



# Liberalization, outward orientation and in-house R&D activity of multinational and local firms: A quantitative exploration for Indian manufacturing<sup>☆</sup>

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## Abstract

In an increasingly globalizing and knowledge-based world economy, the declining importance of R&D activity in India is a matter of concern. This paper analyzes the determinants of R&D behaviour of Indian enterprises over the 1990s in the context of the reforms of 1991 and their impact on the R&D behaviour of MNE affiliates and local enterprises. The analysis suggests that although average levels of spending have fallen, increased competition due to liberalization seems to have pushed local firms to rationalize their R&D activity and make it more efficient. Also, R&D spending seems to rise more than proportionally with firm size after a certain threshold level has been reached. The analysis brings out differences in the nature of R&D activity of MNE affiliates and local firms. Local firms direct their R&D activity primarily towards the assimilation of imported technology, and to providing a backup to their outward expansion via exports and FDI. MNE affiliates, on the other hand, focus on exploiting the advantages of India as an R&D platform for their parents. The paper is concluded with some policy implications of the findings. © 2005 Elsevier B.V. All rights reserved.

**Keywords:** MNE affiliates; R&D expenditure; Liberalization; Outward orientation; India

## 1. Introduction

In an increasingly globalizing and knowledge-based world economy, technological capacity is seen in recent theoretical and empirical literature as an important influence on a country's international competitiveness and growth prospects. National and local governments, therefore, play an important role in the national innovation systems of these economies and aggressively

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promote the innovative activity of national enterprises. These trends have been variously described as technological nationalism or techno-protectionism (see Kumar and Siddharthan, 1997, for a review). As a result, national R&D expenditure as a proportion of GNP has risen for the world from 1.85% in 1980 to 2.55% in the 1990s.

Against that background, the proportion of national resources spent on R&D by India has declined steadily from a peak of 0.98% in 1988 to 0.66% in 1997 (DST, 1999). The declining importance attached to R&D in India is a matter of serious concern given the international trend. It threatens to widen the already serious technology gap between India and the world economy. The bulk of R&D expenditure in India is accounted for by publicly funded R&D institutions, with industry accounting for only 28% of national R&D expenditure. Hence, the decline in the proportion of national R&D expenditure may largely be due to the squeeze on the government budget. However, even the rate of growth of R&D expenditure in industry has declined in the 1990s compared to the 1980s. R&D expenditure in real terms has fallen in 12 out of 28 broad industries in the 1990s and even where it has risen, the R&D to sales ratios have either stagnated or declined (see Basant, 2000; Mani and Bhaskar, 1998, have also observed a similar trend).

The declining importance attached to R&D by industry coincides with the progressive liberalization of the Indian economy since 1991, as part of a wider package of reforms. This might suggest that liberalization has affected the demand for technological activity on the part of enterprises, which could perhaps be due to increased access to technology imports. It is not clear, however, if it has affected just the demand for R&D activity by enterprises or whether it has affected more broadly their technological behaviour as well. If the latter, then different factors would determine the R&D activity of enterprises in the post-reform period as compared to the pre-reform period. For instance, one of the most important aspects of liberalization is the increasing global integration of the Indian economy. This may induce enterprises to become more international in their outlook. The internationalization of enterprises takes the form not only of diversification in export markets but also of investment in subsidiaries and joint ventures abroad. A number of Indian enterprises have indeed adopted in-

ternationalization as a part of their growth strategy in the recent period, and this trend is likely to increase the demand for technological inputs by them. Hence, the international orientation of enterprises may have a greater bearing on their propensity to undertake R&D in the post-reform period than in the pre-reform period. Furthermore, a key aspect of the reforms was the liberalization of the foreign direct investment (FDI) regime in order to attract multinational enterprises (MNEs) to invest in the country. Given the access to the laboratories of their parents that they enjoy, the R&D behaviour of MNE affiliates may be determined by different factors compared to the R&D activity of their local counterparts. Finally, the process of globalisation is expected to affect the technological behaviour of MNE affiliates and local firms in a very different way because the two sets of firms may have different motives for undertaking R&D activities. The analysis and explanation of those differences might provide useful insights for technology policies.

This paper analyzes the determinants of R&D activity of Indian enterprises using a large, unbalanced panel data set consisting of 4209 observations for 840 companies in the manufacturing sector for the period 1992/3 to 1998/9. Given the strategic and rather long-term nature of technology behaviour, the effect of reforms on the R&D behaviour of enterprises may not be spontaneous and is expected to be subject to lags. Hence, a comparison of R&D behaviour in the earlier and later parts of this period may give an idea of the nature of liberalization-induced effects. The inclusion of both MNE affiliates and their local counterparts in different manufacturing sectors allows us to observe differences in the R&D behaviour across the two groups of enterprises and different kinds of industry.

The structure of the paper is as follows. Section 2 describes the data set for the study and discusses the trends and patterns in enterprise-level R&D activity in the Indian corporate manufacturing sector. Section 3 discusses the analytical framework for the quantitative analysis and summarizes key hypotheses. Section 4 describes the research methodology and variable measurement. Section 5 discusses empirical findings from estimations for the full sample and sub-samples. Finally, Section 6 concludes the paper with comments on the implications of

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