



## Short communication

## R&amp;D and the overseas earnings of Indian firms



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## ABSTRACT

This article examines the impact of undertaking R&D, a measure of the enhancement of dynamic capabilities, on firms' overseas earnings patterns, for a panel of several thousand Indian firms, for the period from 1991–92 to 2005–06. The results show that undertaking R&D spending is associated with a significant rise in firms' average overseas earnings levels. These results point to the need for materially enhancing the very low levels of R&D undertaken by firms in India.

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## 1. Introduction

## 1.1. Scope

This note reports the results of a study examining the impact of undertaking R&D activities on the earnings from foreign investments of Indian firms. Based on a dataset on Indian firms, used earlier by Ref. [74]; how undertaking R&D impacts the levels of earnings from foreign investments is evaluated for a panel of firms over a fifteen year period from 1991–92 to 2005–06. Whether the expectation that firms which undertake R&D will have higher levels of earnings from foreign activities holds true in respect of Indian firms is explored in this analysis.

## 1.2. Rationale

Since the time of David Ricardo, say around 1816 or 1817, a theme has been the role of foreign trade and investment in engendering competitiveness and growth [18].<sup>1</sup> Competitiveness

explanations, additionally, take into account innovation efforts [30,34,39,109]. New products, processes and functionalities, based on knowledge generated by research and development (R&D) activities, are a source of growth in domestic and global markets [44,106],<sup>2</sup> as firms' superior capabilities and product advantages have led them to become international players [16,57]. The capabilities, that permitted international expansion of firms' activities, are specific advantages accruing to firms based on their investments in intangible assets.

The dynamic capabilities idea predicates a role for innovation [52,113], and global market successes are outcomes of capability enhancements [112].<sup>3</sup> The framework articulates that R&D-based competences in firms create new products and processes to respond to changing market circumstances [113]. The conduct of R&D activities is a core capability of firms [51,123]. Firm-specific activities [63] and intra-firm knowledge [9] spur internationalization. R&D outcomes change the nature of outputs a firm generates, as overseas markets may have quite different expectations.

Firms' dynamic R&D activities create a knowledge infrastructure [123], and such an infrastructure creates an enabling environment for firms to conduct business productively and pro-actively [85]. According to [123] a hypothetical firm, producing and selling the same product, in the same scale and to the same group of

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<sup>1</sup> Exports are important for long-run growth [38], and demand effects, externalities and trade flows [35] lead to learning and faster spillovers diffusion [3].

<sup>2</sup> Given the importance of globalization and innovation issues, the relationship between R&D and exporting has been validated in an empirical literature. Analyses by Refs. [24,28,37,58,72,124]; have evaluated the links between R&D and exports. Other studies that have established a positive link between various types of innovative activities and exports are by Refs. [11,64,68,81,87,107,110].

<sup>3</sup> Teece et al. ([114]: 516) state that: "We define capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments."

customers over time, would be exercising zero-level capabilities in a stationary process. Should the same firm want to enhance its products and markets scope, perhaps globally, it would require additional capabilities not of a zero order. In developing new products, and complimentary new processes, the firm would undertake additional activities categorized as R&D. Undertaking R&D would be a first-order dynamic capability enhancement. R&D tasks and activities, inherent in changing the trajectory of the current business model of a firm, involve first-order change [123].

The idea relies on the concept of capabilities spillovers, derived from the concept of externalities [84]. According to endogenous growth theory, general investments made in an economy, including the aggregation of firms' R&D spending, results in growth and knowledge development. As this R&D investment and knowledge development process intensifies, both across the economy and in specific locations and sectors, the outcome is an enhancement of knowledge transmission. Such transmission occurs because employees from different firms exchange ideas about new products and services as well as new ways to produce these [10]. Knowledge development and transmission then helps firms become globally pro-active and successful. Firms' activities, such as R&D, product development and knowledge acquisition, significantly spillover into micro-economic international trade performance [29,43,56,65,101].<sup>4</sup>

Motives for overseas transactions, and successes in them, would be predicated upon the possession of technology and intangible assets developed by firms [17]. Successful firms making overseas investments would possess liquid and tangible assets, such as cash and equipment, and also intangible technological and managerial assets. The ownership of these assets would enhance the capabilities of firms, and the availability of a stock of capabilities would help firms successfully leverage these in contexts other than that of the parent country [12,15,31,44,45,53,54,67].

These intangible technological and managerial capabilities would have to be developed, in the first instance, before leverage. Hence, firms actually undertaking a relatively substantial amount of R&D activities would succeed overseas. Intangible assets could include the availability of superior technologies, knowledge and know-how, taking the form of patented designs or processes, manufacturing and research know-how shared among employees. The experiences of the human capital pool of firms would give firms the ability to overseas opportunities using superior technologies. As a consequence, firms' earnings from foreign activities could be substantial. Hence, firms undertaking relatively higher amounts of R&D would experience overseas market success.

Technological innovation would be an output of R&D activities based on human capital use and existing knowledge stock. The results of these activities could be utilized in producing final goods. These would lead not only to permanent increases in output growth rates, but make products and services internationally competitive [100] and increase the overseas earnings of firms. The firms would have the wherewithal to make investments abroad, because the quality of human capital and existing knowledge to be used would be superior to those in countries to which the investments would be directed.

<sup>4</sup> Posner's [101] technology gap model had postulated that countries placed at the technological frontier would export technologically advanced products. These export advantage were temporary, though. Knowledge as a public good could flow freely, via spillovers, and create mimetic effects. The reaction of foreign producers in producing the new goods with cheaper labor would obviate export market advantages. A product life cycle model [56,117] had similar conclusions. Innovations could generate new products passing through different stages of maturity. Initially, the new item would be produced by the innovator country. Once the item was standardized, the production could be located where labor costs were lower.

Though the presence of multinational firms from developing countries have been noted for several decades [118], Indian firms have been late international investors, relative to other countries, and have made overseas investments in any meaningful quantity, only from the mid to late 1990s onwards [86], though the quantity of these have shot up substantially in the last few years [66]. These international investments have been predicated by unique competencies and capabilities engendered, since liberalization, in these Indian firms [88]. Whether undertaking R&D by Indian firms, expected to have led to firms' dynamic capability enhancements, have enabled these firms to generate higher overseas earnings is apposite. An examination of the issue sheds light on the outcomes of dynamic capability building within firms for an important economy.

## 2. Analysis

### 2.1. Data

The analysis covers an important period in the economic history of India, from 1991–92 to 2005–06. A characteristic of Indian firms, after the 1991 liberalization, has been a surge of entrepreneurship [75]. This entrepreneurship surge will have influenced investments by firms in dynamic capability building.

To test the impact of undertaking R&D on firms' earnings income from international investments, data are drawn from the Reserve Bank of India (RBI) database on financial accounts of non-government public limited companies. The data relate to public limited companies, according to the Companies Act, 1956. Some may be listed on stock exchanges. The data cover most sub-segments of Indian industry. The RBI public limited company data represents eighty five percent of the paid-up capital of eighty six three-digit industries [36]. The data have been used in numerous other analyses [74,77]. The total number of firm-year observations over the years is 28,129.

### 2.2. Variables

The dependent variable has been the firms' ratio of earnings from royalty and investments in overseas businesses to sales (*Overseas Earnings*). These earnings would be generated by leverage of firms' capabilities. Resulting from leverage, firms would have monetized their knowledge via sales of these assets to foreign countries or invested in overseas businesses. Both these acts would yield overseas earnings income. These have been recorded by the RBI in its financial compilations. Indian firms do not report consolidated statements of accounts, after inclusion of domestic and foreign subsidiaries and associates' finances within their accounts. Thus, income from foreign subsidiaries and associates would be accounted for as overseas earnings.

The primary explanatory variable has been whether firms have undertaken R&D or not (*R&D Done*). Differences in patterns of firms' internationalization, and income generation activities, have been influenced not only by institutional differences, but also by other firm and industry characteristics as well as general environmental factors. Based on the literature [14,58], a number of characteristics influence overseas investments, and thus earnings from these investments, are controlled for.

The ratio of fixed assets to the firm's total assets measures capital intensity (*Capital Intensity*). In the context of a labor-rich country overseas ventures are likely to embody human capital inputs rather than physical capital inputs. An allied variable is the extent of employee wages in total costs (*Wage Share*). Another covariate is the level of firm imports (*Imports*). The ratio of overhead costs to sales (*Overhead Costs*) is a proxy for other capability

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