



IMPACT OF F.D.I ON INNOVATION AS AN IMPORTANT FACET OF INDIA'S ROAD TO BECOMING AN ECONOMIC SUPERPOWER.

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ABSTRACT

The road to achieving economic might in today's globalised world for the latecomers to industrialisation, i.e., the so-called developing countries like India, must necessarily pass through the expansion of its innovation capabilities, more precisely the innovation undertaken indigenously. The existing economic literature is almost unanimous on the aspect of positive impact of innovation on a country's economic growth and development. The economic literature however is quite divided on the impact of FDI (Foreign Direct Investment) inflows on the impact of innovation in developing countries and how the influx of foreign capital in various forms impacts the innovation capabilities in such countries. There is abundant literature which points to the positive impact of FDI on innovation for certain developing countries while an equally abundant literature shows that FDI inflows actually harm innovation capabilities of certain other developing countries. Also, there exists literature which shows that for certain developing countries FDI inflows have no major impact, in either direction on innovation capabilities. Thus, the impact of FDI inflows on innovation can only be concretely determined for the specific countries on the basis of empirical data. This paper professes to undertake such an attempt, i.e., to establish the impact of FDI inflows on innovation, for India on the basis of empirical data available for the past three decades. For FDI inflows into India, data provided by World Bank has been utilised. Patents and trademarks have been used as proxies for Innovation, and the data for patents and trademarks has been obtained from Intellectual property India annual report published by Government of India. Regression analysis has been used to gauge the impact of FDI inflows on innovation in India over the years and appropriate conclusions regarding policy has been drawn from the same.

Keywords: FDI, INNOVATION, PATENTS, TRADEMARKS, DEVELOPING COUNTRIES.

I. INTRODUCTION

After the Industrial Revolution hastened the pace of economic development first in western Europe and then the rest of the world, the entire economic history from late 18th century till present is viewed by some authors as that of emanating from the relatively permanent changes caused in the economic structure of the world by the humongous technological changes wrought about by the

same. The development in technology and further innovations, both of quantitative and qualitative nature are seen to be the prime drivers of not merely economic changes but also the relations that various countries forge with or against each other. (Hobsbawm, 1988). The disparity that exists between the third world and the western powers are seen by many economists primarily as that originating from economic causes. Further, the economic gap between developing and developed countries is mainly found due to the technological gap between them (Kuznets, 1967). Competitiveness in the global market is being claimed to be determined mainly by R&D and innovations, instead of factor endowments and natural resources (Erdal and Gocer, 2015). The only way for the latecomers in the race of industrialisation and growth to keep pace with the developed countries was to try and adopt better technologies and innovate accordingly. The development theories find capital and technical change as the prime mover in an economic system while in the absence of technical change, economic growth too attains a constant value in steady state equilibrium (e.g., Solow, 1966 and Romer, 1987). Economic literature has clearly established that innovation leads to development (e.g., Aghion and Howitt, 1992; Romer, 1990). The growth models like that of Romer (1990), Grossman and Helpman (1991) model growth as a function of the production of new ideas or what has been alternatively called as innovation. There has been strong empirical evidence to back up these theoretical claims about how innovation promotes growth, development productivity gains etc. (e.g., Geroski, 1989; Fagerberg et. al., 2007). Both the theoretical and empirical literature has shown that innovation is a vital if not the key factor crucial for economic growth and development of a country. In the light of such strong evidence of the impact of innovation on overall economic scenario, it is paramount for any country to innovate in order to become a superpower in today's world. It is with this view of innovation as a crucial factor of development that we shall examine the proliferation of innovation capabilities of India over the past two decades. This would help us to objectively assess as to how far along the road is India in its quest to becoming an economic superpower by 2047 and what obstacles it still has to overcome to hasten this process.

In the era of globalisation Foreign Direct Investment flows is a phenomenon which has a tremendous effect on the world economy as a whole and also on the developing economies. Economic literature has, ever since capital flows in various forms have become a decisive factor, attempted to trace the impact of FDI inflows on the innovation capabilities of developing economies. The economic literature though on the impact of FDI inflows is not as clear cut as that on innovation and can be termed rather ambiguous. Three main lines of research have emerged on the impact of FDI inflows on developing countries in particular and on the host countries in general.

The first line of thought holds that FDI inflows progressively affects the innovation capabilities of the developing/host countries. The influx of capital not only supplies the prerequisite threshold amount of capital required for certain advanced innovations but also increases the competition in domestic market which actually provides the environment necessary for enhancing innovation. The second line of thought, in stark contrast to the first argues that FDI inflows regress instead of progressing the innovation capabilities of developing host countries. It is argued that the influx of foreign capital stifles and crushes the domestic firms under the foot of foreign competition and thus diminishing their innovation capabilities. This line of thought contends that the influx of foreign capital established foreign monopolies in developing countries and monopolies as a rule stifle competition and thus also innovation. The third line of thought maintains that the impact of FDI inflows on innovation capabilities of the developing/host countries cannot

be predetermined or is actually neutral. The argument goes that it is the conditions of developing countries' economy which determines its innovation capabilities though FDI inflows do have an effect but not the decisive one.

Thus, it can be stated that the impact of FDI inflows on innovation, which is a key driver of growth and development can only be established concretely for different countries. This paper attempts to do the same for the post reform period in India.

II. Review of literature

Vernon (1966) in his paper theoretically broke away from the traditional comparative cost theory in order to conduct an analysis of the new trends in international trade and capital theory. On the basis of the analysis undertaken in the paper of international trade and capital movements, which was later christened as the product cycle theory, it was concluded that the production cycle has four stages viz., innovation, growth, maturity and decline. Using the empirical data for consumer demand of manufactured products in Europe, which showed an increase of demand in the continent for manufactured products akin to those produced in United States of America, it was concluded that the advantage in the first stage of production gained due to ownership of new technologies or innovation advantage by the U.S. firms was lost in the later stages as the technology became known and was copied by the European firms and thus to maintain the market share in European markets the U.S. firms were forced to export some of their production facilities to European markets (which is but FDI).

Grossman and Helpman (1991) in their paper presented a theoretical model showing economic growth as a function of Research and development and proved why the government must lay emphasis on achieving an optimum level of research expenditure.

Bertschek (1995) analysed the impact of FDI on domestic innovation using random effects probit model on the data of 1,270 firms of the German manufacturing industry. The paper concluded that FDI has a positive impact on the host country's innovation capabilities.

Dunning (1996) in his paper contradicted the view of Bertschek and concluded that the impact of FDI on innovation is determined endogenously and not by some universal relation that exists between FDI and innovation.

Cainelli et al. (2004) explored the firm level relationship between innovation and economic performance for firms in service sector of Italy. The results clearly indicated that the innovating firms had a better performance than non-innovating firms in terms of economic growth.

Osorio and Pose (2004) analysed the impact of R&D expenditure on innovation and economic growth in peripheral regions of Europe. This paper used a two-fold process, first by analysing the impact of R&D expenditure on innovation (measured by patents applications per million) and then studying the impact of innovation on economic growth. The study brought out that the degree of impact of R&D expenditure on innovation and similarly innovation on economic growth depended on the absorptive capacity of the nation.

Fagerberg et al. (2010) in their paper attempted to combat the erroneous view existing in the economic literature that innovation holds importance more for the developed countries and high-tech firms rather than the developing ones. It was concluded in the paper that though there are certain qualitative differences in the innovation of developing and developed countries, innovation was a very vital factor in the development of developing countries as well. As a vital force in the growth and development of developing countries, stress should be laid on both the theoretical and practical study regarding innovation.

Bradley et al. (2012) in their paper challenged the view that poverty and lack of development in developing economies can only be seen as a resource allocation problem and a lack of capital. Based primarily on case study of Nairobi, Kenya the paper concluded that along with resource allocation the problem of development should also be viewed as the problem of innovating and creating new ideas. Innovation, in the paper was shown to be positively affecting the performance of the firms who had undertaken innovative methods vis-à-vis the firms which hadn't indulged in the same.

Hausman and Johnston (2014) in their paper discussed the role of innovation in not merely development of the economy as a whole but also as a mitigating factor in the downturns of the business cycle in the economy. For both the developing and developed countries it was concluded, from studying the trends related to the Great Recession, that better and intensive innovations can help fend off and reduce the ill-effects of recession on the economy as a whole. Thus, technological innovations were not merely seen as a driver of the growth process but also as a stabilizer of the economy which could further create the basis for growth and development.

Pece et al. (2015) analysed the impact of innovation on long term economic growth for three CEE countries namely Poland, Hungary and Czech Republic by using multiple regression models. The results of the analysis brought out a positive relationship between economic growth and innovation. The study suggested investment in education of workforce, increase in R&D expenditure and investment in technology will launch an economy on the path of growth.

Barsa et al. (2018) in their paper based on data from sub-Saharan Africa concluded that FDI inflows have a negative or regressive effect on the innovation capabilities of developing economies. It was argued that many a times FDI inflows bring along foreign technologies that are not suited for the domestic environment.

Adikari et al. (2021) studied the impact of inward FDI on innovation in Sri Lankan Economy using Autoregressive Distributed Lag (ARDL) cointegration procedure. The time period taken was from 1990-2019. The study concluded that the inward FDI had a negative impact on innovation. Therefore, FDI retarded innovation in the host country.

III. METHODOLOGY

3.1 DATA AND SOURCES OF DATA

To study the impact of Foreign Direct investment (FDI) inflows on innovation in Indian economy the time period under consideration is from 1993 to 2021. Though, the argument for time period selected can be made on the basis of the post-reform period (i.e., post 1991) being the period in which the FDI inflows and innovation indicators have showed an upsurge quantitatively, the time period selected has more to do with availability of reliable data for the variables considered rather than any major

theoretical consideration. Data for FDI inflows to India from rest of the world (in billion US\$) for the aforementioned time period has been taken from statistics provided by the World Bank whereas the data for no. of patents granted in India and no. of trademarks registered in India for the time period considered has been taken from the Annual reports published by Intellectual Property India, Office of the Controller General of Patents, Design and Trademarks, Department of Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Government of India.

3.2 THEORETICAL FRAMEWORK

Following economic literature, no. of patents granted and trademarks registered have been used as proxy for innovation in the country. The impact of FDI inflows on the no. of patents granted and trademarks registered have been considered with a time period lag of two years as suggested by exemplar economic literature on this topic . Simple regression analysis has been used to test the impact of Foreign Direct investment (FDI) inflows on innovation in Indian economy in the time period 1993-2021.

IV. RESULTS AND DISCUSSIONS

		Trademarks	FDI
Pearson Correlation	Trademarks	1.000	.743
	FDI	.743	1.000
Sig. (1-tailed)	Trademarks	.	<.001
	FDI	.000	.
N	Trademarks	29	29
	FDI	29	29

Fig 1. Correlations between FDI inflows and Trademarks registered

Fig 1 clearly shows that a high positive correlation (0.743) clearly exists between the FDI inflows and trademarks registered in India in the selected time period. We further check the goodness of fit of the model to observe whether majority of the variance in the values of dependent variable (trademarks) can be explained by the independent variable (FDI inflows).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.743 ^a	.552	.536	70073.013

a. Predictors: (Constant), FDI

b. Dependent Variable: trademarks

Fig 2. Goodness of fit

The goodness of fit estimate (R squared) shows that only about 55% of the variations in the dependent variable (trademarks) can be explained away by the variations observed in the independent variable (FDI inflows) whereas 45% of the variations observed in the dependent variables are likely caused by other factors. Thus, it is highly likely that the high correlation observed between FDI inflows and trademarks registered in India is accidental and that the increase in trademarks registered is not contingent on the increase of FDI inflows in India during the period under study.

We conduct the same tests to check the relationship between FDI inflows and patents granted in India during the period 1993-2021. The summary of the tests is given below.

Correlations

		patents	FDI
Pearson Correlation	Patents	1.000	.704
	FDI	.704	1.000
Sig. (1-tailed)	Patents	.	<.001
	FDI	.000	.
N	Patents	29	29
	FDI	29	29

Fig 3. Correlations between FDI inflows and patents granted

Fig 3 clearly shows that a high positive correlation (0.704) clearly exists between the FDI inflows and patents granted in India in the selected time period i.e., 1993-2021. We further check the goodness of fit of the model whether majority of the variance in the values of dependent variable (patents granted) can be explained by the independent variable (FDI inflows) or is the high correlation between these two variables is also accidental as in the case of FDI inflows and trademarks registered.

Model Summary

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.704 ^a	.496	.477	6012.008

a. Predictors: (Constant), FDI

b. Dependent Variable: patents

Fig 4. Goodness of fit

R square estimate for this model is 0.496 as shown in Fig 4. The goodness of fit estimate (R squared) shows that only about 50% of the variations in the dependent variable (Patents granted) can be explained away by the variations observed in the independent variable (FDI inflows) whereas more than 50% of the variations observed in the dependent variables are likely caused by other factors. Thus, it is highly likely that the high correlation observed between FDI inflows and patents granted in India is accidental as in the case of correlation

Between FDI inflows and trademarks registered and that the increase in patents granted is not contingent on the increase of FDI inflows in India during the period under study.

V. CONCLUSIONS AND POLICY IMPLICATIONS

- From the results given above it can be concluded that for India, in the period considered (1993-2021), it is highly likely that FDI inflows did not have a high impact on innovation activities undertaken. It is also highly likely that the overall economic growth that took place in India after the economic reforms of 1991 affected positively the confidence of foreign investors (thus, the increase in FDI inflows) and also the sharpened competition in the market gave impetus to innovation activities.
- The policy implications regarding increasing innovation in India thus should target the furtherance and expansion of innovation activities directly, rather than in the roundabout way of focusing on creating policies that attract foreign investment
- The apparatus of technical education in India should be expanded and modernized along the lines of the developed countries. A key part of this would be to increase the amount of funds allocated not only to technical education but also education as a whole on part of the government.
- The curriculum of the technical institutes should be linked up with the actual demands of economy so as to link up the general technical know-how with the particular innovation demands of the various branches of the economy.
- The tie-ups with foreign companies, especially those from the developed economies should be on the basis of technical know-how sharing.
- The system of patents and trademarks registering should be made more robust in order to further incentivize the innovator.

VI. REFERENCES:

- Adikari, A. M., & Liu, H., & Marasinghe, M. M. S. A. (2021). Inward Foreign Direct Investment-Induced Technological Innovation in Sri Lanka? Empirical Evidence Using ARDL Approach. *Sustainability*, 13(13), 7334.
- Aghion, P. and Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60, 323-351.
- Barasa, L., & Vermeulen, P., & Knobon, J., & Kinyanjuni, B., & Kimuyu, P. (2018). Innovation inputs and efficiency: Manufacturing firms in Sub-Saharan Africa. *European Journal of Innovation Management*. 59-83.
- Bertschek, I. (1995). Product and process innovation as a response to increasing imports and foreign direct investment. *The journal of industrial economics*, 43(4), 341-357.

- Bilbao-Osorio, B., & Rodriguez-Pose, A. (2004). From R&D to innovation and growth in the EU. *Growth and Change*, 35(4), 434–455.
- Bradley et al. (2012). Capital Is Not Enough: Innovation in Developing Economies. *Journal of Management Studies*. 49. 684 – 717.
- Cainelli et al. (2006). Innovation and economic performance in services: a firm-level analysis. *Cambridge Journal of Economics*. 30(3).435-458
- Dunning, J. (1995). Reappraising the Eclectic Paradigm in an Age of Alliance Capitalism. *Journal of International Business Studies*, 26, (3), 461-491.
- Erdal, L., & Gocer, I. (2015). The effects of foreign direct investment on R&D and innovations: panel data analysis for developing Asian countries. *Procedia – Social and Behavioral Sciences*, 195 (2015), 749-758.
- Grossman G., & Helpman, E. (1991). Endogenous Product Cycles. *Economic Journal*, 101, 1214-1229.
- Hausman et al., (2014). The role of innovation in driving the economy: Lessons from the global financial crisis. *Journal of Business Research*, 67, issue 1, 2720-2726.
- Kuznets, S. (1967). Population and economic growth. *Proceedings of the American Philosophical Society*, 111(3), 170-193.
- Pece et al (2015). Innovation and Economic Growth: An Empirical Analysis for CEE Countries. *Procedia Economics and Finance*, vol 26, 461-467.
- Romer, P.M. (1990). Endogenous technological change. *Journal of Political Economy*, 98, 71-102.
- Vernon, R. (1966). International investment and international trade in the product cycle. *The Quarterly Journal of Economics*, 80 (2), 190-207.