

Active MNC ' Subsidiaries and Technology Spillovers in an Emerging Economy: the Case of India

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1- Introduction

This paper explores FDI-related technological spillovers in host economies. Governments in developing (and developed) countries spend large sums to attract foreign firms (e.g. \$300,000 per job created in Brazil). However, there is only one welfare justification for subsidising MNCs: they generate technological spillover effects. But, most of the empirical literature has not identified the expected spillovers or explained why they do not occur (Gorg and Greenaway 2004; Javorick, 2004). We argue that it is because of the mismatch between the key assumptions underlying the standard approach and recent theorising about MNCs activities. Therefore, we propose an alternative approach to identify significant spillover effects as well as the specific circumstances in which it arise. The analysis is applied to sample of 4900 manufacturing firms in India for the period 1994-2002.

Research on spillover effects from FDI for many years has been dominated by a particular view of the MNC: a combination of the knowledge asset and the internalisation theory of the MNC. Running from Hymer (1976) to e.g. Blomstrom and Kokko (2003), three assumptions have underpinned that research: First, MNCs exist because they are able to develop, accumulate and take advantage of a unique set of technological assets, such as particular product innovations and superior management or marketing techniques; *Second*, knowledge is easily transferable between MNC units, so assets and technology can be easily moved across different departments and branches within the MNC, or from headquarters to subsidiaries; and *Finally*, the MNC is a tightly integrated organisation, with the behaviour of subsidiaries closely shaped by central strategies and decisions (Blomstrom and Kokko, 2003, Markusen, 1995, Hymer, 1976). The combination of these conditions provides the basis for a 'pipeline' model within which spillovers of superior technology are delivered from MNC parents, via subsidiaries, to domestic firms, but without intervention of the local subsidiaries. Such spillovers are presumed to follow on almost inevitably from the centrally created technological assets of the MNC headquarters. Subsidiaries are assumed to have little or no role in this process except to provide the pipeline through which superior technological assets flow.

This model has two linked problems. The first is conceptual, and concerns the mismatch between the assumptions underlying the model and more recent theorising from the international business literature about the operations of MNCs. In particular, within the international business literature a *"transition is happening of the dominant model of the MNC from the market failure approach of internalisation theory and transaction costs economic theory to the market imperfections approach of capabilities or knowledge based-theory of the firm* (Tallman, 2003). The internationalisation/transaction costs theory tends to consider the MNC as a centrally directed unit, emphasising its capacity to

organise activities internally, including the transfer of knowledge. The knowledge based theory on the other hand sees the MNC as a knowledge sharing-network. It emphasises two things: (i) the potential problems of transferring certain kinds of knowledge within the MNC; and (ii) the increasingly important role of geographically dispersed innovative activities within the MNC. These changes have important implications for studies on FDI-related spillovers, nevertheless the spillovers literature does not yet reflect those implications.

The second problem with the spillovers literature is empirical and concerns the absence of evidence of spillovers effects in the empirical literature (Lipse, 2002, Gorg and Greenaway, 2004). Early studies using industry level and cross sectional designs (e.g. Caves 1974 or Globerman, 1979) found positive results but were unable to identify the relevant causality (see Aitken and Harrison, 1990). More recent studies using panel data analysis, however, have not been able to replicate the generally positive results in the earlier research in a wide range of countries (see Javorick, 2004 for a discussion of the empirical literature and Gorg and Greenaway, 2004 for an exhaustive survey).

Yet, the response to such inconclusive evidence has been limited insofar as researchers have not tended to question the main assumptions underlying the model but instead turned their attention to two other types of explanations. One of these is a demand-side explanation in which the lack of spillovers is presumed to be explained by the limited capabilities of locally owned firms (Kokko, 1994; Konings, 2001). The second focuses on the strategy of the MNC (or its industry), which is expected to influence the types of technology that MNCs transfer to subsidiaries (Narula and Dunning, 2000; Wang and Blomstrom, 1992). Unfortunately, however, these initiatives have not solved the empirical problem. In the first case, many studies have not found such effects to be significant (e.g. Haskel, Pereira and Slaughter, 2002, Damijan et al., 2001, and Sjöholm, 1999) whilst the second type of argument has not, for the most part, been empirically evaluated.

In this paper we suggest that it is important to consider a different model of the process of spillovers generation. In particular, we question the presumption that subsidiaries play technologically passive roles in the knowledge-pipelines that are supposed to link parent companies' knowledge stocks to productivity effects among locally owned firms in host economies; especially in the context of middle-income industrialising countries which are likely to have some skilled human resources and prior industrial experience. Instead, we hypothesise that any significant spillover effect is likely to reflect the active accumulation and creation of knowledge on the part of subsidiaries themselves.

The importance of this hypothesis is examined by exploring four models of FDI-related spillover effects. The first three reflect standard approaches to explaining the process of spillover generation; the fourth incorporates technologically active subsidiaries. We explore: (i) a *'Pipeline' model*: where spillover effects arise from FDI independently of any other circumstance; (ii) an *'Absorptive Capability' model*: where *potential* spillover effects arise from FDI, but are captured only by domestic firms with high absorptive

capabilities; (iii) an '*Industry*' model: where spillovers arise only in the more 'advanced' or 'technologically intensive' industries; and (iv) a '*Subsidiary-Centred*' model: where spillover effects arise from FDI only when foreign affiliates are technologically active in the host country.

As is common practice we model FDI spillovers within the familiar production function framework. However, our empirical analysis improves upon the recent literature in several ways. First, a novel methodological step is used for the main analysis in the paper: estimating the spillover effects of subsidiaries' technological activities. Second, we take into account econometric problems not considered often in earlier studies, which might have biased previous results. In particular, we use Generalised Method of Moments (GMM) techniques designed to control by unobserved heterogeneity, measurement errors, endogenously and persistency. Third, as suggested by Javorcik (2004), we use clustered standard errors to correct by the fact that the measures of potential spillovers are industry specific while the observations in the data set are at the firm level. Thus, we avoid a possible downward bias in the estimated standard errors and spurious findings. *Finally*, we do not assume that all sectors have the same production function. Instead, we allow the main coefficients to change by sector by interacting sector dummies with the changes in capital and labour.

We estimate horizontal and vertical spillovers. The estimation is based on the data from PROWESS electronic data base and the Input-Output table (1998-1999). They are provided by the Center for Monitoring Indian Economy (CMIE) and the Central Statistical Organization (CSO) respectively. The PROWESS database contains information on 9800 firms registered with the Bombay Stock Exchange. For our study, we have drawn on data only for the firms in the manufacturing sector (Sectors 15 to 36 according to the NIC classification). As a result we have a sample of 4900 manufacturing firms during the period 1994-2002.

The results of the study confirm our main hypotheses. In contrast to the most recent studies on FDI spillover effects in industrialising countries FDI occurred in India between 1994 and 2002. Nevertheless, they did not arise simply as a consequence of general FDI-mediated technology transfer from parent companies, as the current perspective on FDI-related spillovers expects. Nor were associated with expected inter-industry differences in technological intensity, or with differences in the absorptive capability of domestic firms. Instead, spillovers were associated with the existence of significant knowledge-creation activities undertaken by local subsidiaries themselves. These results are striking because the whole sample of Indian firms showed a negative externality from FDI. This suggests that the knowledge asset model, with its smoothly operating technology transfer 'pipeline' to subsidiaries, is not an appropriate framework for analysing the significance of technology spillovers from FDI to domestic firms.

The paper is organised as follows. Section 2 develops our hypotheses about the role of subsidiaries for knowledge spillovers. Section 3 discusses the data and methodology. First, sets out the context for our research by discussing industrial development and the

role of FDI in India. Second, it describes the data and, third, the methodology used for our empirical analysis. Section 4 analyses our results, and section 5 concludes.