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# Impact of Foreign Direct Investment on Innovation in Argentina and Brazil

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**Abstract:** ***For late industrializersie.. developing countries in to achieve economic domination in today's globalised world, the development of innovative capabilities, more especially indigenous innovation, is a requirement. Almost all of the existing current economic literature concurs that development of innovation contributes to a nation's economic growth and development. However, the influence of FDI inflows on the impact of innovation in developing nations and how the entrance of foreign capital in various forms impacts the innovation capacities in such countries are rather highly contested in the economic literature, which is mostly hazy on this subject. This paper claims to make such an attempt the impact of FDI inflows on innovation in Argentina and Brazil's economy using empirical data of last three decades. For FDI inflows, 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 the World Bank Database. Simple statistical tools have been used to gauge the impact of FDI inflows on innovation in the economy of Argentina and Brazil over the years and appropriate conclusions regarding policy has been drawn from the same.***

**Keywords:** FDI, Innovation, Patents, Trademarks, Argentina, Brazil

## 1. Introduction

According to some authors, the enormous technological changes brought about by the Industrial Revolution, which accelerated the pace of economic development first in western Europe and then in the rest of the world, are the cause of the relatively permanent changes that were brought about in the global economic structure from the late 18th century to the present day. It is generally agreed that technological advancements and subsequent innovations—both quantitative and qualitative—are the primary drivers of not only shifts in the economy but also shifts in the ways in which nations interact with one another or oppose one another. (Hobsbawm, 1988). Additionally, according to Kuznets (1967), the primary factor contributing to the economic disparity between developed and developing nations is the technological divide. Erdal and Gocer (2015) assert that global market competitiveness is primarily determined by innovations and R&D, not natural resources or factor endowments. If they wanted to keep up with the developed nations, the late entrants in the race for industrialization and growth had to try to adopt better technologies and innovate accordingly. Economic growth also reaches a constant value in steady state equilibrium in the absence of technical change, according to the development theories (e.g., Solow, 1966; Romer, 1987). Economic research (e.g., Aghion and Howitt, 1992;) asserts that innovation is inevitably followed by development. Romer, 1990). Growth is modeled in growth models developed by Romer (1990), Grossman and Helpman (1991), and other authors, among others, as a result of the production of novel concepts, also known as innovation. These theoretical assertions regarding the ways in which innovation boosts growth, development, productivity, etc. have solid empirical backing (for instance, Geroski, 1989; Fagerberg and others, 2007). The role that innovation plays in the expansion and development of a nation's economy has been the subject of both theoretical and empirical research. With this perspective of innovation as a crucial component of development in mind, we will examine the expansion of innovation capabilities in the Indian subcontinent over the past 20 years. We would be able to gain a more objective understanding of India's progress toward becoming an economic superpower by 2047 and the obstacles it still has to overcome to accelerate this process with this information.

Foreign Direct Investment (FDI) flows have a significant impact on the global economy and developing economies in the age of globalization. In light of the growing significance of capital flows, the economic literature has focused on analyzing the impact of FDI on the innovation capabilities of developing nations. The literature on the effects of FDI inflows, on the other hand, is complex and ambiguous. Regarding the effects of FDI on developing and host nations, three primary research perspectives have emerged.

The first point of view contends that the innovation capabilities of developing and host nations are positively impacted by FDI inflows. It suggests that the influx of capital not only provides the necessary funding for cutting-edge innovations, but also encourages competition in the domestic market, fostering an atmosphere that encourages innovation.

The second viewpoint, on the other hand, suggests that FDI inflows hinder developing and host nation innovation capabilities. It contends that the influx of foreign capital reduces domestic firms' ability to innovate and, as a result, suppresses them through increased competition from abroad. This point of view asserts that the establishment of foreign monopolies by foreign capital stifles innovation and competition.

The third point of view maintains that FDI inflows may have no effect on innovation capabilities and cannot be predicted. This viewpoint holds that a nation's innovation capabilities are primarily determined by its economic conditions, with

FDI inflows having an impact but not necessarily a decisive one.

Therefore, in order to ascertain the precise impact of FDI on innovation—a crucial growth and development driver—it is essential to examine the particular circumstances of various nations. The purpose of this paper is to investigate this relationship over the past three decades in the case of the two biggest economies in Southern America, i.e., Brazil and Argentina.

## 2. Review of Literature

Bertschek (1995) undertook a study on the effect of Foreign Direct Investment (FDI) on domestic innovation. Using data from 1,270 German manufacturing companies and a random effects probit model, the study found that foreign direct investment (FDI) boosts innovation capabilities in the host nation.

Dunning (1996) argued in his paper that the relationship between FDI and innovation is determined endogenously rather than by a universal connection, in contrast to Bertschek's perspective.

Alfredo et al. (2003) in their extensive research, which used cross-country data from 1975 to 1995, the independent impact of FDI on GDP or economic growth is greatly exaggerated, and a number of fundamental characteristics of the host economy determine whether FDI would have a positive or negative impact on GDP. The study specifically pointed out that developed financial markets significantly assisted the host economies in making better use of FDI to boost GDP.

Blind and Jungmittag (2004) conducted a study examining how the influence of foreign competition on domestic German businesses impacted their innovation in light of imports and foreign direct investment (FDI). Despite the study's focus on companies in a developed nation with a distinct economy compared to developing nations, it is regarded as a significant contribution to the topic of FDI's effect on domestic innovation. This study introduced an empirical approach to analyzing the impact of FDI imports and inflows on domestic firms' innovation activities, which had not been utilized before. By collecting data from service sector firms in Germany in 2019, the authors employed the probit method to investigate the relationship between FDI and domestic innovation. The study built upon Bertschek's theoretical work in the field. Through extensive empirical analysis, the authors concluded that FDI has a clearly positive influence on domestic firm innovation. Consequently, it is recommended to promote FDI inflows as integration with the global market stimulates domestic innovation. Additionally, the study highlighted the significance of firm size in innovation practices, indicating that larger firms tended to exhibit higher innovation levels in response to increased FDI and imports, although innovation activity did not increase proportionally with firm size.

Fagerberg et al. (2010) made an effort to refute the fallacious notion seen in economic literature that innovation is more crucial for high-tech companies and wealthy nations than for developing nations. The paper came to the conclusion that, even while innovation differs qualitatively across developing and developed nations, innovation is nonetheless essential to the advancement of emerging nations. The study emphasised the necessity for theoretical and applied research on innovation, recognising it as an essential component for the expansion and advancement of developing nations.

Sivalogathasan and Wu (2014) used panel data from South Asian nations covering the years 2000–2011 to conduct research on the relationship between innovation and foreign direct investment (FDI). The results of the study showed that FDI significantly boosts innovation among host nation enterprises. This beneficial effect, meanwhile, is dependent on the host companies' ability to absorb new business and other supportive characteristics. Without these elements, FDI would not have a beneficial impact on innovation.

According to a study by Barsa et al. (2018) that used data from sub-Saharan Africa, foreign direct investment (FDI) inflows have a detrimental or regressive impact on emerging countries' capacity for innovation. It has been argued that FDI inflows frequently bring foreign technologies that are unfit for domestic use.

## 3. Methodology

The effect of Foreign Direct Investment (FDI) inflows on innovation in Brazil and Argentina over a period of three decades has been examined using simple correlation analysis. Following economic literature, the number of patents and trademarks has been used as a proxy for innovation in the country. The impact of FDI inflows on the number of patents and trademarks has reportedly been taken into consideration with a two-year time lag, according to model economic literature on the topic.

Data for foreign direct investment (FDI) inflows for the time period under consideration was obtained from World Bank statistics, whilst data for the number of patents and trademarks was obtained from the World Intellectual Property Organization's (WIPO) website.

## 4. Results and Discussion

| Correlations | | | |
|---|---|---|---|
| | | trademarks | FDI |
| Pearson Correlation | trademarks | 1.000 | .168 |
| | FDI | .168 | 1.000 |
| Sig. (1-tailed) | trademarks | . | .178 |
| | FDI | .178 | . |
| N | trademarks | 32 | 32 |
| | FDI | 32 | 32 |

**Figure 1:** Correlation between FDI inflows and trademarks for Argentina

It is clear in Fig 1 (via the Pearson Correlation estimates) that very minimal correlation (0.168) exists between the FDI inflows and trademarks in Argentina. Here due to very low correlation between these two variables for Argentina, we shall not check the R square estimates, which will be further

used in the case of high correlation existing between two variables.

| Correlations | | | |
|---|---|---|---|
| | | patents | FDI |
| Pearson Correlation | patents | 1.000 | .122 |
| | FDI | .122 | 1.000 |
| Sig. (1-tailed) | patents | . | .253 |
| | FDI | .253 | . |
| N | patents | 32 | 32 |
| | FDI | 32 | 32 |

**Figure 2:** Correlation between FDI inflows and patents for Argentina

It is clear in Fig 2 (via the Pearson Correlation estimates) that very minimal correlation (0.122) exists between the FDI inflows and patents in Argentina. Here due to very low correlation between these two variables for Argentina, we shall again not check the model's goodness of fit.

| Correlations | | | |
|---|---|---|---|
| | | trademarks | FDI |
| Pearson Correlation | trademarks | 1.000 | .536 |
| | FDI | .536 | 1.000 |
| Sig. (1-tailed) | trademarks | . | <.001 |
| | FDI | .001 | . |
| N | trademarks | 32 | 32 |
| | FDI | 32 | 32 |

**Figure 3:** Correlation between FDI and trademarks for Brazil

Fig 3 clearly shows that a medium positive correlation (0.536) exists between the FDI inflows and trademarks in Brazil. We additionally assess the model's goodness of fit to determine the extent to which the independent variable (FDI inflows) can account for the variation in the dependent variable (trademarks).

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .536[a] | 0.288 | 0.264 | 59195.865 |

a. Predictors: (Constant), fdi
b. Dependent Variable: trademarks

**Figure 4:** Goodness of Fit

The estimate of goodness of fit (R squared) reveals that only 28.8% of the fluctuations in the dependent variable (trademarks) can be accounted for by the variations observed in the independent variable (FDI inflows). This suggests that over 71% of the fluctuations in the dependent variable are likely influenced by other factors. As a result, the correlation observed between FDI inflows and trademarks in Brazil is likely coincidental, and the growth in trademarks is not necessarily dependent on the increase in FDI inflows.

We conduct the same tests to check the relationship between FDI inflows and patents in Brazil over the past thirty years. The summary of the tests is given below.

| Correlations | | | |
|---|---|---|---|
| | | patents | FDI |
| Pearson Correlation | patents | 1.000 | .840 |
| | FDI | .840 | 1.000 |
| Sig. (1-tailed) | patents | . | <.001 |
| | FDI | .000 | . |
| N | patents | 32 | 32 |
| | FDI | 32 | 32 |

**Figure 5:** Correlation between FDI inflows and patents for Bazil

Fig 5 clearly shows that a high positive correlation (0.840) exists between the FDI inflows and patents in Brazil. We additionally assess the model's goodness of fit to determine the extent to which the independent variable (FDI inflows) can account for the variation in the dependent variable (trademarks).

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Sig. F Change |
|---|---|---|---|---|---|
| 1 | .840[a] | 0.705 | 0.695 | 988.916 | <.001 |

a. Predictors: (Constant), fdi
b. Dependent Variable: patents

**Figure 6:** Goodness of fit

The estimate of goodness of fit (R squared) reveals that about 70.5% of the fluctuations in the dependent variable (patents) can be accounted for by the variations observed in the independent variable (FDI inflows). This suggests that 29.5% of the fluctuations in the dependent variable are likely influenced by other factors. As a result, the strong correlation observed between FDI inflows and patents in Brazil not coincidental, and the growth in patents is effected the increase in FDI inflows.

## 5. Conclusions and Policy Implications

1) From the results given above it can be concluded that in the two countries considered in South America, in the past 30 years FDI inflows had dissimilar effects on the various countries. In the case of trademarks, it can be said for both Brazil and Argentina that the FDI inflows had no direct substantial bearing on its increase. While in the case of patents, FDI inflows had no impact on this indicator for Argentina while in the case of Brazil, FDI inflows positively impacted no. of annual patents.
2) Thus, the policy implications regarding increasing trademarks in Brazil and Argentina should target the furtherance and expansion of innovation activities regarding trademarks directly, rather than in the roundabout way of focusing on creating policies that attract foreign investment.
3) A similar policy as above should be pursued by Argentina is case of patents as well
4) In the case of Patents for Brazil it looks as if it stands to benefit by attracting FDI but it would be wise to also take steps for the direct furtherance of innovation activities.
5) The following steps should be taken to directly encourage innovation activities in Brazil and Argentina
6) The respected administrations of Brazil and Argentina should modernize and extend their technical education

systems in accordance with developed nations. An important aspect of this would be for the government to raise the amount of money devoted to both technical and general education.

7) In order to connect general technical knowledge with the specific innovation requirements of the different sectors of the economy, the curriculum of technical institutes should be linked to the current demands of the economy.
8) Partnerships with international businesses, particularly those from developed economies, should be based on the transfer of technical know-how.
9) To further encourage innovation, the mechanism for registering patents and trademarks has to be strengthened.

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