

Executive Summary

The present project is undertaken to examine both pull and push factors governing the decentralisation of foreign R&D by MNEs in the Indian economy. More specifically the project is expected to cover the following key objectives:

1. To identify economically active foreign firms in India.
 2. To examine the patterns of foreign firms' R&D investment and patenting in India.
 3. To identify the determinants of R&D investment of foreign firms.
 4. To recognise the drivers of patenting by foreign firms in India.
 5. To examine the nature of innovation activities by foreign firms in India.
- Our conceptual framework to conduct the study is inspired by the previous works of Le Bas and Sierra (2002), De Beule and Van Beveran (2019), and Dezan Shera & Associates (2020) to identify the nature of foreign R&D investment by multinationals in the Indian markets. We also followed Ronstadt (1978) and Qi et al. (2014) to understand the role of R&D activities of the offshore subsidiary firms in the host country.
 - First, we categorize the patents filed by the firms at IPO and USPTO based on priority, assignee, and inventor level information in three categories i.e., technology creating, technology seeking, and technology exploiting. Further, we categorize the firms in the same three categories as per their patenting activities.
 - We prepared the database by exploring different sources as there is no structured database available that provides information on firm level indicators for unlisted and incorporated foreign firms in India. We find a few firms in the CMIE PROWESS data set but with missing information on key interest variables. Therefore, we shifted our analysis to industry level indicators.
 - We have collected company level information from the MCA21 database, industry level information from the CMIE PROWESS database, and innovation indicator (patent application) data from the PatSeer database.
 - We identified the drivers of R&D and patenting by foreign firms in India using panel data regression techniques with both fixed and random effects for our sample. In the case of the R&D equation, we applied logit and probit regression techniques, as the dependent variable is binary and the independent variables are continuous.

- We reported the results of the conditional fixed-effects logistic regression with odds ratios. For the patent equation, we estimated the results both ways using the patent (dependent variable) as a categorical variable as well as a count variable. We applied logit and probit regression techniques in the first case and negative binomial in the second case as per the type of dependent variable. We also analysed the firms based on cross tabulation i.e., market growth wise, technology intensity wise, and market concentration wise.

The key findings of the study are as follows:

1. Information on R&D investment made by foreign firms is rather limited.
2. Only 32% of foreign firms that are wholly owned subsidiaries invest in research related activities through these subsidiaries.
3. Almost 46.5% of WOS (from the same sample) are involved in filing patents either at IPO or USPTO or at both
4. The discrepancy in R&D investments and patenting highlights the potential use of the Indian market to exploit the technology developed elsewhere.
5. Competitive industries incentivize WOS to invest in R&D in India.
6. Similarly, in concentrated industry firms have less motivation to patent.
7. In terms of patents filed at IPO by WOS, most patents have priority outside India.
 - a. In case, the priority is India, assignees are also Indian, and, in such cases, the involvement of Indian investors is higher either as majority inventors or as first inventor.
 - b. Even when the priority is not India, most applications have a family patent in India.
 - c. There are certain cases with Indian assignees and Indian inventors when the priority country is not India. Clearly, these firms are looking for Indian talent to complement their innovations at the international level.
8. WOS patent applications at the USPTO also have mostly patents with priority outside India and without Indian assignees.
 - a. For cases, with priority in India, the assignee is not Indian but, the inventors are based in India. This is in line with a comment that to avoid the cost of a foreign filing license (FFL), companies may give India as a priority country and then use that for most international patents when Indian inventors are involved.

- b. In cases, where Indian inventors are not involved and the priority is India, an expert has noted that only for market considerations, the company will choose India as a priority case.
9. The majority of patents are for exploiting existing technology in Indian markets, however, in recent times there has been a boost in the technology seeking and creating activities of WOS.

Policy Recommendations

- There is no structured database available exclusively for foreign firms (wholly owned subsidiaries) in India. In this case, it is difficult to capture WOS related information with accuracy. There is a need for maintaining a structured database for foreign firms that provides all financial and other company related data. Providing such data to the researchers may improve the quality of research in the country.
- It was observed during the data collection process that there is a data reporting issue in the existing system. There is no mandatory regulation in India for companies to report yearly R&D expenditure related data. The column on R&D expenditure is not mandatory for all the companies to fill in the annual filing form. For any policy reforms data analysis for the past years is important. Therefore, relevant policymakers should work in this direction to strengthen India's innovation policy.
- The requirement of IPO to first file patents in India has been fruitful as this makes companies identify the contributions of Indian inventors and fill priority in India. We suggest that this aspect can be strengthened further by ensuring better compliance.
- Data related to patents of foreign firms can be made easily available and assessable for research purposes. The Indian Patent Office may learn from best international practices in terms of making data available like the USPTO.
- As we find that most patents could be filed merely to use internationally developed products in the Indian market, IPO can keep a strict watch on patents' commercialization through Form 27, particularly for patents filed by foreign firms, and non-residents, and devise a way to release patents for public use if not commercialized or manufactured in India for a certain time. However, policy design for such intervention requires careful consideration given the Indian commitment to WTO under TRIPS.

- Most experts pointed out the need to enhance research infrastructure which is costly for individual companies to develop. Building research infrastructure includes creating research intensive ecosystem that also requires supportive trade and industrial policies. It will be supportive for R&D activities if while importing any components relaxation can be given for firms engaged in research.
- Incentive schemes can be devised for products invented, designed, and produced in India in line with the PLI. The scheme may have gradation in incentives if it is (i) invented, designed, and produced; (ii) designed and produced and (iii) produced. The patent level information can be utilized to decide the level of gradation.