Incentives are any measurable economic advantages afforded to specific enterprises or categories of enterprises (or at the direction of) a government, in order to behave in certain manner". Indian government's industrial development strategies are of many types with different incentives and subsidies. One of the objectives behind all kinds of incentives and subsidies is to develop the industrial base of India.

**Table 12: Rank (Mode) of Different Incentives in Firms' Decisions**

Incentives Factors	Domestic firms	Government sector	Foreign firms	Export	Combination
Tax concessions	2	2	1	2	2
Non tax benefits (FDI)	1	3	2	1	1
Subsidies	2	1	3	3	3

**Source:** Author's Calculation

Firms' mode of ranks with respect to incentive factors are presented in table 12. It is clear from the table that most important factor for foreign collaborations is tax concessions as compared to than others. Among the domestic collaborations firms, the most influencing factor is non tax benefits

i.e. mainly indirect benefits from the foreign firms. But in case of government sector, subsidy is the most important factor for collaboration with other firms. Even if the firms got a loan it was at the time of establishment and not a part of working capital. Thus it is clear that most of the firms preferred indirect benefits to direct benefits like subsidy.

## Conclusion

The purpose of this study has been to find out the nature of spillover effects from stemming the Multinational Corporations in West Bengal. A review of literature on the spillovers from MNCs reveals that most of the works rely on the theories of production functions and their results are largely inconclusive and contradictory. This study argues that the inconclusive results may be because of many factors including methodology, variations across firms and industries etc. in the context of emerging issues and the following development in literature, an alternative framework has been suggested.

The study finds that there are significant differences in the efficiency scores across firms. The results show that firms are more efficient if they are associated with foreign firms. Similar results arise from spillover index i.e. index of spillovers from foreign firms are lower than others.

This study also has tried to identify the determinants of spillover effects. This study finds that in West Bengal, age of firms is an important factor. In our sample, there is no firm below ten years (age) operating with foreign firms. Other than age, firm's own performance is also an important determinant of spillover occurrences. It is revealed from the analysis that collaboration is another instrument for spillovers. But the problems with West Bengal are there are no recent developments in terms of collaborations. Only about 50 per cent of firms are found enjoying the benefits of collaborations. Other than economic factors this study finds that institutional support and incentives can also play an important role in enhancing the spillover effects.

## End Notes

- <sup>i</sup> The channels of transmission mainly are Imitation, Competition, Human Capital and Exports.
- <sup>ii</sup> The S-Index with different weight is constructed by using the following formula:  
 $C = 0.25 Pd_c + 0.25Pr_c + 0.10 Rm_c + 0.20 Ms_c + 0.20Mo_c$ , and same the weight was given for L, M, I also.
- <sup>iii</sup> Problem of age as a proxy is that in the developing counties firms may not accumulate knowledge due shortage of resources and available knowledge. In such a case, other useful indicator may be the level of capital investment besides age.

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