Australian Journal of Basic and Applied Sciences, 9(17) Special 2015, Pages: 86-93

ISSN:1991-8178

Australian Journal of Basic and Applied Sciences

Journal home page: www.ajbasweb.com

The Effect of MNCs Innovation Activities in Stimulating Malaysia's Outward Foreign Direct Investment (OFDI) – A Conceptual Framework

[1]Abd Rahim Jaguli, [2]Marlin Abdul Malek, [3]Nurhaizal Azam Arif

[1]*School of International Studies, Universiti Utara Malaysia, Sintok, 06010 Kedah, Malaysia.*
[2]*Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Sintok, 06010 Kedah, Malaysia.*
[3]*School of International Studies, Universiti Utara Malaysia, Sintok, 06010 Kedah, Malaysia.*

ARTICLE INFO

Article history:
Received 12 March 2015
Accepted 28 April 2015
Available online 2 May 2015

Keywords:
Outward Foreign Direct Investment (OFDI), Foreign Direct Investment (FDI), Local Innovative Capacity, Spillover, Innovation, Knowledge and Technology Transfer, MNC, Malaysia

ABSTRACT

The objective of this paper was to propose a framework of study on the effect of MNCs innovation activities in stimulating Malaysia's Outward Foreign Direct Investment (OFDI). Studies on channels through which technology and knowledge were transferred remained unexplored in the existing OFDI knowledge transfer literature. The study will investigate the drivers of Malaysia's OFDI particularly the effect from international external sources. It will examine whether multinational corporations (MNCs) innovation activities can act as catalysts to stimulate OFDI activities in Malaysia. This study will adopt an aggregative approach using macro-level data. Time series data analysis will be conducted to provide empirical evidence of the effect of foreign innovation activities on Malaysia's OFDI. Data for analysis purposes will be obtained from the World Bank's *World Development Indicator (2014).* In parallel with the data sources, statistical tests will be conducted on the main determinants of OFDI and the effect of foreign innovation and international trade activities on OFDI performance of Malaysia.

To Cite This Article: Abd Rahim Jaguli, Marlin Abdul Malek, Nurhaizal Azam Arif., The Effect of MNCs Innovation Activities in Stimulating Malaysia's Outward Foreign Direct Investment (OFDI) – A Conceptual Framework. ***Aust. J. Basic & Appl. Sci.,*** *9(17): 86-93, 2015*

INTRODUCTION

FDI in most countries is considered an important element for the enhancement of economic growth and social development. Policies and strategies therefore have been designed to stimulate flows of inward FDI into a country. As far as developing countries like Malaysia are concerned, one of the major reasons to attract FDI from developed countries is to acquire advanced technology and new ideas in order to develop its innovation capability and catch up with technological leaders. Malaysia has received substantial amounts of FDI over the past years. Malaysia continues to be a major recipient of FDI with an equivalent of RM38.8 billion in 2013 as opposed to RM31.1 in 2012 in various manufacturing sectors, while its OFDI over the same period amounted to RM42.9 billion. As of 2013, the country had reduced the net direct investment outflow to RM4.1 billion from RM21.7 billion the year before (Malaysian Industrial Development Authority Report, 2013). This amount was encouraging as it is important because through FDI knowledge from developed countries transcends national boundaries and can be transmitted to domestic firms, thereby raising productivity growth and technological progress in other countries. On top of that, there is also a trend of active outward foreign direct investment (OFDI) by firms in developing economies like Malaysia in recent years. FDI outflows from developing countries reached a record level where Transnational corporations (TNCs) from developing economies are increasingly acquiring foreign affiliates from developed countries located in their regions. Developing and transition economies together invested $553 billion, or 39 per cent of global FDI outflows, compared with only 12 per cent at the beginning of the 2000s (The World Investment Report (WIR), 2014). There are many reasons for this rapid development for instance faster economic growth, investment incentives and liberalization as well as rising income from high commodity prices (The World Investment Report (WIR), 2014).

Many studies on the determinants of OFDI at macro level have employed the investment development path (IDP) framework (Dunning, 1981, 1986, 1988). Past researches for example Liu, Buck, & Shu (2005) and Zhang & Bulcke (1996) had

Corresponding Author: Abd Rahim Jaguli, School of International Studies (SoIS), Universiti Utara Malaysia, Sintok 06010 Kedah, MALAYSIA.
Tel: +604-9288510; E-mail: abdrahim@uum.edu.my

examines whether OFDI is determined by economic development, trade and inward foreign direct investment. Gao, Liu & Zou (2013) and Kyrkilis and Pantelidis (2003) examines the impact of human mobility and human capital. Furthermore, Buckley, Clegg, Cross, Liu, Voss and Zheng (2007) studies on market size, policy liberalisation and host country natural resource endowments. In a case of Malaysia, previous study have shown that foreign market size, real effective exchange rate, international reserves and trade openness are among the determinant of OFDI (Goh & Wong, 2011). The findings proposed that apart from the market-seeking incentive and the adoption of outward-oriented policies, implementation of liberal economic policy could encourage OFDI (Goh and Wong, 2011). All the findings from these studies have shed light on the issues related to OFDI and enhanced the understanding of the determinants of OFDI. However, the significant effects of innovation and R&D activities by MNCs through FDI had been mostly ignored in existing studies on OFDI particularly, developing countries like Malaysia.

Past researches had proposed that FDI is the main channel for technology spillovers where it benefits productivity and innovation activities in the host-country (Grossman and Helpman, 1991; Coe and Helpman, 1995; Blomström and Kokko, 1998; Buckley *et al*., 2002; Görg and Greenaway, 2004). Moreover, many studies also considered FDI as the key channel for technology and knowledge spillovers (Branstetter, 2000; Keller and Yeaple, 2003; Giroud, 2003; Ivarsson and Alvstam, 2005; Liu and Buck, 2007; Blalock and Simon, 2009; Liu, Wang and Wei, 2009). FDI contributes directly to employment, capital, exports, and new technology in the host country (Blomström, Kokko and Globerman, 2001). Some studies revealed that local firms may benefit indirectly through improved productivity enhanced productivity levels and/or productivity growth (Blomström, 1986; Haddad and Harrison, 1993; Gorg and Greenaway, 2004). Sjoholm 1999 suggests that when the technology and knowledge is transferred from the parent firm to their local affiliates, it leaks to the host country firms. The technology transfer to firms subsequently may create knowledge spillover in countries where it is considered as unintentional transfer of technology or knowledge that is exchanged outside the intended boundary. The technology introduced by foreign firms may spillover horizontally or vertically to local firms.

Hence, this study attempts to investigate the impact of MNCs innovations activities through FDI on the innovation progress of a developing country by examining on whether MNCs can act as a catalyst to stimulate OFDI in developing countries like Malaysia. Studying the impact of FDI on OFDI of a developing economy such as Malaysia, which has received substantial flows of foreign investment, could therefore provide useful insights into foreign firms relationships with host countries economic progress. Hence, this study goes beyond the existing research in the area of OFDI by opening the black box of MNCs' technology and knowledge spillovers in stimulating local investments abroad.

Theoretical background and hypotheses:

One of the main channels for multinational expansion is through FDI. In FDI theory, firms invest overseas to obtain raw materials and other resources. One of the most comprehensive theories of FDI is the Eclectic Theory of International Production developed by Dunning which also known as the Ownership, Location and Internalization (OLI) model. The theory considers the host-country's factor endowments and intangible assets which serve to explain the international involvement of firms within the host- country. The Eclectic Theory holds that a firm's decision to invest in a foreign market can be explained in terms of its ownership advantage, the location advantage of the market in which it is investing and internalisation advantages conferred by direct investment (Dunning, 1981, 1988). Drawing upon the Eclectic Theory, more studies begin to investigate the effects of FDI on host-countries. Built on the early industrial organisation theory (Hymer, 1976; Caves, 1971 and 1974; Kindelberger, 1984) which provides important theoretical contributions upon the effects of FDI on host countries, researchers postulates that multinational firms transfer a range of intangible proprietary assets to their affiliates and host countries through their investments (Markusen, 1995; Caves, 1996; Blomström and Kokko, 1998; Blomström and Sjöholm, 1999; Görg and Greenaway, 2004; Ivarsson and Alvstam, 2005; Liu and Buck, 2007; Girma, Kneller and Pisu, 2007).

Many empirical studies have investigates and found that inward FDI has positive effects on local innovation (Kinoshita, 2000; Branstetter, 2000; Hu and Jefferson, 2002; Cheung and Lin 2004). Some of the studies even focuses on the issue of wider technology spillovers by multinational firms in host economies (eg.; Sjoholm, 1999; Blomström and Kokko, 2001; Blomström *et al*., 2001; Görg and Strobl, 2001; Javorcik, 2004; Gunther, 2005). Despite the growing body of research on the topic and the belief that FDI may act as catalyst for technology and knowledge transfers, there is little evidence on whether the significant effects of innovation and R&D activities from FDI could contribute to the increase in OFDI activities in host countries.

MNCs Innovation Activities:

As Furman *et al*., (2002) revealed that local R&D has been proved to be an important determinant of national innovative capacity, the importance of foreign firm's R&D activities to host countries should be acknowledged. The significance of Malaysia's change from an agricultural country which has primary commodities to an export-driven economy

which is based on high technology, knowledge-intensive and capital-intensive industries has attracted MNCs to shift their R&D centres from headquarters to Malaysia and its neighboring countries. Earlier research by Hobday (1996), has confirmed that there were a substantial amount of incremental innovation activities among MNC subsidiaries in Malaysia, particularly during 1980s. These substantial amounts of incremental innovation activities by foreign firms played an important role in the development of the Malaysian economy as Narayanan and Wah (2000) revealed in their study. They found that that FDI via MNCs has played an important role in the rapid development of manufacturing sectors, and in particular in the increased share of high-technology exports in Malaysia. This finding indicates that foreign R&D activities have been an important element in Malaysia as they now have better product and process technology and human resources capabilities in Malaysia (Rasiah 2003). Foreign-owned firms tend to have higher technological intensities and R&D intensities than those of Malaysian local firms (Rasiah 2004). It is believed that advancement in technology is an integral part of a country's growth as an industrialised country. MNCs play an important role in innovation activities because they possess firm-specific advantages which typically take the form of knowledge-based assets such as product or process technology information, managerial know-how, quality of human resources and marketing skills as well as branding. Therefore, these distinctive advantages are pivotal to the progress of local producers.

A number of studies have found that one of the important drivers of local innovation is the involvement of foreign R&D in host countries (Grossman and Helpman, 1991; Coe and Helpman, 1995; Wang and Blomstrom, 1992; Branstetter, 2000; Kinoshita, 2000; Ivarsson and Alvstam, 2005; Liu and Buck, 2007). The findings suggest that R&D spillovers take place not only domestically but internationally. The findings also demonstrated the important role played by MNCs in elevating local producers. Some of the empirical research (e.g., Coe and Helpman, 1995; Eaton and Kortum, 1996; Keller, 2004) demonstrates that international technology spillovers have been a main source of technological advance for both developed countries and less developed countries. The technology spillovers to host country firms take place through imitation, reverse engineering or recruitment of foreign firm's human resources (Braconier and Sjoholm, 1998). Obviously, the effect of trade liberalisation and economic integration has also facilitated the progress of the technological development. Therefore, with specific reference to foreign innovation activities in Malaysia, we propose:

***Hypothesis 1*:**

Malaysia's OFDI is positively associated with levels of foreign innovation activities in Malaysia.

Exports:

Besides spillovers from FDI and innovation activities of MNC in Malaysia, this study takes a step further by examining the effect of international trade in facilitating Malaysia's OFDI. This sections attempts to answer a research question on whether international trade plays a significant role in the transfer of international technology. The following questions are raised:

1. Do firms acquire knowledge about foreign technology when trade takes place between them in international markets?
2. Are developing countries like Malaysia considered as the major beneficiaries from international trade through learning by exporting and importing?

As a country transforming from an agricultural and commodities-based economy to a manufacturing and knowledge-based economy Malaysia has become an export-driven country. High technology, knowledge-based and capital-intensive industries have stimulated the development of Malaysia as an export-driven country. It offers foreign investors a vibrant business environment with stable political environment and pro-business government policies. Malaysia's strategy to exercise the export-oriented strategy beginning in 1980s has been the major conduit that has transformed Malaysia from a primarily commodity-based economy to a more industrial based economy. As a result, Malaysia recorded an average of 8 percent economic growth for about nine years prior to the 1997 East Asian financial crisis (Central Bank Malaysia). This financial shock had a profound impact on the Malaysian economy when it registered a negative one per cent growth rate in 123 1998. There has been a tremendous increase in the Malaysia's exports during 1985-2005. Malaysian total export figures in 1985 were USD18.2 billion which increased further to USD73.9 billion in 1995, growing at an annual rate of approximately at 38-40 percent. In 2005 the total export was USD156 billion, registering an increase of 17.6 percent per year during the 1995 – 2005 period. Singapore was Malaysia's largest export market in 1970 and remained so in 1993, accounting for about 22% of the exports. Japan was the second largest export market in 1970; however, the position was overtaken by the US in the 199Os.

A vast body of literature has studied export and import-related international technology as a channel of knowledge transfer. Grossman and Helpman (1991), Coe and Helpman (1995) and Keller (2004) considered international trade as an important channel of diffusion of knowledge among trade partners. International trade activities in export and import transactions have often been emphasised as spillover channels. International trade transaction between less

high-tech countries and high technology countries enables the transfer of technology knowledge to the exporting or importing countries (Grossman and Helpman, 1991; Coe and Helpman, 1995; Greenaway and Yu, 2004; Salomon and Shaver, 2005; Bratti and Felice, 2009; Bloom, Draca and Reenen, 2009).

Exporting activities allows the diffusion of a great deal of potential technological information. Exporting countries may acquire technological support from technological leader countries and facilitate knowledge spillovers. Moreover, as international buyers always require high quality products, by exporting to this type of countries, it enables developing country firms to collaborate with their foreign buyers. This collaboration may create the opportunity of "learning-by-exporting" where exporting firms learn about new ways to improve product quality and production process. This is important because in order to be successful in international market, firms in developing countries depend on the quality and price of the products. Evidence from previous theoretical and empirical studies in fact show that knowledge transfer from export activities does occur and has a significant positive effect on product innovation. This is coherent with the fact that learning by exporting has a positive effect on local firms. There are some theoretical explanations as follows: the endogenous growth theory emphasises the role of internationalisation in enhancing innovation which is generated from international flow of ideas (Grossman and Helpman, 1991). This source of international spillovers which flows from buyers to sellers through their interactions enables local sellers to access the ideas and technology developed by their foreign counterparts. Grossman and Helpman (1991, p.166-7) state this clearly. "It is plausible to suppose that foreign contribution to the local knowledge stock increases with the number of commercial interactions between domestic and foreign agents. That is, we may assume that international trade in tangible commodities facilitates the exchange of intangible ideas…It seems reasonable to assume therefore that the extent of the spillovers between any two countries increase with the volume of their bilateral trade".

Past empirical findings also consistently suggest the positive effect of exporting on knowledge spillovers. A contribution by Blalock and Gertler (2002) which found that Indonesian textile exporters benefitted from foreign customers in various ways, from product design to technology, was echoed by Greenaway and Yu (2004) who considered in their study that exports act as a channel of technology spillover because exporting facilitates technology diffusion through learning by exporting. The effect of learning by exporting on innovation is in line with finding by Salomon and Shaver (2005). In their empirical study which used firm-level data, they provided evidence of learning by exporting on product innovation for Spanish manufacturing firm's from 1990 to 1997. The study revealed the positive effect of export volumes on innovation performance where exporters increase their patent applications after they export their products. The result is consistent with previous findings that exporting is highly correlated with innovation as exporters can access ideas and knowledge when they collect and handle customer's responses. All information and ideas that were gathered were used to modify the products in order to meet customer preferences.

***Hypothesis 2*:**

Malaysia's OFDI is positively associated with levels of country's exports.

Imports:

The major sources of Malaysian imports have been the EU, ASEAN, the US, Japan and East Asia, accounting for 23 percent, 23 percent, 9 percent, 17 percent, and 10 percent respectively in 1970. The share of imports from the US increased from 9% in 1970 to 17% in 1990 and remained at the same level in 2000. Malaysian imports from Japan accounted for 17% of its total imports in 1970 but increased to 24 percent in 1990 and remained steady at about 21 percent 199Os (Department of Statistics Report, 2005). One of the reasons Malaysia has to import more of the intermediate manufactured goods, machinery and equipment from abroad is because of the scarcity in raw materials and capital goods. Japan has been one of the major sources of Malaysian imports where intermediate manufactured goods, machinery and transport equipment were concerned. Malaysia, as an open economy, has been very much dependent on foreign trade to achieve its economic development goals indicating that international trade has been playing an important role in the development of Malaysian economy. Malaysia certainly 125 has gone through a relatively rapid process of trade liberalisation and globalisation. In light of the generally positive relationship between international trade and local innovation (as found in the previous studies which have been discussed above) and the significant of export and import activities in Malaysian economy, this study therefore proposes a relationship between imports and local innovative capacity.

As mentioned earlier, intensive studies especially by Grossman and Helpman (1991) and Coe and Helpman (1995) have examined international knowledge spillovers from international trade. The studies highlight how knowledge may spillover from international trade, thus affecting the progress of domestic firms. They identified that imports of products from developed to developing countries permit developing country producers to familiarise themselves with technologically better-quality products. This familiarity gives them knowledge and ideas on how to improve their products. These studies confirm that trade can facilitate knowledge spillovers

by facilitating the interaction of 'reverse engineering' between developed country producers and developing country buyers (Grossman and Helpman, 1991; Coe and Helpman, 1995). Previous studies have examined the issue as to whether imports act as channels of knowledge spillovers. Bloom, Draca and Reenen (2009) presented recent results on the role of imports in international technology transfers. They used firm and plant-level panel data on diffusion (information technology) and innovation (patents) combined with four digit industry-level data on trade. Their results suggest that increased import competition with China has resulted in a significant technological upgrading in European firms through both faster diffusion and innovation. Their results seem to be consistent with technology being embodied in the imported goods, and there could also be imports-related learning benefits.

***Hypothesis 3*:**

Malaysia's OFDI is positively associated with levels of the country's imports.

Inward Foreign Direct Investment:

There are a number of important channels through which inward FDI can benefit innovation activity in the host country, subsequently increased the OFDI. Firstly, local firms can be trained about new products and technologies conveyed by MNCs by means of reverse engineering. Secondly, spillovers can take place through labour turnovers or mobility of human capital, whereby local firms acquire the technological know-how from MNCs by "stealing" their skilled workers. Thirdly, the demonstration effect from MNCs can encourage and inspire local firms to innovative from activities that involve communication between local firms and MNCs. Undertaking activities which involve the development of new products and processes may involve active learning for local firms and may, in turn, stimulate them to innovate.

However, it should also be recognised that FDI may negatively affect a host country's productivity. It negatively affects the productivity of host country's local firms by removing demand from local firms in terms of competition (Aitken and Harrison, 1999). In order to monopolise the market and to reduce the productivity of local firms through competition effects, MNCs tend to guard their firm-specific advantages to prevent leakages to local firms. Studies such as that conducted by Haddad and Harrison (1993); Aitken and Harrison (1999); Konings (2001); Djankov and Hoekman (2000); Zukowska-Gagelmann (2002); Yudaeva *et al.* (2003) and Kosova (2004) have shown that there is no positive effect of spillovers on the host country. There are several possible explanations for this result. It is possibly because local firms did not have enough capacity to absorb knowledge and were inferior when compared to MNCs (Blalock and Gertler, 2002). The levels of competition between foreign and local firms are also important as revealed by Aitken and Harrison (1999). Moreover, MNCs' decisions regarding the amount and kind of technology transferred to subsidiaries were crucial in determining potential spillovers. Having said that, the positive relationship between FDI and local productivity should be acknowledged based on previous studies of spillovers. It is possible to hypothesise that these conditions are also likely to occur in developing countries like Malaysia. Hence, it could conceivably be hypothesised in this study that:

***Hypothesis 4*:**

Malaysia's OFDI is positively associated with inward FDI in the country.

Methodology:

This study will adopt an aggregative approach using macro-level data. Data for analysis purposes will be obtained from the World Bank's *World Development Indicator (2014)* as well data from MIDA and MITI. The sample period will be chosen from 1980 to 2013. This study will use the same data sources and bases as the national innovative capacity research work for Organisation for Economic Co-operation and Development (OECD) countries used by Furman *et al*. (2002). However, its relevance will be extended by applying it to the innovation performance and OFDI in Malaysia. Stationarity that is pertinent for time series analysis will be tested in order to determine whether the variables under consideration contained unit-roots and are non-stationary. The augmented Dickey-Fuller (ADF) tests will be employed. The study will continue with exogeneity tests to identify if there are two-way causal relationships.

This study employs OFDI as the dependent variable which is based on the outflow of foreign direct investment stock at 2000 prices. Based on earlier theoretical and empirical researches on the OFDI and international trade, a number of explanatory variables are included in addition to the OFDI variable; hence the empirical model is specified as follows:

$$OFDI_t = \beta_0 + \beta_1 FP_t + \beta_2 FDI_t + \beta_3 X_t + \beta_4 M_t \quad (1)$$

The dependent variable in the regression equation is the value outward foreign direct investment (OFDI) stock at 2000 prices. Foreign patent (FP) is determined by the number of patent applications by foreign firms in a given year. The firms have to apply for a patent which is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. A firm must make an applicant to file a patent with the Intellectual Property Corporation of Malaysia which will assess whether it meets the requirements of the

Patents Act 1983. The Intellectual Property Corporation of Malaysia (MyIPO) defined patent in Malaysia as an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. Data for foreign patent will be obtained from the statistic department of The Intellectual Property Corporation of Malaysia (MyIPO).

FDI is the inflow of foreign direct investment stock at 2000 prices. Export is denoted by exports of goods and services (X) measured at constant prices of the year 2000. Import signifies imports of goods and services (M) measured at constant prices of the year 2000.

In order to gain a better insight into innovation activities and good quantitative proxies for innovation, this study uses the more traditional measure of innovation in terms of patent as the proxy for measuring innovation. Patents have become a common measure for innovation output and a good way to track flows of knowledge across firms, sectors and countries. Patents have long been considered a well-grounded proxy for the level of innovation (Eaton and Kortum, 1996, 2002; Furman *et al.*, 2002). Although there are two widely used indirect approaches to measure innovation such as R&D and patents according to the OECD's definition (OECD 2002), only about two dozen relatively rich countries report substantial amounts of R&D because the definition primarily denotes resources spent towards innovation and not those spent on imitation and technology adoption. Moreover, relative to R&D, patents have the advantage because patent data has been collected for a longer time (more than 150 years for some countries), and also poorer countries have a substantial number of patents (WIPO 2003).

For analysis purposes, data will be obtained from the World Bank's *World Development Indicator (20014)*. The value of FDI, exports, imports and GDP per capita were measured at constant prices of the year 2000 as reported in the World Bank's *World Development Indicators*. Data for foreign and local patent will be obtained from the statistic department of The Intellectual Property Corporation of Malaysia (MyIPO). Constrained by the availability of the local and foreign patent time-series, the sample period was chosen from 1980 to 2013. This study will use the lagged dependent variable and independent variables as instruments. Logarithms of all variables will be used.

In order to determine whether the data series is stationary at levels or stationary after first difference, a first step of the analysis that is pertinent to time series data will be employed in order to test the stationarity property of the variables. Pre-tests will be performed in order to avoid spurious regressions of the variables under consideration which contain unit-roots and are non-stationary. In spurious regressions, the results suggest that there are two or more variables that are statistically related but these are not in fact causally linked; actually it is simply a contemporaneous correlation. Thus, it is vital to investigate whether the variables are cointegrated and have any long-term relationship. If the data series is stationary after first difference, cointegration or error correction (ECM) models are needed to analyse the empirical relationships among the variables. It is important as the ECM can identify long-term and short-term relationships among all the variables.

The ECM can be written in the following form:

$$\Delta Y_t = \alpha + \beta e_{t-1} + \sum_{i=1}^{n} \gamma i \Delta x_{t-i} + \varepsilon_t \qquad (2)$$

where Δ denotes the differences, Y_t is a dependent variable, X_t is a set of explanatory variables and e_t is the residual term from a long-run equilibrium relation such as: $Y_t = \beta' X_t + \mu_t \, u_t \approx IN(0, \sigma^2)$. e_{t-1} is defined as the error-correction term (ECT) and represents the long-run relationship between the variables in (2).

This study will employ the augmented Dickey-Fuller (ADF) tests to test the stationarity of the six time series LP, FP, FDI, X, M and YC. Co-integration tests were performed using the Johansen and Juselius (1990) procedure. Two tests will be performed based on the maximal eigenvalue test and trace test. Exogeneity tests will also be carried out in order to identify if there are two-way causal relationships between local innovative capacity and its explanatory variables.

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