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# **The Determinants and Impacts of Foreign Direct Investment**

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# The Determinants and Impacts of Foreign Direct Investment

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MSc Economics Dissertation- London Metropolitan University

*De la li Accolley MSc (Econ)*

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Some theories on the determinants and impacts of Foreign Direct Investment (FDI) are presented and critically discussed. In the empirical investigations which follow this, the effects of some macroeconomic variables such as economic growth, market size, degree of openness, real effective exchange rate, and labor cost on flows of FDI into the USA have been tested. In the specification of the econometric model, account has been taken of the fact that economic growth could be both a determinant and impact of FDI inflows. The main finding is that economic growth in the USA does not explain the long-run behavior of the FDI inflows equation. It can explain its short run behavior but not significantly. Besides, it has been found that FDI inflows contribute to economic growth in the USA. Open-market operations have been proposed as economic policy to attract FDI flows.

The Determinants and Impacts of Foreign Direct Investment (2003)

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# Contents

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	<b>Abbreviations and Acronyms</b>	<i>iii</i>
	<b>Introduction</b>	<b>1</b>
<b>1</b>	<b>Definitions</b>	<b>1</b>
<b>2</b>	<b>The compilation of FDI flows</b>	<b>2</b>
<b>3</b>	<b>A Brief History of FDI</b>	<b>3</b>
<b>4</b>	<b>The Outline of the Dissertation</b>	<b>5</b>
	<b>Summary</b>	<b>6</b>
<b>Chapter 1</b>	<b>The Determinants of FDI</b>	<b>7</b>
<b>1.1</b>	<b>The Microeconomic Determinants of FDI</b>	<b>7</b>
<b>1.1.1</b>	<b>The Internationalization Model of Uppsala School</b>	<b>8</b>
<b>1.1.2</b>	<b>Vernon's Product-Cycle Hypothesis</b>	<b>11</b>
<b>1.1.3</b>	<b>The Industrial Organization Theories of FDI</b>	<b>12</b>
<b>1.2</b>	<b>The Macroeconomic Determinants of FDI</b>	<b>12</b>
<b>1.2.1</b>	<b>Exchange Rate</b>	<b>12</b>
<b>1.2.2</b>	<b>Economic Growth</b>	<b>14</b>
<b>1.2.3</b>	<b>Market Size</b>	<b>15</b>
<b>1.2.4</b>	<b>Other Determinants</b>	<b>15</b>
<b>1.3</b>	<b>Dunning's Eclectic Theory of FDI</b>	<b>16</b>
	<b>Summary`</b>	<b>16</b>
<b>Chapter 2</b>	<b>The Impacts of FDI</b>	<b>19</b>
<b>2.1</b>	<b>The Impacts of FDI on the Host Country's Economy</b>	<b>19</b>
<b>2.1.1</b>	<b>Economic Growth</b>	<b>19</b>
<b>2.1.2</b>	<b>Balance of Payments</b>	<b>22</b>
<b>2.1.3</b>	<b>Other Impacts</b>	<b>22</b>
<b>2.2</b>	<b>The Impacts of FDI on the Home Country's Economy</b>	<b>23</b>
<b>2.2.1</b>	<b>Employment</b>	<b>23</b>
<b>2.2.2</b>	<b>Balance of Payments</b>	<b>23</b>
	<b>Summary</b>	<b>23</b>
<b>Appendix to Chapter 2</b>	<b>Trade Creation and Trade Diversion versus FDI</b>	<b>25</b>
<b>Chapter 3</b>	<b>Empirical Investigations</b>	<b>27</b>
<b>3.1</b>	<b>The Models</b>	<b>27</b>
<b>3.2</b>	<b>The Economic Assumptions Underlying the Models</b>	<b>29</b>
<b>3.3</b>	<b>The Data</b>	<b>30</b>

<b>3.4</b>	<b>The Methods and Results of the Estimations</b>	<b>30</b>
<b>3.4.1</b>	<b>The Two-Stage Least Squares (2SLS)</b>	<b>30</b>
	<b>The Results of the Estimations by 2SLS</b>	<b>31</b>
<b>3.4.2</b>	<b>Johansen's Procedure</b>	<b>32</b>
	<b>Summary</b>	<b>34</b>
		<b>35</b>
<b>Appendices</b>		
<b>Appendix 1</b>	<b>Modeling the Relationship between FDI inflows and Outflows</b>	<b>35</b>
<b>A1.1</b>	<b>The Model</b>	<b>35</b>
<b>A1.2</b>	<b>The Data</b>	<b>35</b>
<b>A1.3</b>	<b>The Methods and Results of Estimations</b>	<b>36</b>
<b>A1.3.1</b>	<b>The Cross Section Estimates</b>	<b>36</b>
<b>A1.3.2</b>	<b>The Pooled Estimates</b>	<b>36</b>
<b>A1.3.3</b>	<b>The Mean Group Estimates</b>	<b>37</b>
	<b>Conclusion</b>	<b>38</b>
<b>Appendix 2</b>	<b>Test of Stationarity with Various Time Series</b>	<b>39</b>
<b>Appendix 3</b>	<b>Granger Causality Test</b>	<b>42</b>
<b>Appendix 4</b>	<b>Test for Exogeneity</b>	<b>43</b>
<b>Chapter 4</b>	<b>FDI Policies</b>	<b>45</b>
<b>4.1</b>	<b>Some Countries' FDI Policies</b>	<b>45</b>
<b>4.1.1</b>	<b>Canada</b>	<b>45</b>
<b>4.1.2</b>	<b>FDI Policies in some LDCs</b>	<b>46</b>
<b>4.2</b>	<b>An Indirect but More Effective FDI Policy</b>	<b>46</b>
<b>4.2.1</b>	<b>Open-Market Operations and FDI Inflows in Theory</b>	<b>46</b>
<b>4.2.2</b>	<b>Effectiveness of the Indirect FDI Policy</b>	<b>47</b>
	<b>Summary</b>	<b>49</b>
	<b>Conclusion</b>	<b>51</b>
<b>1</b>	<b>The Limitations in the Analyses</b>	<b>51</b>
<b>1.1</b>	<b>The Survey of the Economic Literature on FDI</b>	<b>51</b>
<b>1.2</b>	<b>The Empirical Investigations</b>	<b>51</b>
<b>2</b>	<b>The Main Contribution to Economic Analysis</b>	<b>52</b>
<b>2.1</b>	<b>The Necessary and Sufficient Conditions for FDI</b>	<b>52</b>
<b>2.2</b>	<b>The Concepts of Trade Creation and Trade Diversion</b>	<b>52</b>
<b>2.3</b>	<b>The Modeling of the Feedback between FDI Inflows and Economic Growth</b>	<b>52</b>
<b>2.4</b>	<b>The Relationship between FDI Inflows and Outflows</b>	<b>53</b>
<b>2.5</b>	<b>Open-Market Operations and FDI Inflows</b>	<b>53</b>
<b>3</b>	<b>Points for Further Investigations</b>	<b>53</b>
	<b>Bibliography</b>	<b>55</b>
	<b>References</b>	<b>55</b>
	<b>Other Materials</b>	<b>58</b>

# Abbreviations and Acronyms

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<b>ADF</b>	Augmented Dickey-Fuller
<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>AIC</b>	Akaike Information Criterion
<b>CEE</b>	Central and Eastern Europe
<b>CET</b>	Common External Tariff
<b>DC</b>	Developed Country
<b>DF</b>	Dickey-Fuller
<b>DO</b>	Degree of Openness
<b>EEC</b>	European Economic Community
<b>EG</b>	Engle-Granger
<b>FBL</b>	Foreign Bank Lending
<b>FDI</b>	Foreign Direct Investment
<b>FDII</b>	Foreign Direct Investment Inflows
<b>FDIO</b>	Foreign Direct Investment Outflows
<b>FIRA</b>	Foreign Investment Review Act
<b>FPI</b>	Foreign Portfolio Investment
<b>FTA</b>	Free Trade Agreement
<b>IMF</b>	International Monetary Fund
<b>GDP</b>	Gross Domestic Product
<b>GFCF</b>	Gross Fixed Capital Formation
<b>GNP</b>	Gross National Product
<b>IMF</b>	International Monetary Fund

<b>IV</b>	Instrumental variable
<b>JV</b>	Joint Venture
<b>LC</b>	Labor Cost
<b>LDC</b>	Less-Developed Country
<b>LL</b>	Levin and Lim
<b>MEC</b>	Marginal Efficiency of Capital
<b>M&amp;A</b>	Merger and Acquisition
<b>ML</b>	Maximum Likelihood
<b>MNC</b>	Multinational Corporation
<b>MNE</b>	Multinational Enterprise
<b>NAFTA</b>	North American Free Trade Agreement
<b>NEP</b>	National Energy Program
<b>OLI</b>	Ownership, Location, and Internalization
<b>OLS</b>	Ordinary Least Squares
<b>PLC</b>	Public Limited Company
<b>REER</b>	Real Effective Exchange Rate
<b>SA</b>	Seasonally Adjusted
<b>TB</b>	Trade Balance
<b>TNC</b>	Transnational Corporation
<b>TNO</b>	Transnational Operation
<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>VAR</b>	Vector Autoregression
<b>2SLS</b>	Two- Stage Least Squares

# Introduction

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The European empires have almost vanished. In their place is a single empire of footloose corporate capital dominated by the United States.  
- D Ransom

The first object of this introductory chapter is to give an overview of the concept of foreign direct investment (FDI): what it means and encompasses. Secondly, it provides some information on how FDI flows are aggregated. A brief history of FDI is thereafter presented. The outline of the dissertation is given in section 4.

## 1 Definitions

FDI is an investment made abroad either by establishing a new production facility or by acquiring a minimum share of an already existing company (Bannock *et al*, 1998, p. 106; Ethie, 1995, pp. 303-4; Lawler and Seddighi, 2001, p. 353)<sup>1</sup>. Unlike foreign bank lending (FBL) and foreign portfolio investment (FPI), FDI is characterized by “the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence by the direct investor on the management of the enterprise” (IMF, 1993, p. 86). A direct investor may be an individual, a firm, a multinational company (MNC), a financial institution, or a government. FDI is the essence of MNCs<sup>2</sup> –they are so called because part of their production is made abroad. Furthermore, MNCs are the major source of FDI –they generate about ninety-five percent of world FDI flows.

When the setting-up of a new site abroad is financed out of capital raised in the direct investor’s country, FDI is referred to as greenfield investment (Lawler and Seddighi, 2001, p. 363, note 1). The use of the term greenfield FDI has been extended to cover any investment made abroad by establishing new productive assets. It does not matter whether there has been a transfer of capital from the investor’s country (home or source country) to the host country. Another type of FDI is cross-border or international merger and acquisitions (M&A). A cross-border M&A is the transfer of the ownership of a local productive activity and assets from a domestic to a foreign entity (United Nations, 1998, pp. 212-4). In the short-term, a country may benefit more from a greenfield FDI than from a M&A FDI. One of the reasons is that green-

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<sup>1</sup> FDI is associated with production abroad, which cannot be confined to manufacturing abroad.

<sup>2</sup> A MNC is an enterprise operating facilities of production abroad. An enterprise is called MNC if at least twenty-five percent of its world output is made outside its country of origin. The terms MNC, multinational enterprise (MNE), and transnational corporation (TNC) are used interchangeably. According to the latest estimates, there are 65,000 TNCs today operating about 850,000 foreign affiliates (United Nations, 2002)

field FDI impacts directly, immediately and positively on employment and capital stock. The installation of a new industry in a foreign country adds to this latter existing capital stock and entails jobs creation.

These short-run effects may not be evident so far as M&A FDI is concerned. The immediate effects on factors of production are not the only criteria taken into consideration in contrasting the benefits and costs from greenfield and M&A FDI, from a recipient country point of view. This issue is dealt with in more details in United Nations (1998).

Profits not repatriated by direct investors but kept in a host country to finance future ventures constitute a type of FDI called reinvested earnings (Kenwood and Lougheed, 1999, p. 253).

It often happens that a foreign affiliate of a MNC undertakes direct investment abroad. Such a FDI is called indirect FDI because it represents “an indirect flow of FDI from the parent firm’s home country (and a direct flow of FDI from the country in which the affiliate is located)” (United Nations, 1998, p. 145).

Non-success in the activities of a foreign affiliate, unfavorable changes in the recipient country’s FDI policy, strategic reasons, and other factors lead MNCs to divestment –withdrawal of an affiliate from a foreign country.

FDIs, viz. Greenfield, M&A, reinvested earnings FDI, can also be classified into three other categories: export-oriented FDI, market-development FDI, and government initiated FDI (Reuber *et al*, 1973, pp. 72-81).

The purpose of an export-oriented FDI is either to extract raw materials or to manufacture component parts or finished goods at a lower cost for export to the investor’s home country or elsewhere. This is a vertical extension backwards of the activities of the firm. The investor in making such an investment seeks to maintain or increase its market share through sale of cheap goods. When a firm establishes sales subsidiaries abroad, there is a vertical integration forward of its activities.

The purpose of a market-development FDI -sometimes called import-replacement FDI- is to produce locally goods and services for sale in the recipient country. The determinants of such an investment are the local market size, the host country trade policy, etc. Such an investment is also called horizontal FDI

A government-initiated FDI is one initiated and subsidized by the recipient country. Such an investment is provided by LDCs in order to relieve unemployment, reduce disparities between regions in the host country, reduce the deficit of the balance of payments, etc.

## 2 The Compilation of FDI Flows

The available statistics on flows of FDI between a country and the rest of the world are classified into two main categories: FDI inflows (or FDI inward flows) and FDI outflows (or FDI outward flows). A country’s gross FDI inflows at the end of a given period are the total amount of direct investments this latter has received from non-resident investors during this period of time <sup>3</sup>. On the other hand, a country’s gross FDI outflows are the value of all greenfield and M&A FDI made abroad by its resi-

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<sup>3</sup> Investments made in a host country by an affiliate out of funds borrowed locally are not recorded in the FDI statistics (South Centre, 1997).

dents during a given period of time. As one can see, aggregate FDI flows are based on the concept of residence and not on the one of nationality. A direct investment made in Southampton, England by one Mr. Phillips, living in Thessalonika (Greece) for the last three years, is regarded and recorded as an outflow of FDI from Greece to the UK though the investor is a British national. An FDI by a Taiwanese firm in Shanghai (China) through its affiliate in Hong Kong –indirect FDI- is not considered as an outward flow of FDI from Taiwan to mainland China but as one from Hong Kong to China.

According to the IMF (1993) guidelines, an investment abroad should be recorded by the home country as an outward flow of FDI and by the recipient country as an inward flow of FDI provided the foreign investor owns at least 10 percent of the ordinary shares or voting power of the direct investment enterprise.

Divestments by foreign investors from a country are deduced from this latter's gross FDI inflows and from the foreign investors' countries' gross FDI outflows. Net FDI inflows are therefore equal to gross FDI outflows minus divestments by foreign investors, and net FDI outflows equal gross FDI outflows minus divestments from abroad.

The value of all the productive assets held by the non-residents of a country make up what is called FDI inward stock. FDI outward stock is the net value of all the productive assets held abroad by the residents of a country.

In practice, the compilation of FDI data is not as simple as presented herein. Governments especially in less developed countries (LDCs) face difficulties in collecting FDI data because they do not have “adequate statistics gathering machinery” (South Centre, 1997). Furthermore, some countries have accounting conventions different from the IMF (1993) guidelines. These facts explain the discrepancies between world FDI inflows and world FDI outflows which normally should be equal.

Countries' balances of payments contain statistics on FDI flows.

### 3 A Brief History of FDI

The idea to produce abroad goes back a long way. As a matter of fact, several activities similar to nowadays' FDI took place in the remote past. During the third millennium before Christ, Sumerian merchants, established in the southern part of Mesopotamia (current Iraq), realized the necessity of having representatives based abroad to receive, to stock and to sell their commodities (Lipsey, 2001, p. 17). During the fourteenth century, the Hanseatic League which was a guild of German cities' merchants set up trading posts in Bergen (Norway), Bruges (Belgium), London (UK), and Novogorod (Russia). During the same period there were about one hundred Italian banks involved in multinational operations (Hirst and Thompson, 2000, p. 20).

The seventeenth and eighteenth centuries witnessed the emergence of colonial companies such as the Dutch and British East India Companies, the Muscovy Company, the Royal Africa Company, the Hudsons Bay Company, and the Virginia Company (Hirst, and Thompson, 2000, p. 20). The Virginia Company was chartered in 1606 by King James 1 to establish the first permanent English settlement in Jamestown (State of Virginia in the current USA) (Lipsey, 2001, p.17).

By the end of the nineteenth century to the first two decades of the twentieth century, quite a few European companies were enjoying extracting minerals, running farms,

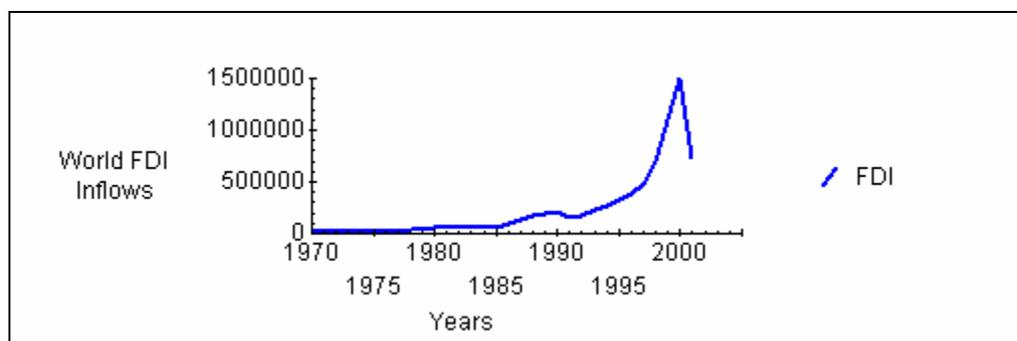
manufacturing goods in overseas territories in Africa, America, Asia, and Australia. Some American and European companies operating affiliates abroad before the First World War were: Lever, Singer General Electric, Courtaulds, Nestlé, Michelin, Hoechst, Orenstein & Koppel, and Edison (Dunning, 1970, p. 2; Foreman-Peck, 1995, p. 138). It is worthwhile to stress here that before World War I, direct investment abroad was an activity less important than FPI. In 1914, this latter accounted for 90 percent of all international capital movements (FBL, FDI, FPI, government loans, grants...). The major providers of the £9,500m invested abroad in 1914 were Great Britain (43 percent), France (20 percent), and Germany (13 percent) (Kenwood and Longhead, 2000, p. 28). The main recipients of these funds were other developed countries in North America and Europe. The only main determinant of international capital movement was interest rate differentials. Investments (especially portfolio investments) were made in countries offering high interest rates. US investors, contrary to other capital exporters, leaned towards direct investments (Lipsey, 2001, p. 18 and pp. 22-3).

The Depression of 1929 and World War II caused downturns in international business activities.

After the Second World War, official gifts and loans, followed by direct investments made up the most important international capital flows (Södersten and Reed, 1994, p. 468).

In the early 1960s, the term MNC was introduced in the economic literature to refer to those firms operating in more than one country. At the same time, the frontier between FDI and FPI was drawn (Hirst and Thompson, 2000, p. 20).

The evolution of world FDI inward flows from 1970 to 2001 is represented in Figure 1 below.

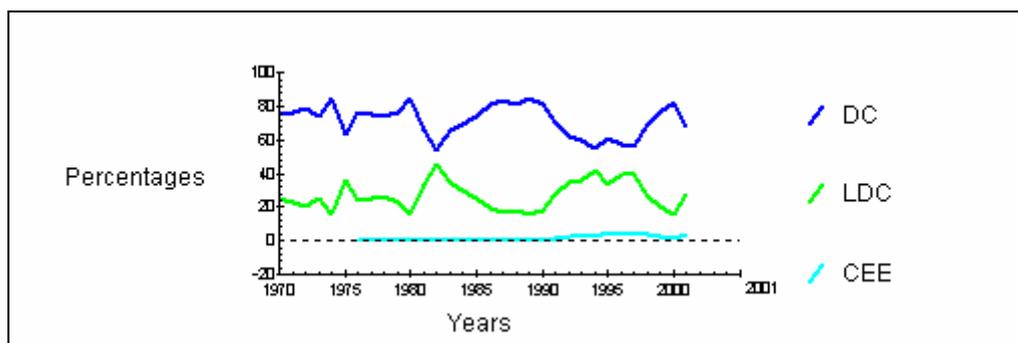


**Figure 1: FDI Inflows, World, 1970-2001 (annual)**

*Data source: UNCTAD, database*

From 1970 to 1984, world FDI inflows increased slowly. In 1984, world FDI inflows were about 5 times what they were in 1970. From 1985 to 2000, there was a fast and sustained growth in world FDI flows. They were, in 2000, about 26 times what they were in 1985. In 2001, world FDI flows plummeted.

There has been a high concentration of FDI among developed countries (DCs) as shown in Figure 2.



**Figure 2: Percentages of World FDI flows received by DCs, LDCs, and Central and Eastern Europe (CEE) countries, 1970-2001 (annual)**

**Data source: Percentages computed out of data retrieved from UNCTAD, database**

From 1970 to 2001, DCs received at least 50 percent of world FDI inflows. The percentage of world FDI received by Central and Eastern Europe countries was almost equal to zero till 1990. After the collapse of the communist bloc in 1990, they have started opening their economies to foreign investors.

## 4 The Outline of the Dissertation

Five chapters follow this introduction. The first one is entitled *The Determinants of FDI*; the second one, *The Impacts of FDI*, the third one, *Empirical Investigations*. The fourth chapter's title is *FDI Policies*. The last one is the *Conclusion*.

In Chapter 1, some propositions put forth by economists to elucidate the concept of FDI are surveyed and critically discussed. Theories of FDI can be classified into two categories according to the level of analysis of the phenomenon. There are microeconomic theories of FDI and macroeconomic ones. The micro-level theories justify FDI by firms' desire to maximize their profits, the imperfection of markets, etc. The macroeconomic explanations of FDI seek to find out a meaningful relationship between flows of FDI and some macroeconomic variables such as economic growth rate, exchange rate, etc.

In Chapter 2, the benefits and costs brought about by FDI to both home and host countries are broken down. Should a host country, like Marxists, consider FDI as a means of exploitation by capitalists?

Chapter 3 is the most original part of this paper. It aims at testing empirically some propositions advanced by economists to justify FDI. Economic growth is mainly targeted. Economic growth, in the economic literature, turns to be a determinant as well as an effect of FDI. Some researches have confirmed that a high rate of growth encourages foreign investments. There are also investigations proving that FDI contributes significantly to economic growth in recipient countries. The postulated feedback effect will be tested for after estimating simultaneously FDI and economic growth equations using two-stage least squares (2SLS) and vector autoregression (VAR) techniques. The empirical investigations will be carried out using US data. The US have been selected because of the availability of their data on FDI and other variables of interest over a long period of time. The data retrieved and used for the estimations are quarterly ones and the era of interest ranges from 1980 to 2001.

If FDI is significantly instrumental in economic growth in host countries, it should be fostered. Which economic policy do countries need to attract FDI? Is the free industrial zone policy under way in Togo and other developing country a good idea? These are the issues discussed in Chapter 4.

The conclusion will assess the achievement of the objectives of the dissertation and will present a prospect for further research.

## Summary

1. FDI is an investment made abroad either by establishing a new production facility or by acquiring a minimum share of an already existing company.
2. Greenfield FDI, cross-border M&A, reinvested earnings are types of FDI.  
÷ FDI data can be classified into two categories: FDI inward flows and FDI outward flows.
3. To produce or to invest abroad is an activity going back a long way.



# Chapter 1

## The Determinants of FDI

---

The need for a theory of direct foreign investment depends on whether there are observable patterns in international ownership and meaningful distinctions between source countries and host countries.

- R. Aliber

There are several ways whereby firms could expand their activities into a country different from theirs. They could export the goods they produce, franchise or license their activities and methods of production to a foreign business, or make FDI. But since the late 1960s, what one has been observing is their leanings towards FDI. Production abroad has become a more and more important activity. There have been indeed increases in world FDI flows as indicates Figure 1 on page 4. This growth took a phenomenal pace from 1985 to 2000. What are then the motivations underlying firms decisions to settle subsidiaries abroad. Furthermore, most of FDI have taken place in the advanced industrial countries. Why do some countries receive more FDI than others? Answers will be provided for such questions through a survey and assessment of the economic literature on FDI.

The first theories on FDI appeared in the 1960s. Before that period, there were articles explaining and appraising capital movements between countries but they did not isolate FDI from other international capital: FBL, and FPI. The main reason was that what will be called FDI was not a so important activity as it has become with the emergence of MNCs (see Introduction, section 3).

Theories on the determinants of FDI can be classified into two broad categories: the micro-level theories and the macro-level ones. The micro level theories focus on the circumstances that lead firms to produce abroad whereas the macro-level theories try to find out what determine the level of FDI received by a country. Dunning's Eclectic Theory picks up from both types of theories to explain FDI.

### 1.1 The Microeconomic Determinants of FDI

How and why does a firm become a multinational corporation? Why does a firm go on increasing its international involvement? The internationalization models of the Uppsala school, Vernon's product-cycle hypothesis, and the industrial organization theories of FDI try to provide answers for such questions.

## 1.1 .1The Internationalization Model of Uppsala School

This model elaborated by Johanson and Wiedersheim-Paul (1975) from the University of Uppsala (Sweden) states that generally a MNC does not commence its activities by making gigantic FDIs. It first operates in the domestic market and then gradually expands its activities abroad. They called this gradual mutation the *establishment chain*. The establishment chain is comprised of four stages. During the first stage, the MNC-to-be just produces and sells its goods and services at home. It does not undertake any regular export activity because of lack of expertise and a tendency to avoid risks. During the second stage, the firm starts its international involvement by exporting its goods and services to neighboring countries and countries it knows well via independent representatives (agents). The psychic distance between the firm's home country and a given country, viz. differences in language, culture, political system, level of education, level of industrial development, etc, strongly influences the firm decision to export. At this stage, the size of the potential market is expected to play a less important role compared to its psychic distance. The firm enters the third stage of the establishment chain when it begins establishing sales subsidiaries abroad. The size of the potential market can be a determining factor in the choice of where to establish the first sales subsidiaries. The firm may decide to start selling in small markets that are –may be- similar to the domestic one or in large markets. The fourth stage is the setting up or the acquisition of manufacturing facilities abroad. The establishment of manufacturing facilities abroad is influenced by several forces: psychic distance, tariffs, non-tariff barriers, transport costs, etc. It follows that it is hard to observe any correlation between manufacturing facilities establishment and psychic distance.

Johanson and Wiedersheim-Paul (1975) made it clear that firms especially those with extensive experience from other foreign markets are not expected to follow the whole four-stage process to become MNCs. Skips in stages can be observed.

Johanson and Wiedersheim-Paul (1975) tested empirically their internationalization model using data of four Swedish MNCs: Sandvik, Atlas Copco, Facit, and Volvo. They identified the moments when each of the four firms established agencies, sales subsidiaries, and production facilities abroad. They selected twenty host countries that were all common to these four firms. They then ranked these countries according to their psychic distance from Sweden. GNP was used to proxy the host countries' market size. For each of the four firms they computed the Spearman correlation coefficients<sup>1</sup> first between the time order of establishments and the order of psychic distance and second between the time order of establishments and market sizes. High and positive correlation coefficients were found between the order of the agencies establishment and psychic distance for Sandvik, and Atlas Copco. This bore out the predictions of the internationalization process model: firms, first, establish independent representatives (agents) in neighboring countries or in countries they are acquainted with. Regarding the internationalization process of Facit and Volvo, there was no evidence of relationship between agencies establishment and psychic distance. As to the market size, it is positively correlated with the time order of subsidiaries establishment in the case of Sandvik and Atlas Copco. These firms established their sales subsidiaries, first, in small markets. The correlation coefficients between the market size and time order of sales subsidiaries establishment were low for Facit and Volvo.

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<sup>1</sup> For details on Spearman correlation coefficient see a Statistics handbook, for instance McClave et al (1998).

**Box1.1: The Necessary and Sufficient Conditions for FDI**

Prior to producing in a foreign country, a firm appraises the returns on the investment project. It tries to see what producing abroad will add to its revenues and market value. A way it does this is by comparing, first, the expected rate of return on the FDI project to that on exporting goods produced at home. If it deems that to produce abroad is more profitable than to export goods produced locally, the FDI project is then feasible. This first comparison constitutes what can be called the necessary condition for a FDI (Aliber, 1993, pp. 181-2). It can be illustrated algebraically. Let  $R_t$  be the expected flow of income from a FDI project at time  $t$  and  $R_t^*$ , the one from the export of goods manufactured at home. The historical value of both investments is  $I_o$  and  $T$  is their life. The discount rate which makes the sum of the discounted revenues from an investment equal to its historical value is called *marginal efficiency of capital* (MEC). The MEC of the FDI project,  $\rho$ , is given by relation (B1.1.1).

$$I_o = \sum_{t=0}^T \frac{R_t}{(1 + \rho)^t} \quad (\text{B1.1.1})$$

The MEC of the similar investment made at home,  $\rho^*$ , is expressed by relation (B1.1.2).

$$I_o = \sum_{t=0}^T \frac{R_t^*}{(1 + \rho^*)^t} \quad (\text{B1.1.2})$$

Now, let  $r_{LR}$  be the long run interest rate at time 0 in the home country.

Producing abroad is preferable to selling abroad goods produced at home only if:

$$\rho > \rho^* > r_{LR} \quad (\text{B1.1.3})$$

or

$$\rho > r_{LR} > \rho^* \quad (\text{B1.1.4})$$

Each investor looks forward to reaping the highest possible return from his investment. He will prefer making direct investment abroad only if the return on this latter is greater than the one on both

direct investment at home and portfolio investment at home.

Secondly, the investor compares the expected rate of return from his FDI project,  $\rho$ , to the one a host country firm may expect from a similar investment. If he attaches a higher value to its project than his competitors in the recipient country do, he will carry out his FDI project. This is the sufficient condition for FDI (Aliber, 1993, p 182).

Let  $\rho_R$  and  $r_{RLR}$  be respectively the rate of return that a host country's firm is awaiting from an investment similar to the FDI undertaken in the host country, and the long run interest rate in the recipient country. The sufficient condition for FDI can be specified as in relation (B1.1.5) or (B1.1.6).

$$\rho > \rho_R > r_{RLR} \quad (\text{B1.1.5})$$

$$\rho > r_{RLR} > \rho_R \quad (\text{B1.1.6})$$

Relations (B1.1.5) and (B1.1.6) can also be used to explain why economic agents invest in portfolio abroad instead of making FDI or vice versa. All, in fact, depends *ceteris paribus* on the levels of both rates of returns. If the long run interest rate abroad is greater than the anticipated rate of return from a FDI project, it is more profitable to invest in portfolio abroad.

To finish with this section, it is important to point out that it is very unlikely that, in the short run, the profits of a foreign affiliate of a MNC be greater than the one of its competitors from the recipient country. One reason is that foreign affiliates undergo cost of economic distance that their competitors from the recipient country do not incur. These costs result from the fact that they are operating in a cultural and economic environment different from theirs. In these circumstances, MNCs rely on some offsetting advantages such as trademark, managerial skills, and know-how to carry out their FDIs.

Welch and Luostarinen (1988) made a survey of some empirical studies confirming the predictions of the Uppsala school. They, first, referred to the results of an investigation conducted by Luostarinen in 1976 on around 75 percent of the Finnish industrial companies engaged in a foreign operation of any kind. 65 percent of the firms in sample had only non-investment marketing operations abroad, i.e. exports and sales through agents. 33 percent moved from non-investment marketing operations to production facilities establishment abroad. Only 2 percent of the firm began producing abroad without any prior foreign operation. Welch and Luostarinen (1988) also pointed out the results of a research undertaken by Larimo on Finnish MNCs over the sample period 1980-82. 13 percent of the firms observed started their foreign operations by building plants abroad. The remaining 87 percent followed somehow the establishment chain. FDI by Japanese firms in South East Asia also reflected the evolutionary and sequential build-up of foreign commitment advanced by the Nordic Researchers (see Yoshihara, 1978).

As for Millington and Bayliss (1990) the internationalization model of the Uppsala school hold true just for firms without any prior international experience. They investigated the factors underlying fifty transnational operations (TNOs), i.e. joint ventures (JVs) and/or subsidiaries, in the EC market by 50 UK manufacturing PLCs. Out of the 50 UK firms, 10 had no previous experience in the EC market before setting up a manufacture. They did not follow the establishment chain but moved directly from product development to the establishment of factories abroad. Millington and Bayliss (1990) referred to this long jump as *discrete strategy*. The other 28 firms out of the sample jumped from intermediate stages of the establishment chain to manufacturing abroad. Millington and Bayliss (1990) argued that there should be factors other than the market-based experiential knowledge influencing firms' decision to establish plants abroad. One of the factors they mentioned is called *formal planning*. The model they advanced is a life cycle model based on the international development of the firm rather than the market or product. In the outset of its internationalization, the firm tends to follow the establishment chain i.e. it relies on market experience and incremental adjustment. As the firm's international experience increases, it bases its decision to produce abroad on formal planning and systematic searches. The TNO becomes part of the strategic objectives of the parent company and the decision to produce abroad is taken after appraising and comparing many overseas production opportunities. In its final stage of development, the firm can easily skip the first stages of the establishment chain due to its international experience.

The studies carried out by Millington and Bayliss (1990) seem to have some limitations. Only 50 out of the 405 UK direct investors in the EC market were considered. Can results from this sample be extrapolated to the other firms? Besides, the investigations involved TNOs by UK firms only in the EC market. How is the EC market different from the UK one? The concept of psychic distance between home and host country advanced by Johanson and Wiedersheim-Paul (1975) as a reason for the firm's step-wise internationalization process was somehow eliminated from their studies. This weakens their critic of the Nordic studies. Finally, their studies are on a specific TNO by a UK firm and not on the firms' evolution over time.

The firm's internationalization models do not explain why firms go multinational. They, merely, describe how they go multinational. It is important to have a look at theories providing answers for this question.

### 1.1.2 Vernon's Product-Cycle Hypothesis

This theory tries to explain the shift of the production of high-income and labor-saving new items from the US to other countries. Vernon (1966) assumed that US entrepreneurs are the first to spot the need for such goods in the US market<sup>2</sup>. He predicted that the first plants for their production will be built in the US and not abroad. The reason for that is not necessarily to avoid international transport costs or US import duties. There are forces stronger than these elements influencing the decision of the earlier producer of a new good to operate at home. Since the new product is unstandardized, viz. its inputs requirements per unit of production, its processing and final specification are not uniform and can hardly be fixed in advance, the producer needs a location where communication with its economic environment, i.e. customers, suppliers, and business rivals, is swift and easy.

The product becomes somewhat standard as and when its demand increases. Shifts of the locations of the manufacturing facilities within the US may follow the product maturation. Demand for the new high-income and labor-saving product starts appearing outside the US as soon as its existence is known. This demand will grow quickly in other DCs provided it has a high income elasticity of demand or it is a good substitute for high labor cost. At this stage, will the producer go on exporting from the US or will he build plants abroad? A careful decision is made after weighting the two alternatives. Direct investment can substitute the exports providing the marginal cost of production in the US of the maturing item plus its transportation cost to the recipient country (another DC) is higher than the average cost of prospective production in the latter. Because the maturing product made by the parent firm in the US costs more than one made by a subsidiary in a DC, its export to LDCs will be not from the US but from a recipient DC. If the labor cost difference between the US and the recipient country turns out to be very significant and can compensate the shipping cost of the item to the US, the foreign subsidiary will start supplying the US market. This initial investment abroad by a US firm will be regarded by its rivals in the IS as a menace to the *status quo*. They find their share of the market at stake and will challenge the pathfinder investor by investing abroad in the same area.

When the product reaches an advanced stage of standardization, unskilled labor can be substituted to skilled labor and LDCs may prove to be attractive production locations. The high-income and labor-saving product will be made finally in LDCs and exported to the US.

Taking into account changes occurred in the international environment after 1966, Vernon (1979) admitted that the product cycle hypothesis lost part of its explanatory and predictive power.

The first of those major changes was that innovating firms spread their networks of foreign subsidiaries around the world. For instance, in 1950, out of 181 US-based MNCs, 138 had each manufacturing subsidiaries in less than 6 countries and 43, in between 6 and 20 countries. In 1970, among the same 181 US-based MNCs, just 9

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<sup>2</sup> This means that firms headquartered in other countries are unaware about conditions in foreign markets. Vernon (1979) admitted that this assumption could no longer hold true because innovating firms, whether US ones or European ones, have spread their networks of foreign subsidiaries and have had good scanning capability after the 1960s.

had manufacturing facilities each in less than 6 countries. Each of the 172 remaining were operating subsidiaries in either 6 or more than 6 countries. Not only US-based MNCs spread their networks of foreign subsidiaries but European ones as well. 116 out of 135 European MNCs had each, in 1950, foreign subsidiaries in less than 6 countries. In 1970, they were just 31 to still have foreign subsidiaries each in less than 6 countries.

The second major change was that the income gap between the US and the other DCs shrank after 1970. For example, in the late 1970s, the per capita income in France and Germany nearly equates that of the US whereas in 1969, it was less than its one-third. Also, the difference between the US market size and that of other DCs declined partly due to the development of the European Economic Community (EEC).

All these changes questioned some of the assumptions and predictions of the product cycle hypothesis. However, the model still fits some small firms and even some big MNCs in the US, and some other enterprises headquartered abroad.

### **1.1.3 The Industrial Organization Theories of FDI**

Penrose (1956) and Caves (1971), among others, argued that the causes of a FDI by a firm are the same as the causes of its domestic expansion.

Caves (1971) researched on the characteristics intrinsic to the industries in which FDIs tended to occur. He broke down FDIs made by MNCs into horizontal and vertical investments. As regards horizontal FDI, it was found to occur in industries characterized by oligopoly with product differentiation in both the home and the host countries. As for vertical FDI, he argued that it took place in industries characterized by oligopoly, not necessarily differentiated, in the home market.

According to Hymer (1960), firms undertake horizontal FDI because they possess some special asset yielding higher return on foreign markets only through foreign production. Caves (1971) stressed that this special asset should be knowledge about how to serve a market and how to differentiate products (through advertising and slight changes in the products' shape) and must be transferable to foreign markets at no or a little cost.

As in the case of domestic expansion, the reasons behind vertical integration among DCs seem to be the avoidance of oligopolistic uncertainty and the erection of barriers to the entry of new competitors.

These theories emphasize on the firm-specific advantages and say less about the country-specific advantages motivating firms to go abroad.

## **1.2 The Macroeconomic Determinants of FDI**

How some macroeconomic variables such as exchange rate, rate of economic growth, market size etc are likely to determine the flows of FDI into a country is presented here. In analyzing the effects of one of these determinants on FDI inflows, it is assumed that the other determinants remain constant.

### **1.2.1 Exchange Rate**

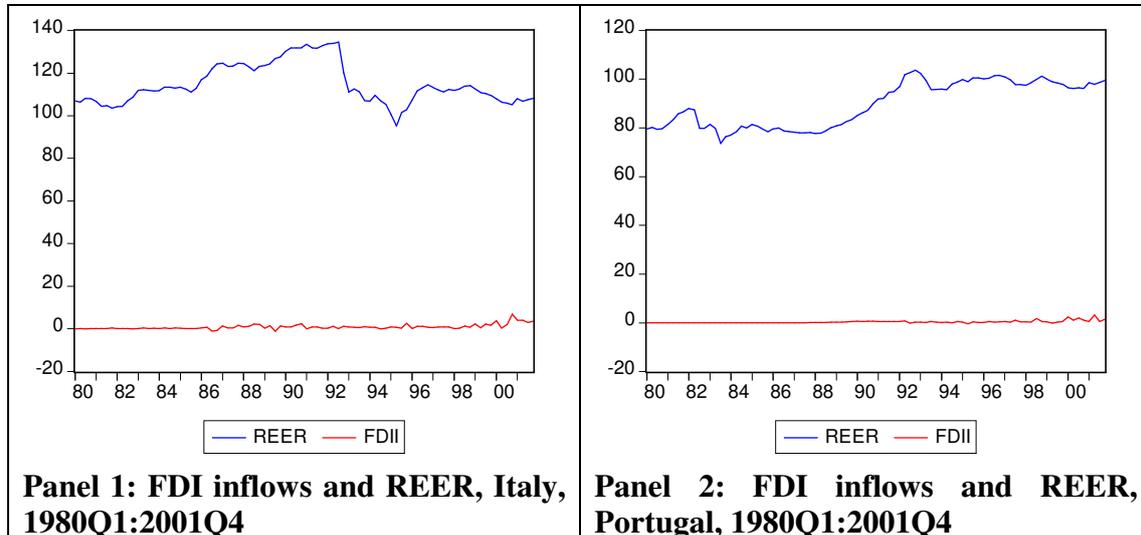
There is, *ceteris paribus*, a negative relationship between FDI flows into the US and the value of the US Dollar. For Aliber (1993) if the US Dollar becomes more and

more undervalued, investments in plant and equipment in the US by foreign investors should increase. He argued that change in the effective foreign exchange value of the US Dollar is a proxy for the anticipated returns on investment in the US. A continuous depreciation of the US Dollar would mean an increase in the anticipated profit rate associated with investment in the US, which will appeal to foreign investors. When the US Dollar goes down, comparative advantage shifts in favor of the US because they become a low-cost place for the production of many items.

Bénassy-Quéré *et al* (1999) dealt as well with the issue of the impacts of exchange rate on FDI flows. For them, both the level and the variability of exchange rate count. The way the level of exchange impacts on FDI flows depends on the type of investment in consideration (horizontal FDI or export-oriented FDI). In the case of horizontal FDI, various mechanisms are possible. A depreciation of the host country's exchange rate will have a positive influence on the flows of horizontal FDI it receives through reduced cost of capital, as Aliber (1993) predicted. An appreciation of the local currency will also increase the flows of horizontal FDI because the local consumers are having a higher purchasing power. The appreciation of a local currency has a negative effect on vertical FDI inflows because items produced locally are becoming expensive abroad.

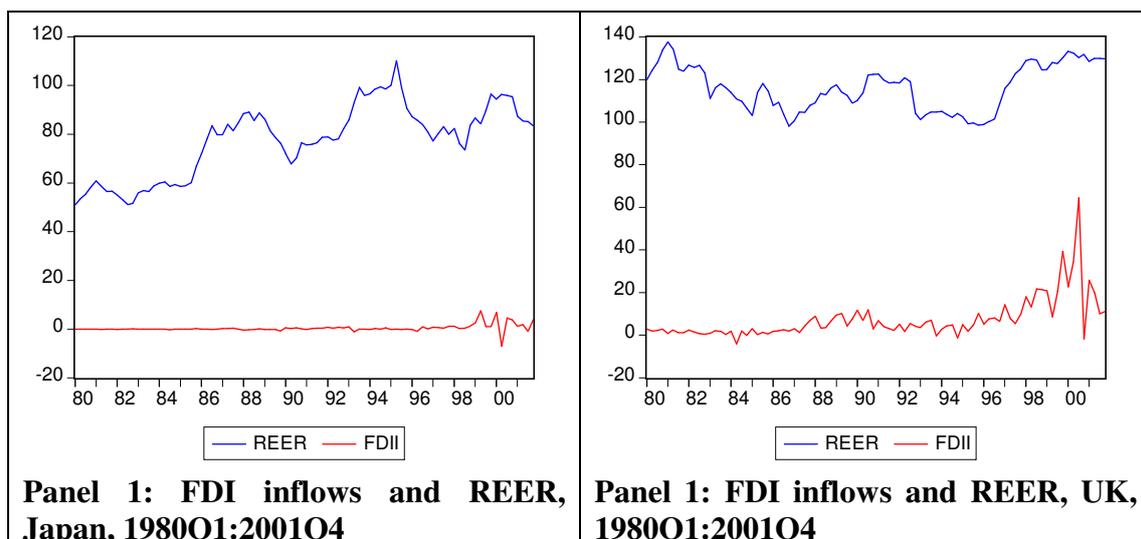
Bénassy-Quéré *et al* (1999) pointed out that, in general, the theoretical impacts of exchange rate volatility is ambiguous but there is empirical evidence suggesting a positive impact of exchange rate volatility on FDI outflows.

In figures 1.1 and 1.2 below, FDI inflows into Japan, Italy, Portugal, and the UK and the real effective exchange rates (REERs) of these countries' currencies are plotted. The FDIs are denominated in US Dollar.



**Figure 1.1: FDI inflows and real effective exchange rate in Italy and Portugal, 1980-2001, quarterly.**

Data source: IMF IFS CD-ROM



**Figure 1.2: FDI inflows and real effective exchange rate in Japan and the UK, 1980-2001, quarterly.**

Data source: IMF IFS CD-ROM

FDI do not appear to be very sensitive to changes in real effective exchange rate in Italy, Japan and Portugal. For the UK, FDI inflow responds to change in real effective exchange rate. The trend seems to indicate a positive relationship between the two variables. This may mean that most FDIs in the UK are horizontal FDIs. Investors produce in the UK goods for consumers with higher purchasing power.

It is important to stress here that FDI inflows may also impact on the foreign exchange value of a currency. An important flow of foreign money-capital into a country may induce an appreciation of its currency.

### 1.2.2 Economic Growth

Another determinant of international production is the rate of economic growth in the host country. It is positively related to FDI (Lipsey, 2000, p. 4; Salvatore, 2001, p. 405). Aliber (1993) argued that changes in the relationship between growth rates in different countries impact on the pattern of international capital movement. Capital will move from countries experiencing a slowdown or a downturn in their economic growth towards countries with higher economic growth rate.

Over the period 1950-58, US investments in manufacturing industries in Europe were directed to the faster-growing countries (Dunning, 1970, p. 299). Lipsey (2000) confirmed the positive relationship economic growth in the host country and annual inward FDI.

Scaperlanda and Mauer (1969) produced empirical evidence rejecting the hypothesis that rate of growth in the ECC was a determinant of US investment in this area.

This dissertation is very skeptical about the results of these econometric studies confirming or rejecting rate of growth as a determinant of FDI for two reasons. First, the models tested are not correctly specified. As mentioned in Chapter 3, rate of growth is not only a determinant of FDI but also an effect of FDI. These studies have failed to take into account this dual role played by economic growth. So the results they have come up with are very to be biased. Secondly, the regression they have run are very likely to be spurious since no work has been done to test the order of

integration of the variables in their models. Rate of economic growth is often a stationary variable where FDI inflows may be of any order of integration. Unit root tests on inward FDIs received by 11 DCs (see Appendix 2, p. 41) reveal an order of integration ranging from 0 to 2.

### 1.2.3 Market Size

Many empirical works have borne out the role played by host country's size as a determinant of FDI.

Scarperlanda and Mauer (1969), studying the determinants of US direct investments in the EEC, found the size of EEC the only significant variable after many simulations. They used the Gross National Product (GNP) of EEC as a proxy for market size.

Dunning (1970) reported the results of some empirical works undertaken in 1967 by Messrs, Bandera and White on the determinants of US direct investment in Europe. The market size of the recipient countries was found to be the most influential factor. In some regressions by Lipsey (2000), the coefficient associated to the lagged values of GDP was negative, which meant a negative impact of lagged GDP on FDI inflows.

### 1.2.4 Other Determinants

There are other factors pointed to as determinants of FDI. Some of them are: degree of openness, labor cost, privatization, trade linkages and borders, risk and macroeconomic stability, and FDI policy (Holland and Pain, 1998; Lansbury *et al* 1996; United Nations, 1998; Wheeler and Mody, 1992).

#### Box 1.2: The Firm's International Involvement

What is meant by internationalization and how can that be measured?

Welch and Luostarinen (1988) proposed a broad and more acceptable definition of internationalization. It is "the process of increasing involvement in international operations". This definition does not confine internationalization to outward international operations by the firm, viz. exports, FDIs but takes into account as well its inward international operations such as imports.

Various indices can be computed to gauge the degree of transnationality or internationalization of a firm. For a given

firm, one may consider either one of the following ratios:

- Foreign assets/ total assets
- Foreign sales/ total sales
- foreign employment/ total employment

or a combination of these three ratios (United Nations, 1998, pp. 43-4). The UNCTAD uses this latter method to produce the list of the largest TNCs.

None of these indices measures perfectly the degree of transnationality of a firm.

At a national level, the international involvement of country is measured by the trade to GDP ratio which is equal to  $(\text{exports} + \text{imports}) / \text{GDP}$ . This ratio is also called degree of openness to trade.

### 1.3 Dunning's Eclectic Theory of FDI

Dunning (1979) reviewed and assessed the main theories advanced to explain the *raison d'être* of FDI: the international capital theory, the industrial organization theories, the location theories, the product cycle theory, etc. He found none of these theories entirely cogent. They just partially succeeded in answering the questions of *how*, *why*, *where* and *when* of FDI. He then tackled the issue using an eclectic approach. The eclectic theory of FDI devised by Dunning takes from the above theories to build a model capable of accounting adequately for the causes of FDI, i.e. what motivates a firm to serve a given market and why should that be through FDI and not through exports for instance. The eclectic theory postulates that three conditions are essential for a FDI.

The first condition is that the firm must have a net ownership advantage over the other firms serving the foreign market. This ownership advantage may be a product or process differentiation ability, a monopoly power, a better resource capacity or usage, a trademark protected by patent, or an exclusive, favored access to product markets etc.

The second condition requires that the firm prefer internalizing its ownership advantages rather than externalizing them. This means that the firm possessing ownership advantages must deem producing abroad more profitable than selling or leasing its activities to foreign firms. A firm might prefer internalizing its ownership advantages in order to protect the quality of its products, to control supplies and conditions of sales of inputs, to control market outlets.

Finally, the firm enjoying an ownership advantage and an internalization incentive will produce abroad only if there are abroad location advantages such as cheaper labor, higher labor productivity, etc.

The extent to which a country's firms possess ownership advantages and internalization incentives, and the locational attraction of its endowments compared to those of other countries explain its propensity to engage in foreign production.

The ownership, Location, and Internalization (OLI) advantages are not static. They may change over time.

Dunning (1998) stressed that the OLI triad of variables can be compared to a three-legged stool. None of these three conditions is more important than the other. Each of them plays an important role in explaining the activities of MNCs.

#### Summary

1. The internationalization model of the Uppsala School (also referred to as the Nordic Researchers) explains how firms go multinational. Firms, first, operate in the domestic market and then expand little by little their activities to countries they are acquainted with.
2. Vernon's Product-Cycle hypothesis shed light on the shift of the production of high-income and labor-saving new products from the US to other countries. It says that US firms produce high-income and labor-saving items in the US at the earlier stage of the existence of these goods. At the end of the day, they will set up

subsidiaries abroad to produce these goods at lower costs and then import them into the US.

**3.** According to the industrial organization theories of FDI, firms go multinational for the same reasons as they expand domestically.

**4.** Increase in the FDI flows into a country is associated with a depreciation of its currency.

**5.** The economic rate of growth and the size of the recipient country appeal to foreign investors.

**6.** According to the Dunning' s eclectic theory, three conditions are essential for production abroad: firm-specific ownership advantage, internalization incentive, and country specific locational advantage.





# Chapter 2

## The Impacts of FDI

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Yet relatively little emphasis has fallen on what might seem the two principal economic features of direct investment by the international corporation: (a) it ordinarily effects a net transfer of real capital from one country to another; and (b) it represents entry into a national industry by a firm established in a foreign market.

- R E Caves

FFDI brings benefits and costs to both home and host countries. These impacts may be economic, political, socio-cultural, etc and depend on the type of FDI –Greenfield or M&A, horizontal or vertical. Some of these possible effects are presented in this chapter. The impacts of FDI in the host countries are dealt with in section 1 and section 2 presents the impacts of FDI in home countries.

### 2.1 The Impacts of FDI on the Host Country's Economy

#### 2.1.1 Economic Growth

FDI is said to contribute to economic growth in recipient countries. This may be by adding to the existing capital stock in the host country, by stimulating technical progress in this latter or by creating new jobs<sup>1</sup>.

Studies carried out before the 1980s confirmed that FDI inflows into Canada increased capital formation in this latter (see Lipsey, 2000, p. 9). Lipsey (2000) came up with the same finding for Canada. For other countries, Lipsey (2000) did not find a significant effect of FDI either inflows or outflows on capital formation. It is important to point out here that the impacts of FDI inflows on capital formation in a country depends on the type of FDI this latter has been receiving (Greenfield FDI or M&A FDI). As said in the first section of the introductory chapter, international M&A does not add, at once, to the host country's capital stock where as Greenfield FDI does (see page 2). So, in regressing gross fixed capital formation (GFCF) on FDI inflows into a country, the robustness of the parameter that one has hinges on the type of FDI the host country has predominantly received. Also in estimating the GFCF equation, it is important to make sure that the key explanatory variables have been included in the model, i.e. GDP, FDI inflows, FDI outflows, and long-run interest rate. It is important

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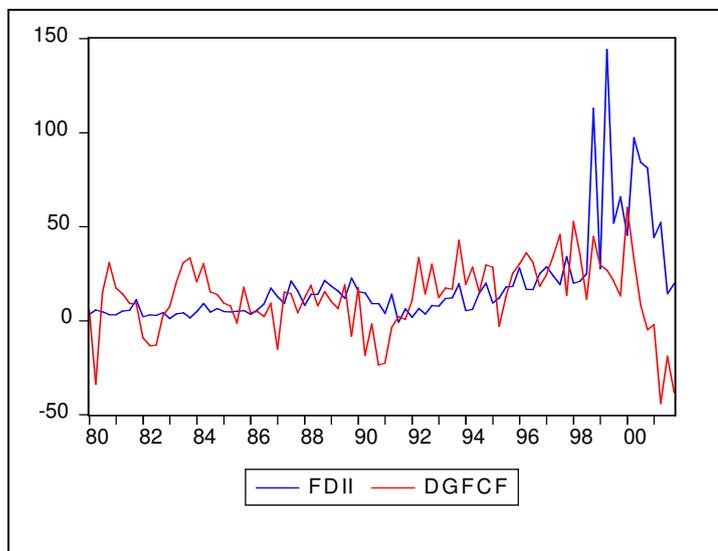
<sup>1</sup> The growth in output over time equation is specified as follows:

$$\frac{\delta Y / \delta t}{Y} = \frac{\delta A / \delta t}{A} + w_K * \frac{\delta K / \delta t}{K} + w_L * \frac{\delta L / \delta t}{L} \quad (2.1)$$

where A, Y, K, L,  $w_K$ , and  $w_L$  are respectively the technological progress, the output, the capital stock, the labor force, and the weights associated to capital and labor.

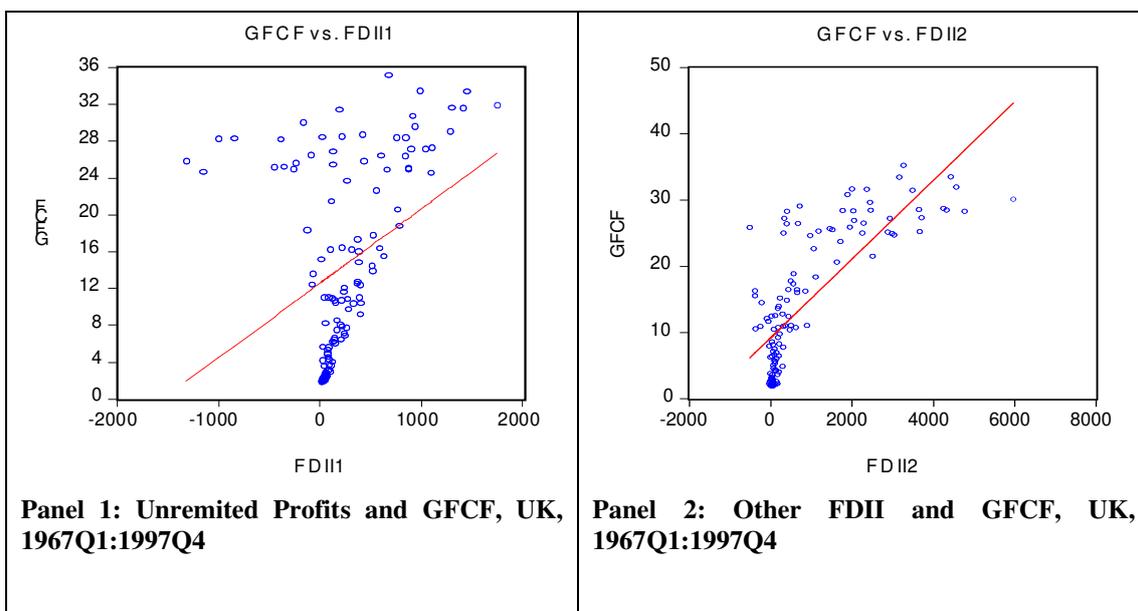
as well not to forget that in the equation, regressors such as GDP is an endogenous variables explained by GFCF and that the regressor FDI inflows is explained by GDP and eventually economic growth. In the conclusion of this dissertation, a model taking into account all these facts has been proposed.

In Figure 2.1 below, GFCF and FDI inflows in the US have been plotted. The graph suggests a co-movement between FDI inflows and GFCF in the US.



**Figure 2.1: FDI and absolute change in GFCF in the USA, 1980-2001, quarterly**  
**Data source: IMF IFS CD-ROM**

In the first panel of Figure 2.2, the evolution of reinvested earnings by foreign firms in the UK is plotted against this latter's gross fixed capital formation. There is a positive relationship between the two variables. The second panel of Figure 2.2 suggests as well a positive relationship between the other types of FDI and GFCF in the UK.



**Panel 1: Unremitted Profits and GFCF, UK, 1967Q1:1997Q4**

**Panel 2: Other FDI and GFCF, UK, 1967Q1:1997Q4**

**Figure 2.2: FDI and GFCF in the UK, 1967-1997, quarterly**  
**Data sources: Datastream for the data on FDIs and IMF IFS CD-ROM for the data on GFCF**

Borensztein *et al* (19998) ruled out the possibility those FDI inflows contribute to economic growth by increasing capital stock in the host country. For them, it is, instead, by stimulating technological progress that they contribute to economic growth. Their view that FDI crowds out domestic investment was based on empirical investigations they carried out using 69 LDCs data. How does FDI stimulate or enhance technological progress? Through generating knowledge or technological spillovers that increase factor productivity. The knowledge spillovers take place through four possible channels: imitation, competition, linkages, and/or training (Hermes and Lensink (2003), Lensink and Morrissey (2001), Gorg and Strobl, 2001). Foreign firms possess some special assets such as advanced technologies and organizational skills over domestic firms. These latter may find it cheaper to imitate or copy them rather than innovating new ways of doing things. Domestic firms by imitating foreign firms may become more productive. FDI is then said to generate positive technological spillover through the channel of imitation. FDI is said to generate technology spillover through the competition channel when the competition between foreign and domestic firms induces domestic firms to upgrade their technology or adopt new methods of production. Technology or knowledge spillover arises through the channel of linkages in instances such when domestic firms supply foreign firms with raw materials and/or intermediate goods. This linkage may force foreign firms to provide technical assistance to domestic firms or encourage them to upgrade their technologies in order to meet some requirements. Domestic firms in adopting new methods of production because of the presence of foreign firms train their staff so that they be able to them efficiently. These four channels are not, in actuality, independent one from another.

There are empirical investigations confirming that FDI is instrumental to economic growth by means of stimulating technological progress. Borensztein *et al* (1998) found a positive impact of FDI on growth through technology spillover that is labor augmenting or Harrod-neutral. This spillover effect hinges on the presence of a threshold level of educated labor force in recipient countries. Hermes and Lensink (2003) confirmed this finding using a panel of 67 LDCs. Lensink and Morrissey (2001) attempted to replicate these studies using a larger sample. The evidence they brought was not in favor of complementarity between FDI and human capital as advanced by Borensztein *et al* (1998)<sup>2</sup>. Empirical investigations by Carkovic and Levine (2002) did not, also, enable to conclude about complementarity between FDI and human capital. Other recipient country's conditions are pointed to, in the literature, as a prerequisite for the growth effect of FDI via technology spillover. Some of them are the level of financial development, the level of economic development, and trade openness. Hermes and Lensink (2003) came up with evidence that the development of the domestic financial system is a necessary condition for FDI to generate positive externalities that increase output. Carkovic and Levine (2002) carried out the same experiment. They got ambiguous results. Across countries, FDI appeared to have positive effects mainly in financially developed countries. This evidence was not found applying panel estimators to the data. Carkovic and Levine (2002) investigated the hypotheses of complementarity between FDI and economic development, and FDI and trade openness. These hypotheses did not hold true.

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<sup>2</sup>The main contribution of Lensink and Morrissey (2001) to the literature on FDI and economic growth is that FDI boosts economic growth via technology spillover but its volatility has a negative impact on economic growth

It is true that FDI into a country, especially LDCs, generates spillovers that enhance labor productivity. On the other hand, the impact of FDI inflows on the level of employment in host countries cannot be denied. FDI can positively affect the level of employment in host countries. Greenfield FDI means new job creation in the host country. M&A FDI does not necessarily produce such effect in the short run. According to Driffield and Taylor (2000), skilled jobs created by foreign firms are offered to people previously employed elsewhere in the home country but not to unemployed<sup>3</sup>. The unemployed labor benefits from the positions left within local firms by those recruited by foreign firms. FDI can also have negative effects on employment. This may occur when capital-intensive FDI induces more labor-intensive local firms to close down (South Centre, 1997).

### 2.1.2 Balance of Payments

The impacts of FDI on both current and capital account are considered.

The impacts of FDI on trade, i.e. exports and imports, are ambiguous. A horizontal FDI, for instance, theoretically induces a decrease in the host country's imports and, *ceteris paribus*, an improvement of its trade balance. This prediction may not hold true if the inputs used by the foreign-owned firm are imported from abroad. Furthermore, a FDI consisting in selling in the host country goods manufactured abroad, i.e. a vertical integration forward, will have the effect of increasing the home country's imports. A FDI aiming at extracting minerals or producing component parts may positively impact on the host country's visible balance.

The effects of FDI on the host country's capital account depend on whether the investment has been financed out of money-capital borrowed in the host country and the share of profit repatriated. FDI financed out of capital raised in the home country improve the state of the host country's capital account. So do profits non-repatriated by foreign firms. As mentioned earlier (see the first section of Introduction on page 2), non-repatriated profits are considered as flows of FDI from the home to the host country. Profits repatriated have the opposite effect on the recipient country's balance of payments

## 1.3 Other Impacts

FDI causes in host countries some problems of cultural, environmental, political, and social order. These problems depend on the industries involved, the market power of the foreign firms, and the characteristics of the recipient countries.

FDI in mass media, i.e. newspapers, radio, and television, from Western corporations is detrimental to the cultural patrimony of developing countries. It does not enrich national cultural values but favors Americanization, the subjugation of European customs, the alienation of youngsters, and sometimes perversion.

FDI in manufacturing and mining sectors in developing countries can be the source of negative externalities affecting the local environment, e.g. pollution of air and rivers.

The interests of some giant Western corporations have disturbed the stability of many political regimes in LDCs. Some MNCs have been reported to be behind conflicts in developing countries.

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<sup>3</sup> Foreign-owned firms, generally, offer higher salary than domestic firms.

FDI in the hotel and tourism industry in some LDCs has intensified some social evils such as prostitution, pedophilia, homosexuality, AIDS, etc. Taking advantage of their higher purchasing power and the lower cost of living combined with financial difficulties in LDCs, some tourists from DCs use local women and teenagers as object of pleasure and most of all the leave behind them is broken lives, bastards, sexually transmitted diseases.

In the appendix which follows this chapter, an attempt has been made to find out what can be the effects of FDI within a customs union (see page 25-6).

## 2.2 The Impacts of FDI on the Home Country's Economy

The literature on the impacts of FDI on the home country is not as abundant as that on its impacts on recipient countries. Some impacts usually pointed to are that on employment and balance of payments.

### 2.2.1 Employment

Production abroad affects negatively employment in home countries. Blomström *et al* (1997) came up with results showing that, for a given level of home output, shifting the labor-intensive production stages to LDCs means fewer employees in the US. Empirical evidence found by Blomström *et al* (1997) using Swedish data are the opposite of the one they found in the US. Employment in parent firms increased along with their production abroad. They argued that the foreign activities may have induced a need for additional supervisory, management, marketing, and R&D personnel in the parent firms. They tested this hypothesis. The results were paradoxical. White-collar employment within Swedish parent firms did not increase with foreign production as expected. It was, instead, blue-collar employment within Swedish parent firms that increased.

### 2.2.2 Balance of Payments

The effects of FDI on home countries' balance of payments are the opposite of those on host countries' balance of payments. This latter issue has been treated in the previous section on page 22.

## Summary

1. FDI impacts on both the level and the productivity of factors of production in recipient countries.
2. The impacts of FDI on the state of the recipient country's balance of payments depend on the type of FDI and on how foreign firms allocate their profits.
3. FDIs are the source or occasion many cultural, environmental, political, and social evils in LDCs.

4. FDI has a negative impact on employment in home countries.
5. The effects of a FDI on the source country's balance of payments are the opposite of that on the recipient country's balance of payments.



## Appendix to Chapter 2

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Of course, everything else held equal, it is “better” to have a model that captures formally more of the salient aspects of the situation than to have one that omits important features.

- D Kreps

### Trade Creation and Trade Diversion versus FDI

A customs union is an agreement between at least two countries to remove trade barriers in visible and invisible goods between themselves and set a common external tariff (CET) on imports from countries which are not part of the union. Customs union was believed to be undoubtedly welfare improving. Viner (1950) questioned this view. He distinguished between trade creating and trade diverting effects resulting from a customs union formation. In his analysis, the possibility that producers from a non-member country react to a customs union formation by building plants in one of the member states was ignored. In the analysis made herein, this possibility is considered.

Let us consider three countries producing each a commodity X but at different costs. Table A.1 presents the cost of the good before and after the formation of a customs union between country A and B.

**Table A.1: A price data for commodity X before and after trading alliance**

Country	A	B	C
Unit Cost	20	14	12
Price in Country A before Trading Al- liance	20	28	24
Price in Country A after Trading Al- liance	20	14	24

Before the unionization of country A and B, a tariff of 100% was imposed on imports of commodity X from both country B and C. This protected country A's industry from competition from both country B and C. On the other hand, consumers in country A were penalized because forced to take the good X produced domestically at a higher price. After the trading alliance between countries A and B, both agreed on a tariff of 100% on imports of good X from country C. This enables country B to specialize in the production of X and supply it at a lower price of 14 in country A.

There is thus a replacement of an expensive domestically produced item by a cheaper import from a partner country. This is an *internal trade creation* brought about by the formation of the customs union between country A and B. The prejudice undergone by producers of good X in country C is referred to as *trade diversion*.

The view sustained herein is that trade creation and trade diversion are just short-term effects. The formation of a customs union between country A and B may be regarded as a triggering event since producers in country C will start seriously planning to make an horizontal FDI into country A in order to avoid the tariff barriers.

It can be argued that firms in country C have an ownership advantage over their business rivals in countries A and B. If they manage to produce good X at the lowest cost, i.e. 12, it may be because they know how to efficiently combine inputs. The need for producers in country C to protect the quality of their product may offer them a reason to choose to internalize their ownership advantages. The customs union between countries A and B may be a location advantage attracting firms from country C. If they produce good X in country A, their market will comprise both consumers in countries A and B because goods produced in country A can be exported to country B without any duty.

When a producer of good X from country C build the first plants in country A in response to the trading alliance between countries A and B, other producers of the same good and from the same country will imitate him. They will, by all means, produce good X in country A at a price lower than that offered by their competitors from country B. The trade creating and trade diverting effects originally caused by the trading alliance between countries A and B will be evicted. The commodity X will now be exported to country B from country A. This is a new trade creating effect resulting from the horizontal FDI made in country A by producers from country C.

The trade creating and trade diverting effects caused by a customs union formation are not a once and for all or permanent effects. They are evicted or possibly reversed when producers from a non-member state start making horizontal FDI into one of the countries forming the customs union.

# Chapter 3

## Empirical Investigations

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In many areas of Economics, different econometric studies reach conflicting conclusions and given the available data, there are frequently no effective methods for deciding which conclusion is correct.

- M Blaug

Does the analysis of data show an influence of economic growth or labor cost in the US on the level of FDI they receive? Is it true that the size of a national market appeals to foreign direct investors? Econometric techniques are, in this chapter, applied to US data to bring evidence on these issues.

The models to estimate, the economic theories underlying the models and the estimation results are presented below.

### 3.1 The Models

The original object of these empirical investigations was to test five hypotheses: economic growth, market size, the degree of openness, exchange rate, and labor cost as determinants of inward flows of FDI. The model to estimate was solely the following single equation:

$$FDII_{it} = \alpha_{0i} + \alpha_{1i}\Delta GDP_{it} + \alpha_{2i}GDP_{it} + \alpha_{3i}DO_{it} + \alpha_{4i}REER_{it} + \alpha_{5i}LC_{it} + u_{it} \quad (3.1)^1$$

where  $FDII$ ,  $\Delta GDP$ ,  $DO$ ,  $REER$ ,  $LC$ , and  $u$  stand respectively for the inward flows of FDI, the absolute change in GDP, the degree of openness, the real effective exchange rate, the labor cost and the error term. The subscripts  $i$  and  $t$  help distinguish recipient countries and time periods in the panel. It turns that, in relation (3.1), all the explanatory variables are not exogenous. The regressors  $\Delta GDP$  and  $GDP$  are not only determinants of FDI inflows but as well endogenous variables explained by FDI inward flows ( $FDII$ ) and other variables such as technological change, education per worker, growth in labor input, gross fixed capital formation, etc. Biased and inconsistent estimates will be obtained if the feedback between FDI inflows and  $\Delta GDP$  or  $GDP$  is not taken into account in estimating the parameters of relation (3.1) (see, for instance, Ramanathan, 2002, pp. 544-6). One of the following models can therefore be added to relation (3.1):

$$\Delta GDP_{it} = \beta_{0i} + \beta_{1i}FDII_{it} + \beta_{2i}\Delta GFCF_{it} + \beta_{3i}\Delta TB_{it} + v_{it} \quad (3.2)$$

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<sup>1</sup>As one would have noticed  $GDP$  is used to proxy the market size.

$$GDP_{it} = \gamma_{0i} + \gamma_{1i}FDII_{it} + \gamma_{2i}GFCF_{it} + \gamma_{3i}TB_{it} + w_{it} \quad (3.3)$$

where  $\Delta GFCF$ ,  $\Delta TB$ , and  $v$  are the absolute change in the gross fixed capital formation (GFCF), the absolute change in the trade balance (TB) -change in exports minus imports-, and the stochastic disturbance.

Relation (3.2) enables to test the effects of FDI inflows,  $\Delta GFCF$ , and  $\Delta TB$  on economic growth. Most of the times,  $\Delta GDP$  is a stationary variable and  $FDII$  is not. Regressing  $\Delta GDP$  on  $FDII$  will be nonsense if  $\Delta GDP$  is  $I(0)$  and  $FDII$  is  $I(1)$  or  $I(2)$ . A way of dealing with this issue is to consider in equation (3.2)  $\Delta GDP$  as a function of  $\Delta FDII$  and not  $FDII$ . This is equivalent to estimating relation (3.3).

Relation (3.1) combined with relation (3.3) suggest that economic growth in a recipient country is both a determinant and an effect of FDI inflows. This feedback was never tested before over time. What has been done, often, in empirical works is either to test economic growth as a determinant of inward flows of FDI or to test FDI inflows as a source of growth. It is wrong to do so<sup>2</sup>.

To sum up, two structural equations make up the FDI model that is going to be estimated.

$$\begin{aligned} FDII_{it} &= \alpha_{0i} + \alpha_{1i}\Delta GDP_{it} + \alpha_{2i}GDP_{it} + \alpha_{3i}DO_{it} + \alpha_{4i}REER_{it} + \alpha_{5i}LC_{it} + u_{it} \\ GDP_{it} &= \gamma_{0i} + \gamma_{1i}FDII_{it} + \gamma_{2i}GFCF_{it} + \gamma_{3i}TB_{it} + w_{it} \end{aligned} \quad (3.4)$$

The endogenous variables (jointly determined variables) of the model are:  $FDII$  and  $GDP$  (and consequently  $\Delta GDP$ ). The variables are  $DO$ ,  $REER$ ,  $LC$ ,  $GFCF$ , and  $TB$  are treated as exogenous (or predetermined).

One of the assumptions underlying the estimation of a single equation by OLS is that the regressors in the model are independent and uncorrelated with the error term (see Gujarati, 1995, p. 65; Studenmund, 2001, p. 85). If it occurs that they are not, the estimated parameters will be biased and inconsistent. In the first equation of model (3.4), the regressor  $GDP$  is correlated with the error term  $u$ . A random increase in  $u$  will result in an increase in FDI inflows ( $FDII$ ) and then in an increase in  $GDP$ . So,  $GDP$  and  $u$  move in the same direction, i.e.  $cov(GDP, u) > 0$ . In the second equation of model (3.4), the explanatory variable  $FDII$  is also correlated with the stochastic disturbance  $w$ . If  $w$  increases,  $GDP$  will go up and so will  $FDII$ . It follows that model (3.4) cannot be estimated by OLS.

There are other methods of estimation which help overcome these problems. They are: the indirect least squares, the instrumental variable (IV) method, the two-stage least squares (2SLS) method, and the vector autoregression (VAR) model. Model (3.4) will be estimated using 2SLS and VAR models. The estimates produced by each of these two methods are not the same. The 2SLS, obviously, is based on the OLS method of estimation and the VAR model on the maximum likelihood (ML) method.

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<sup>2</sup> Some economists having worked on the impacts of FDI on economic growth postulated the endogeneity of FDI inflows in their growth equations and jointly estimated the two functions in a cross-country framework. They did not test the hypothesis of feedback between the two variables (see Borensztein *et al*, 1998; Lensink and Morissey, 2001). Previous attempts to estimate over time FDI inflows and growth equations simultaneously do not exist. Caroko ic and Levine (2002), in estimating their growth equation over time, postulated and controlled for the endogeneity of  $FDII$ . They did not test the endogeneity of  $FDII$  in their growth equation. Besides, they did not check the order of integration of the variables in their models.

Cointegration (i.e. long run equilibrium relationship) between the variables of the model will be tested for using the Engle-Granger (EG) method in the case of the 2SLS method of estimation, and the Johansen procedure in the case of VAR model. Thereafter, exogeneity will be tested for.

There is no literature on testing for cointegration using the 2SLS method of estimation. What has been done in this dissertation is an attempt to extend Engle-Granger's residual-based ADF test to simultaneous equation models. This way of doing may be questioned but, at least, it has the merit of reminding an unexplored issue: testing for cointegration using the 2SLS method of estimation. Instead of agreeing that Johansen's procedure offers a better alternative, one must push its curiosity further.

Before moving onto the presentation of the two methods of estimation that will be used, it is worthwhile to recall the hypotheses that are going to be tested and how economic theory relates them to the endogenous variables of the model.

### 3. 2 The Economic Assumptions Underlying the Models <sup>2</sup>

The parameter  $\alpha_{1i}$  is expected to be positive. Economic theory suggests that economic boom in a country appeals to foreign investors. This seems to explain most of FDIs into the US and South East Asian countries.

The size of the host market is also positively related to the flows of FDI it receives. It is a fillip for horizontal FDI and vertical integration forward. There is no precise measure of the size of a market. Economists tend to use most of the time GDP to proxy it (see Johanson and Wiedersheim-Paul, 1975; Lipsey, 2000). The parameter  $\alpha_2$  should therefore be greater than zero ( $\alpha_2 > 0$ ).

The parameter  $\alpha_3$  captures the influence of the degree of openness of the host country on the flows of FDI it receives. The trade to GDP ratio, i.e. exports plus imports over GDP, is often used to proxy the degree of openness (see Hirst and Thompson, 1999, p. 27 and pp. 62-5). This ratio suggests how a country is being integrated into the new economic order. There is no a priori to make about the sign of the parameter  $\alpha_3$ .

The parameter  $\alpha_4$  can have either sign but is expected to be negative for the US. The exchange risk theory of FDI suggests that a continuous decline in the effective exchange value of the US Dollar might cause an increase in the flows of FDI it receives (see Chapter 1, pp. 12-4).

The sign of the parameter  $\alpha_5$  depends on the level of development of the host country considered. Cheap labor cost explains the flows of FDI into some developing economies such as Madagascar and Togo. High labor cost explains divestments from DCs such as the UK and the US.  $\alpha_5$  is therefore expected to be negative in the US.

The parameter  $\beta_1$  is supposed to be positive. FDI is said to have a positive impact on GDP and economic growth in the host country (see chapter 2).

The relationship between GDP, and GFCF and TB is derived from the national income identity. The coefficient  $\beta_2$  is expected to be positive. The sign of  $\beta_3$  depends on whether the host country has been exporting more than it imports.

<sup>2</sup> Some assumptions about the determinants of FDI are presented in more details in the second section of chapter 1

### 3.3 The Data

The data used in the regressions (FDII, GDP, LC, REER, GFCF, and TB) have been retrieved from the IMF IFS CD-ROM. They are US data and are denominated in US Dollar. The era of interest ranges from the first quarter of 1980 to the last quarter of 2001.

The absolute change in GDP has been computed out of the data on GDP.

The degree of openness has been computed out of data on exports, imports and GDP.

$$DO = \frac{(\text{Exports of Goods and Services} + \text{Imports of Goods and Services})}{\text{GDP}} * 100$$

DO is said to be exogenous in model (3.4). The trade to GDP ratio used to proxy it does not seem to be exogenous because it depends on GDP. It is, in fact, very difficult to obtain good measures of openness.

The data on FDI inflows are net of divestments. The GFCF is the one by the private sector.

The hourly earning index in manufacturing sector is used as labor cost.

### 3.4 The Methods and Results of the Estimations

The stationarity of the data is beforehand tested (See definitions and results in Appendix 2, p. 40). FDII, GDP, DO, and REER are  $I(1)$ .  $\Delta$ GDP is  $I(0)$ . LC, GFCF, and TB are  $I(2)$ . The specification of model (3.4) will be reconsidered so that the variables in the model be  $I(1)$  –this is a necessary condition for cointegration. The variable LC, GFCF, and TB in model (3.4) will be replaced by their first differences which are  $I(1)$ . This yields model (3.5).

$$\begin{aligned} \text{FDII}_{it} &= \alpha_{0i} + \alpha_{1i}\Delta\text{GDP}_{it} + \alpha_{2i}\text{GDP}_{it} + \alpha_{3i}\text{DO}_{it} + \alpha_{4i}\text{REER}_{it} + \alpha_{5i}\Delta\text{LC}_{it} + u_{it} \\ \text{GDP}_{it} &= \gamma_{0i} + \gamma_{1i}\text{FDII}_{it} + \gamma_{2i}\Delta\text{GFCF}_{it} + \gamma_{3i}\Delta\text{TB}_{it} + w_{it} \end{aligned} \quad (3.5)$$

In model (3.5), all the variables are  $I(1)$  except  $\Delta$ GDP and the intercept terms which are stationary. The specification of the model can again be modified. In the first equation of model (3.5), cointegration will be tested for, first, between the  $I(1)$  variables, i.e. FDII, GDP, DO, REER, and  $\Delta$ LC. If these variables are found to be cointegrated, then their residuals will be cointegrated with  $\Delta$ GDP. The new specification of model (3.6) is:

$$\begin{aligned} \text{FDII}_{it} &= \alpha_{2i}\text{GDP}_{it} + \alpha_{3i}\text{DO}_{it} + \alpha_{4i}\text{REER}_{it} + \alpha_{5i}\Delta\text{LC}_{it} + u_{1it} \\ \text{GDP}_{it} &= \gamma_{1i}\text{FDII}_{it} + \gamma_{2i}\Delta\text{GFCF}_{it} + \gamma_{3i}\Delta\text{TB}_{it} + w_{it} \end{aligned} \quad (3.6)$$

where

$$u_{1it} = \alpha_{0i}^* + \alpha_{1i}^*\Delta\text{GDP}_{it} + u_{2it} \quad (3.7)$$

The methods of estimation used are, as said before, the 2SLS and the VAR.

#### 3.4.1 The Two-Stage Least Squares (2SLS)

The 2SLS procedure is made up of two stages.

The first is to estimate by OLS the reduced form equation of all the endogenous variables appearing in the right-hand side of model (3.6). In the first structural equation of model (3.6), GDP is the endogenous variable appearing on the right-hand side. In the second equation, FDII is the endogenous variable appearing on the right-hand side. The reduced form equation of an endogenous variable is this latter expressed as a linear combination of all the pre-determined variables in the model. They are expressed as follows.

$$FDII_{it} = a_{1i}DO_{it} + a_{2i}REER_{it} + a_{3i}\Delta LC_{it} + a_{4i}\Delta GFCF_{it} + a_{5i}\Delta TB_{it} + \delta_{it} \quad (3.8)$$

$$GDP_{it} = b_{1i}DO_{it} + b_{2i}REER_{it} + b_{3i}\Delta LC_{it} + b_{4i}\Delta GFCF_{it} + b_{5i}\Delta TB_{it} + \varepsilon_{it} \quad (3.9)$$

$\delta_{it}$  and  $\varepsilon_{it}$  are the error terms.

The second stage of the 2SLS is the substitution of the endogenous variables on the right-hand side of model (3.6) by the fitted values obtained from their reduced form equations. In the first equation of model (3.6), GDP will be replaced by the fitted values obtained from relation (3.9) and in the second equation FDII will be replaced by the fitted values obtained from estimating relation (3.8).

#### - The Results of the Estimations by 2SLS

The relations have been estimated using Eviews 4. The estimated reduced form equations are given by relations (3.8a) and (3.9a). The values in brackets are the t-ratios.

$$\hat{FDII}_t = -182.87 + 6.63DO_t + 0.51REER_t + 4.65\Delta LC_t + 0.08\Delta GFCF_t - 0.053\Delta TB_t$$

(-6.838) (8.131) (3.559) (0.903) (0.74) (-0.194)

(3.8a)

$$\bar{R}^2 = 0.47 \quad t_{2.5\%}(88-6) \approx 2$$

The fitted FDII are integrated of order 1.

$$\hat{GDP}_t = -13317.9 + 829.17DO_t + 26.44REER_t - 1208.9\Delta LC_t - 3.77\Delta GFCF_t + 6.17\Delta TB_t$$

(-9.89) ((20.209) (3.678) (-4.664) (-0.7) (0.65)

(3.9a)

$$\bar{R}^2 = 0.841$$

The ADF test including intercept but no time trend suggests that the fitted values of GDP are integrated of order 1.

The intercept terms have been introduced into the reduced form equations in order to improve their explanatory power

Only the order of integration of the fitted reduced form equations matter. One should not, at this stage, worry about the stationarity of their residuals  $\delta_t$  and  $\varepsilon_t$ .

In the second stage of the 2SLS, in replacing, say  $FDII_t$  by  $\hat{FDII}_t + \delta_t$ , the error term in the second structural equation becomes:  $\gamma_1 \cdot \delta_t + u_{1t}$ . If  $\gamma_1 \cdot \delta_t + u_{1t}$  is stationary it means that there is cointegration between the variables involved in the second structural equation of model (3.6).

The results of the estimation of model (3.6) are the following.

$$\hat{FDII}_t = 0.014\hat{GDP}_t - 4.529DO_t + 0.13REER_t + 20.043\Delta LC_t$$

$$\hat{GDP}_t = 205.74 \hat{FDII}_t + 36.436 \Delta GFCF_t + 21.995 \Delta TB_t \quad (3.6a)$$

(6.836)      (-4.04)      (1.266)      (3.663)       $\bar{R}^2 = 0.47$

(13.98)      (2.155)      (0.495)       $\bar{R}^2 = 0.810$

$t_{2.5\%}(88-4) \approx t_{2.5\%}(88-3) \approx 2$

The coefficients of  $FDII$ ,  $GDP$  and  $\Delta GFCF$  are correctly signed and statistically significant. The degree of openness has a significant negative impact on FDI inflows. The coefficients associated to the variables  $REER$  and  $\Delta TB$  are positive but not statistically significant.

The residuals of the first equation making up model (3.6a) are stationary but the residuals of the  $GDP$  equation are not. Since the variables in the  $FDII$  equation are cointegrated, it is possible to estimate relation (3.7).

$$\hat{u}_{1t} = -7.401 + 0.087 \Delta GDP_t \quad (3.7a)$$

(-1.669)      (1.836)

$\bar{R}^2 = 0.027$        $t_{2.5\%}(88-2) \approx 2$        $t_{5\%}(88-2) \approx 1.66$

The coefficient associated to  $\Delta GDP_t$  is significantly positive as expected.

Furthermore, the fact that the residuals of the  $GDP$  equation are not stationary means that there is no long run equilibrium relationship between the variables involved in this equation. Another method will be used to check this: Johansen's procedure. Before moving on to Johansen's approach to cointegration analysis, the results of the diagnostic tests on each equation of model (3.6a) are presented. The first equation, i.e. the  $FDII$  equation, suffers from serial correlation between the error terms, non-linear relationship between its variables, non-normally distribution of the residuals, and heteroskedasticity. The second equation, as well, suffers from the same misspecification as the first.

Tests for exogeneity have, also, been performed. The purpose of these tests is to see whether the variable  $GDP$  should have been considered as endogenous in the  $FDII$  equation and vice versa. For details on tests for exogeneity, see Maddala, 2001, pp. 380-1 or Appendix 4 of this dissertation, pp. 43-4. The results for the tests confirm the hypothesis of mutual dependence between the two variables.

### 3.4.2 Johansen's Procedure

Another way of testing for cointegration and estimating long-run equilibrium relationship is the Johansen's maximum likelihood approach. This approach is based on the VAR representation of the variables in the model. For details on VAR models and test for cointegration using the Johansen's procedure see Greene, 2003, pp. 649-661; Maddala, 2001, pp. 543-69; Verbeek, 2000, pp. 277-305. The package used for the tests and estimations is Microfit 4.0. In the analyses of the data the variable,  $\Delta GDP$  has been treated as  $I(0)$  endogenous variable<sup>3</sup>.

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<sup>3</sup> Since the variable  $\Delta GDP$  is the first difference of the variable  $GDP$ , it has been rounded up to avoid that the correlation matrix in the unrestricted VAR model be singular. It will be impossible to test for cointegration and estimate cointegrating relations if the correlation matrix is singular.

A test has been carried out in order to select the order of the VAR. In the unrestricted VAR model used for the test, the maximum lag length is 6. The Akaike Information

Criteria (AIC) has suggested in the selection of a VAR model of order 4. The highest value associated to the AIC is -1197.2. Thereafter, a test has been carried out in order to find out the number of cointegrating relations that exists between the variables. A restricted VAR model with no intercept or trend has been used. The LR test based on the trace of the stochastic matrix has suggested the existence of two cointegrating relationships, for a level of significance of 10 percent. The results are reported below in Table 3.1.

**Table 3.1: Statistics from the LR test based on trace of the stochastic matrix**

Null Hypothesis	Alternative Hypothesis	Statistic	95% Critical value	90% Critical value
$r = 0$	$r \geq 1$	145.2549	110.1000	105.4400
$r \leq 1$	$r \geq 2$	80.9481	83.1800	78.4700
$r \leq 2$	$r \geq 3$	50.0079	59.3300	55.4200

Estimated eigenvalues: .30812, .20268, .14589, .13507, .052824, .011690.

After imposing exactly identifying restrictions and then over-identifying restrictions the two following cointegrating relations have been obtained.

$$\tilde{FDII}_t = 33.7175GDP_t + 23938.4DO_t + 14379.6REER_t - 2369751\Delta LC_t \quad (3.6b)$$

$$\tilde{GDP}_t = 12538FDII_t + 13277.5\Delta GFCF_t - 120190.2\Delta TB_t$$

The maximum likelihood estimates obtained are correctly signed. The coefficient of GDP in the FDII equation is positive; likewise, the coefficient of FDII in the GDP equation is positive. The degree of openness has a positive impact on FDII. REER is positively related to FDII and  $\Delta LC$  is negatively related to FDII.  $\Delta GFCF$  and  $\Delta TB$  are positively related to GDP.

Comparing the results obtained using the 2SLS and the Johnson's procedure, it can be said that the difference is not only in the magnitude of the estimated parameters but as well in their signs. In either case, the sign of FDII, GDP,  $\Delta GFCF$  and  $\Delta TB$  is the same but the one of DO and  $\Delta LC$  has changed.

The effects of the long-run FDII and GDP equations, and  $\Delta GDP$  on the short-run behavior of the  $I(1)$  variables in the model have been analyzed. The adjustment coefficients and the coefficients of  $\Delta GDP$  have been extracted from the error correction equations. Their values and t-ratios are in Table 3.2 on page 34.

The long-run FDII equation contributes significantly to the short-run movements of REER and  $\Delta LC$ . The long-run GDP equation contributes significantly to the short-run behavior of  $\Delta LC$  and  $\Delta GFCF$ .

$\Delta GDP$  has an impact on the short-run behavior of GDP and  $\Delta GFCF$ . The coefficient of  $\Delta GDP$  in the dynamic FDII equation is positive but not statistically significant.

**Table 3.2: Adjustment coefficients and coefficients of  $\Delta$ GDP in the error correction equations.**

	Error Correction Term		
	ecm1 <sub>t-1</sub>	ecm2 <sub>t-1</sub>	$\Delta$ GDP
FDII	.5156E-6 (0.16632)	-.1006E-4 (-1.1428)	.010913 (0.22523)
GDP	.4057E-7 (0.67436)	-.2639E-6 (-1.5445)	.99963* (1063.2)
DO	.3246E-7 (0.44752)	-.3447E-6 (-1.6731)	.0011189 (0.98691)
REER	-.1665E-5* (-2.2419)	.1092E-5 (0.51793)	.0067907 (0.58520)
$\Delta$ LC	.2016E-6* (3.1030)	.7114E-6* (3.8557)	-.7313E-3 (0.7313E-3)
$\Delta$ GFCF	-.1361E-5 (-0.51190)	-.1636E-4* (-2.1654)	.19326* (4.6499)
$\Delta$ TB	.2910E-6 (0.33509)	-.2783E-5 (-1.1282)	.3312E-3 (0.024403)

$t_{2.5\%} \approx 2$

## Summary

1. Economic growth and the size of the US measured by its GDP determine the flows of FDI they receive. Likewise, FDIs into the US have a positive impact on GDP. Using the results from the 2SLS estimations one can say that there is a feedback between FDI inflows, economic growth, and market size in the US.
2. Johansen's procedure has enabled to conclude that there is a long-run equilibrium relationship between FDI inflows into the US, GDP, degree of openness, labor cost, domestic direct investment and trade balance.. Using the 2SLS, one could not conclude about cointegration between these variables.



# Appendices to Chapter 3

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Nothing adds such weight and dignity to a book as an Appendix.  
- M Twain

## Appendix 1: Modeling the Relationship between FDI Inflows and Outflows

According to the theory of factor-endowments, if factor prices fail to equalize, capital will move from capital-abundant countries to countries poorly endowed with capital where marginal productivity of capital is higher. Also this theory predicts that two-way FDI can never occur. The reality is the complete opposite. International production does not follow the above pattern. Flows of FDI from DCs to LDCs are non-significant and most FDIs take place among DCs. The world's major sources of FDI flows prove to be, as well, the major receivers of FDI. There is therefore a positive relationship between the flows of FDI received by a country and the FDIs made abroad by its residents.

This hypothesis has been posited, tested and confirmed by Lipsey (2000). The slope parameter he obtained after regressing pooled annual FDI outflows on pooled annual FDI inflows was positive and highly statistically significant.

This investigation purports to further the work of Lipsey (2000) using various techniques to estimate the model with panel data and cointegration analysis.

### 1 The Model

The econometric model is:

$$FDIO_{it} = a_{0i} + a_{1i}FDII_{it} + u_{it} \quad (A1.1)$$

FDII, FDIO, and  $u$  are FDI inflows, FDI outflows, and the error term. The subscripts  $i$  and  $t$  represent a country of the panel and a period of time.

The assumptions underlying classical linear regressions, i.e. non-stochastic explanatory variables, homoskedasticity, etc are assumed to hold true. They will be tested for later on.

### 2 The Data

Quarterly data on inward and outward flows of FDI have been retrieved from the IMF IFS CD-ROM over the period 1978Q1-2001Q4. They are denominated in US dollar. Eleven (11) countries make up the panel: Australia, Austria, Canada, France, Germany, Japan, Netherlands, Spain, Sweden, the UK and US.

The stationarity of the variables are tested using Microfit 4.0. The decisions have been made using the Akaike Information Criteria (AIC).

The ADF tests reveal that the FDII and FDIO data for Australia, Austria, Canada, France, Japan, Netherlands, Sweden, and the US are  $I(1)$ . For Germany, the variable FDII is  $I(0)$  and FDIO is  $I(2)$ . For Spain, FDII is  $I(1)$  and FDIO is  $I(0)$ . For the UK, FDII is  $I(2)$  and FDIO is  $I(1)$  -See results in Tables A2.3, A2.4, and A2.5 of Appendix 2, on page 41.

### 3 The Methods and Results of Estimations

Three econometric techniques will be used to obtain estimates of the parameters of model (A1.1): the cross section estimators, the pooled estimators, and mean group estimators (Pesaran and Smith, 1995).

#### 3.1 The cross section Estimates

For each of the eleven countries, the variables FDII and FDIO are averaged over the time period of interest. The two sets of 11 averages computed will be used to run the following model.

$$\tilde{\text{FDIO}}_i = a_0 + a_1 \tilde{\text{FDII}}_i + \tilde{\mathbf{u}}_i \quad (\text{A1.2})$$

Where  $\tilde{\text{FDIO}}_i = \frac{1}{96} \sum_{t=1}^{96} \text{FDIO}_{it}$  and  $\tilde{\text{FDII}}_i = \frac{1}{96} \sum_{t=1}^{96} \text{FDII}_{it}$ .

The results of this regression are:

$$\tilde{\text{FDIO}}_i = 1.821 + 0.842 \tilde{\text{FDII}}_i + \hat{\mathbf{u}}_i \quad (\text{A1.2a})$$

(2.05) (5.8024)

$$\bar{R}^2 = 0.76563 \quad t_{5\%}(11-2) = 1.833$$

The positive relationship between the two variables is confirmed here. Both parameters are positive and statistically significant. The coefficient of determination is very high.

The model does not suffer from any misspecification (non-linearity, heteroskedasticity, etc).

#### 3.2 The Pooled Estimates

It is, first, assumed that the slope parameter in model (A1.1) is the same for all the country in the panel. Only the intercept changes across countries. Dummy variables are then introduced in model (A1.1) to capture the change of the intercept term across countries. Model (A1.1) becomes:

$$\text{FDIO}_{it} = \sum_{j=1}^{11} a_{0j} D_{ji} + a_1 \text{FDII}_{it} + \mathbf{u}_{it} \quad (\text{A1.3})$$

where

$$D_{1i} = \begin{cases} 1 & i = 1 \\ 0 & \text{otherwise} \end{cases} \quad D_{2i} = \begin{cases} 1 & i = 2 \\ 0 & \text{otherwise} \end{cases} \quad \text{etc.}$$

The results of the regression are in Table A1.1, below. The data used are the pooled ones.

Table A1.1: Estimates of the Dummy Variable Model Produced by Eviews

Variable	Coef	t-ratio
D1	-8.11263	-6.06379
D2	-8.14251	-6.07256
D3	-6.70435	-5.02541
D4	-2.68282	-2.01523
D5	-3.68778	-2.77037
D6	-3.56607	-2.6597
D7	-5.26848	-3.95298
D8	-7.24485	-5.4254
D9	-7.15185	-5.3521
D10	0.82639	8.618282
D11	-1.09344	-0.80168
FDII	0.44931	15.85827

$$t_{2.5\%}(\infty) = 1.966 \quad t_{5\%}(\infty) = 1.645$$

All the dummies, a part from the one for the US, are statistically significant. The slope parameter is positive and statistically significant. The residual sum of squares is 88483.73.

Now, its assumed that the intercept term is the same for all the 11 eleven countries in the panel. The dummies in model (A1.3) are dropped and replaced by a constant term. The model becomes:

$$FDIO_{it} = a_0 + a_1 FDII_{it} + u_{it} \tag{A1.4}$$

The results of the regression are:

$$\widehat{FDIO}_{it} = 3.108537 + 0.518931 FDII_{it}$$

(A1.4a)

(9.969)      (19.5124)

$$\bar{R}^2 = 0.264673 \quad t_{5\%}(\infty) = 1.645$$

The residual sum of squares is equal to 95681.27.

The F test carried out using the residual sum of squares rejects model (A1.4). The F ratio is equal to 7.1394.

### 3.3 The Mean Group Estimates

Model (A1.1) is estimated separately for each of the eleven countries in the panel. The average of the estimated parameters is thereafter taken. It can be either the simple average or the weighted one. Here the simple average will be considered. The results are presented in Table A1.2.

**Table A1.2: Results of the Estimation of Model (A1.1) for each of the 11 Countries in the Panel**

	Const.	FDII	R <sup>2</sup>
Australia	0.465 (-3.146)	0.201 (2.370)	0.046
Austria	1.380 (5.035)	0.409 (13.538)	0.657
Canada	0.926 (4.156)	0.697 (15.040)	0.703
France	-0.362 (-0.363)	1.977 (11.976)	0.600
Germany	5.300 (5.753)	0.267 (5.434)	0.231
Japan	4.583 (11.402)	0.709 (2.752)	0.065
Netherlands	1.601 (4.299)	0.897 (13.671)	0.662
Spain	-0.323 (-0.847)	1.092 (9.282)	0.473
Sweden	1.524 (5.582)	0.217 (4.017)	0.137
UK	4.606 (1.585)	0.991 (3.956)	0.134
US	8.159 (5.713)	0.393 (8.216)	0.412
Average Coef	2.5326	0.71355	

$$t_{2.5\%}(92 - 2) \approx 2$$

$$t_{5\%}(92 - 2) \approx 1.7$$

The positive relationship between FDII and FDIO is confirmed for each country. Furthermore, all the slope parameters are statistically significant. However, the diagnostic tests indicate misspecification in some cases. The regressions of countries whose data are not integrated of the same order are spurious. They have been run just in order to compute the mean group estimators.

For Australia, Canada, France, Sweden, and the US, cointegration, i.e. long run equilibrium relationship, was found between FDII and FDIO.

For Austria, Canada, Germany, Japan, Netherlands, the UK, and the US, the Granger causality test has enabled to conclude about mutual causality between FDII and FDIO. FDII Granger causes FDIO in Australia and France. In Spain and Netherlands, FDIO Granger causes FDII. Details on Granger causality test are on page 42-3

### Conclusion

The positive relationship between FDII and FDIO cannot be denied. It is not simply a positive relationship between the two variables but a long run equilibrium relationship (cointegration) in some cases.

Granger causality tests allow concluding that the two variables are not independent from each other. One causes the other or both tend to influence one another.

These results contradict the explanations and predictions of the factor-endowments theory.

## Appendix 2: Test of Stationarity with Various Time Series

A random time series  $Y_t$  is said to be stationary (more precisely weakly stationary) if 'its means and variance are constant over time and the value of covariance between two time periods depends only on the distance between the two time periods and not on the actual time at which the variance is computed' (Gujarati, 1995, p. 714). In algebraic terms,  $Y_t$  is weakly stationary if:

$$E(Y_t) = \mu \quad (\text{A2.1})$$

$$\text{var}(Y_t) = E(Y_t - \mu)^2 = \sigma^2 \quad (\text{A2.2})$$

$$E(Y_t - \mu)(Y_{t+k} - \mu) = \gamma_k \quad (\text{A2.3})$$

There are several ways of testing for stationarity (see Gujarati, 1995, pp. 714-20; Studenmund, 2001, p. 426-7). The most popular of these tests is the Dickey-Fuller (DF) unit root test for stationarity. The DF test assumes that a time series  $Y_t$  follows an autoregressive process of order 1:

$$Y_t = \rho Y_{t-1} + u_t \quad (\text{A2.4})$$

where  $u$  is the residual. If the estimated  $\rho$  is found to be equal to 1,  $Y_t$  is said to have a unit root or to be a random walk time series and therefore is non-stationary. If the estimated  $\rho$  is less than 1,  $Y_t$  is stationary.

An alternative specification of relation (A2.4) is:

$$Y_t - Y_{t-1} = \Delta Y = (\rho - 1)Y_{t-1} + u_t \quad (\text{A2.5})$$

$$= \delta Y_{t-1} + u_t \quad (\text{A2.6})$$

If  $Y_t$  is non-stationary i.e.  $\hat{\rho} = 1$ , the estimated  $\delta$  will be equal to 0, and  $\Delta Y_t$  will be a white noise or stationary. The first difference of a random walk time series is a stationary time series.

There are several variants of the DF unit root test. Here are some of them:

$$\Delta Y = \delta Y_{t-1} + u_t \quad (\text{A2.6})$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + u_t \quad (\text{A2.7})$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t \quad (\text{A2.8})$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \sum_{k=1}^m \alpha_k \Delta Y_{t-k} + u_t \quad (\text{A2.9})$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{k=1}^m \alpha_k \Delta Y_{t-k} + u_t \quad (\text{A2.10})$$

where  $t$  is the time or trend variable and  $m$  the number of lagged dependent variable introduced in the model.

Tests based on relation (A2.9) or (A2.10) are called augmented Dickey-Fuller (ADF) unit root tests because of the introduction of lags of the regressand as repressors to get rid of serial correlation.

To test whether a time series  $Y_t$  is stationary or not, one of the above relations is estimated. The following hypotheses are then formulated:

$$\begin{aligned} H_0 : \delta = 0 &\Rightarrow \rho = 1 \\ H_A : \delta < 0 &\Rightarrow \rho < 1 \end{aligned} \quad (\text{A2.11})$$

The test statistic is called Dickey-Fuller  $\tau$  statistic and is the estimated  $\delta$  divided by its standard error. The critical values are given by most of the econometric packages offering ADF tests.

If the absolute value of  $\tau$  statistic is less than the critical value for a given level of significance, the null hypothesis of non-stationarity is accepted. Otherwise, the alternative hypothesis of stationarity of  $Y_t$  is accepted.

If it happens that  $Y_t$  is found to be non-stationary. Another DF or ADF unit root test can be performed on its first difference  $\Delta Y_t$ . This is done by substituting  $Y_t$  by  $\Delta Y_t$  in relation (A2.4) and  $Y_{t-1}$  by  $\Delta Y_{t-1}$ . After that, a relation akin to (A2.6) or any of its variants is derived and estimated. The test of significance of the estimated  $\delta$  is the same as before.

If a time series is not stationary but its  $d$ -th difference is, it is said to be integrated of order  $d$  or to follow an  $I(d)$  process.

In running regression on time series, it is important to make sure that all the variables follow the same process. Otherwise, the results of the regression will be spurious. This is a necessary condition for cointegration.

ADF unit root tests have been performed on all the time series in model (3.4) using either relation (A2.9) or (A2.10). The data are US ones. The lag length is 11. The econometric package used is Eviews 4. The  $\tau$  statistics as well as the critical values are reported in tables below.

Table A2.1:  $\tau$  ratios from ADF unit root tests on the time series in model (3.6)

FDI Inflows	ADF tests including no intercept and no trend			ADF tests including intercept and trend		
	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference
FDII	N/A	N/A	N/A	-2.596407	-22.37476	N/A
DGDP	N/A	N/A	N/A	-6.652396	N/A	N/A
GDP	N/A	N/A	N/A	-1.101657	-6.652396	N/A
DO	N/A	N/A	N/A	-2.955734	-3.996962	N/A
REER	0.480071	-6.610450	N/A	N/A	N/A	N/A
LC	N/A	N/A	N/A	-1.836689	-3.306677	-12.40997
GFCF	N/A	N/A	N/A	-2.113941	-2.474346	-14.93701
TB	N/A	N/A	N/A	-3.448726	-2.368558	-22.16521
FDII reduc. form equat.	N/A	N/A	N/A	-2.257318	-4.692872	N/A
GDP reduc. form equat.	-1.348333	-9.921955	N/A	N/A	N/A	N/A
$u_1$ *	-2.908508	N/A	N/A	N/A	N/A	N/A
$W$ *	-1.750153	-12.56110	N/A	N/A	N/A	N/A

Lag length = 11

\* The ADF tests with no intercept and trend suggest the same evidence.

Table A2.2: Critical values, ADF unit root tests on time series in model (3.6)

Critical values	ADF tests including no intercept and no trend			ADF tests including intercept and trend		
	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference
5%	-1.944619	-1.944619	N/A	-3.462912	-3.462912	-3.463547

The results of the ADF tests on the variables FDI and FDIO for the eleven (11) countries in the panel are presented below in Tables A2.3 and A2.4. The econometric package used is Microfit 4.0.

**Table A2.3:  $\tau$  ratios from ADF unit root tests on the variables FDI**

FDI Inflows	ADF tests including intercept but no trend			ADF tests including intercept and trend		
	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference
Australia	-1.6850	-7.0555	N/A	-1.3889	-7.0109	N/A
Austria	-2.7479	2.7479	-11.1024	0.83301	0.83301	-11.1425
Canada	2.6918	-1.4355	N/A	1.6280	-3.7380	N/A
France	1.5714	-4.4398	N/A	-0.89812	-5.0246	N/A
Germany	4.3137	N/A	N/A	3.9222	N/A	N/A
Japan	-1.6560	-4.5021	N/A	-2.3751	-4.4500	N/A
Netherlands	1.9412	-1.9166	N/A	0.93310	-5.9197	N/A
Spain	-1.0241	-3.4790	N/A	-2.5076	-3.4963	N/A
Sweden	-2.2522	-11.6215	N/A	-3.2670	11.5493	N/A
UK	-1.1541	-2.8503	-4.8986	-2.3321	-2.2723	-4.7615
USA	-2.0354	-3.3833		-3.5359	-3.3531	N/A
Average $\tau$ ( $\tau_T$ )	-0.18515	-3.79357	-8.0005	-0.17424	-2.28826	-7.952
Average FDI inflows	-3.3305	N/A	N/A	-4.4004	N/A	N/A

**Table A2.4:  $\tau$  ratios from ADF unit root tests on the variables FDIO**

FDI outflows	ADF tests including intercept but no trend			ADF tests including intercept and trend		
	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference
Australia	-2.1952	-3.6751	N/A	-4.5109	-3.6088	N/A
Austria	1.3587	1.2293	-7.2564	-0.45723	-0.58163	-7.2161
Canada	3.0371	-3.2135	N/A	1.0575	-6.4719	N/A
France	-1.7873	-5.3695	N/A	-4.7631	-5.2871	N/A
Germany	-0.28776	-0.28776	-5.1697	-2.0352	-2.0352	-5.1398
Japan	-2.3385	-3.4732	N/A	-2.9010	-3.4494	N/A
Netherlands	1.3195	-4.0596	N/A	-2.4998	-4.4396	N/A
Spain	-5.6488	N/A	N/A	-6.4565	N/A	N/A
Sweden	-2.4882	-16.7871	N/A	-3.0039	-16.7380	N/A
UK	-1.3632	-3.4068	N/A	-2.4803	-3.4912	N/A
USA	-0.53127	-8.4291	N/A	-2.6414	-8.3880	N/A
Average $\tau$ ( $\tau_T$ )	-0.99318	-4.74724	-6.21305	-2.79017	-5.44908	-6.17795
Average FDI inflows	0.44322	N/A	N/A	-3.9778	N/A	N/A

**Table A2.5: Critical values of ADF unit root test**

Critical values	ADF tests including intercept but no trend			ADF tests including intercept and trend		
	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference
5%	-2.8955	-2.8959	-2.8963	-3.4626	-3.4632	-3.4639

Stationarity can also be tested for in a panel. There are tests such as: Levin and Lim (LL) tests –LL1 and LL2- and Im et al tests (see Cerrato, 2001; So Im *et al* 1997). The Im et al unit root test for dynamic heterogeneous panels is presented in this appendix. The model to estimate in order to test for unit root in the case of heterogeneous panel is given by relation (A2.12) or any of its alternative form.

$$\Delta Y_{it} = \beta_{1i} + \beta_{2i}t + \delta_i Y_{i,t-1} + \sum_{k=1}^m \alpha_{ik} \Delta Y_{i,t-k} + u_{it} \quad (A2.12)$$

$$i = 1, \dots, N : t = 1, \dots, T$$

The test hypotheses are:

$$H_0 : \delta_i = 0$$

$$H_A : \delta_i < 0 \quad (A2.13)$$

$$i = 1, \dots, N_1 ; \delta_i = 0, i = N_1 + 1, \dots, N$$

Separate unit root tests are performed for each of the cross units making up the panel. The average of the  $\tau$  statistic of the cross unit is then computed.

$$\tau_T = \frac{1}{N} \sum_{i=1}^N \tau_i \quad (A2.14)$$

$\tau_T$  is normally distributed. Its mean and variance are tabulated by So Im *et al* (1997) using Monte Carlo simulations. The test static is therefore:

$$\tau^* = \frac{\sqrt{N}[\tau_T - E(\tau_T)]}{\sqrt{\text{var}(\tau_T)}} \quad (A2.15)$$

If the test statistic is less than its critical value, the null hypothesis of stationarity is accepted: otherwise, it is rejected

### Appendix 3: Granger Causality test

Consider following model:

$$FDIO_t = a_0 + a_1 FDII_t + u_t \quad (A3.1)$$

where FDII and FDIO stand respectively for foreign direct investment inflows and foreign direct investment outflows.  $u$  is the stochastic disturbance. Assume model (A3.1) is estimated. The robustness of the slope parameter and the goodness of fit just confirm correlation between the two variables. They do not say anything about whether one causes another or whether both are mutually dependent. A way of finding out this is to perform Granger causality test.

The models to estimate for the test are:

$$FDIO_t = \sum_{j=1}^r \alpha_j FDII_{t-j} + \sum_{j=1}^r \beta_j FDIO_{t-j} + u_{1t} \quad (A3.2)$$

$$FDII_t = \sum_{j=1}^r \gamma_j FDIO_{t-j} + \sum_{j=1}^r \delta_j FDII_{t-j} + u_{2t} \quad (A3.3) \text{ where } .r \text{ is}$$

the lag length.

To test whether FDI inflows causes FDIO or not, model (A3.2) is considered as the unrestricted model of the test. The restricted model will be the following one.

$$FDIO_t = \sum_{j=1}^r \beta_j FDIO_{t-j} + u_{3t} \quad (A3.4)$$

Relation (A3.2) says that FDIO is explained by both its past values and the past values of FDII. Equation (A3.4) says that FDIO is just explained by its own past values. The test hypotheses will be addressed as it follows:

$H_0 : \alpha_1 = \alpha_2 = \dots \alpha_r = 0 \Rightarrow$  Relation (A3.4) holds true

$H_A : \alpha_1 \neq 0$  or  $\alpha_2 \neq 0 \dots$  or  $\alpha_r \neq 0 \Rightarrow$  Relation (A.2) holds true.

The test statistic is:  $F = \frac{(RSS_R - RSS_{UR})/r}{RSS_{UR}/(n-k)}$ , where  $k$  is the number of parameter in the unrestricted model, viz. relation (A3.2). The critical value for a given level of significance is:  $F(r, n-k)$ .

If  $F < F(r, n-k)$ , the restricted model is accepted; FDII does not cause FDIO.

If  $F > F(r, n-k)$ , the alternative hypothesis is accepted; FDII causes FDIO.

To test whether FDIO Granger causes FDII, a similar test is carried out. The unrestricted model will be relation (A3.3) and the restricted one will be the following one.

$$FDII_t = \sum_{j=1}^r \delta_j FDII_{t-j} + u_{4t} \quad (A3.5)$$

The test hypotheses are:

$H_0 : \gamma_1 = \gamma_2 = \dots \gamma_r = 0$

$H_A : \gamma_1 \neq 0$  or  $\gamma_2 \neq 0, \dots \gamma_r \neq 0$

The test statistic and the decision rules are the same as before.

One will have one of these four cases after performing these two tests:

- The first test may reveal that FDII Granger causes FDIO and the second test will reveal that FDIO does not Granger cause FDII. In this case, there is a unidirectional causality from FDII to FDIO.
- The first test may reveal that FDII does not Granger cause FDIO but the second test will reveal that FDIO Granger causes FDII. This means that there is a unidirectional causality from FDIO to FDII.
- The first test may indicate causality from FDII to FDIO and the second test also will indicate causality from FDIO to FDII. The two variables are therefore mutually dependent.
- The two tests reject the existence of causality. In this case, the two variables are independent.

#### Appendix 4: Test for Exogeneity

Consider model (3.6).

$$\begin{aligned} FDII_{it} &= \alpha_{2i} GDP_{it} + \alpha_{3i} DO_{it} + \alpha_{4i} REER_{it} + \alpha_{5i} \Delta LC_{it} + u_{it} \\ GDP_{it} &= \gamma_{1i} FDII_{it} + \gamma_{2i} \Delta GFCF_{it} + \gamma_{3i} \Delta TB_{it} + w_{it} \end{aligned} \quad (3.6)$$

In estimating the equations by 2SLS it is assumed that the variables FDI and GDP are mutually dependent. Tests can be performed in order to check this assumption. The tests for exogeneity are performed on each structural equation making up system (3.6). The purpose of the test for exogeneity performed on the first equation of model (3.6) is to check whether the variable GDP should actually be treated as exogenous. To do this a F-test will be carried out using the first equation of model (3.6) as a restricted model. The unrestricted model is given by relation (A4.1).

$$FDI_{it} = \alpha_{2i}GDP_{it} + \alpha_{3i}DO_{it} + \alpha_{4i}REER_{it} + \alpha_{5i}\Delta LC_{it} + \alpha_{6i}\widehat{GDP}_{it} + u'_{lit} \quad (A4.1)$$

where  $\widehat{GDP}$  is the fitted value of GDP from the reduced form equation. The restricted and unrestricted models are estimated by OLS. The residuals sum of squares are collected and the F ratio computed as seen in Appendix 3.

The test hypothesis is:

$$H_0 : \alpha_6 = 0$$

$$H_A : \alpha_6 \neq 0$$

If  $\alpha_6$  proves to be statistically different from 0, GDP is actually endogenous; otherwise it is not.

To check whether FDI should be treated as an endogenous variable in the GDP equation the same procedure will be followed. The restricted model will be the second equation of model (3.6) and the unrestricted model is the following.

$$GDP_{it} = \gamma_{1i}FDI_{it} + \gamma_{2i}\Delta GFCF_{it} + \gamma_{3i}\Delta TB_{it} + \gamma_{4i}\widehat{FDI}_{it} + v'_{lit}$$

(A4.2)

The results of the tests of exogeneity carried out on variables FDI and GDP are presented in Table A4.1.

*Table A4.1 Results of the test for exogeneity on variables FDI and GDP in model (3.6)*

	RSS <sub>R</sub>	RSS <sub>UR</sub>	F ratio
FDI equation	27416.22	26258.82	3.658359
GDP equation	7.55E+08	7.52E+08	0.335106

$$F_{5\%}(1, 83) \approx 3.9$$

$$F_{5\%}(1, 84) \approx 3.9$$

# Chapter 4

## FDI Policies

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... in the recent years there has been what is tantamount to a sea-change in the attitude of developing countries towards FDI. Increasingly, they now welcome all FDI and compete with one another to attract it.  
- South Centre

This chapter deals with host countries' FDI policies. They may aim at attracting more flows or protecting national sovereignty. FDI policies in some countries are investigated. An economic policy to attract FDI is then proposed. This paper is skeptical about the effectiveness of FDI policies consisting in offering tax concessions to appeal to foreign firms. It advocates that governments should simply try to fight economic recession and unemployment by pursuing an expansionary monetary policy. Caring about the growth of domestic direct investment and output means acting on market size, an important determinant of FDI inflows. The effectiveness of the FDI policy put forward in this chapter is tested using the results of the empirical investigations carried out in chapter 3 and other findings related to the US economy.

### 4.1 Some Countries' FDI Policies

A survey of FDI policies in Canada over the past four decades is made. After that, the way FDI policies are conducted in some corrupt LDC regimes is discussed.

#### 4.1.1 Canada

Canada is a major recipient of FDI, especially from the US, its southern neighbor. Over the past four decades, the Canadian government had an ambivalent attitude towards direct investment into Canada. Policy measures were adopted to foster and daunt FDI into Canada. Some of these policy measures were: the Foreign Investment Review Act (FIRA), the National Energy Program (NEP), Investment Canada Act, Free Trade Agreement (FTA), and the North American Free Trade Agreement (NAFTA).

The FIRA was adopted in December 1973. It required a review through application process of acquisitions and greenfield FDIs above a certain size in Canada. The implementation of FIRA started in April 1974 with the review by the Foreign Investment Review Agency of new acquisitions and control of Canadian firms by foreign producers. The review of new greenfield FDIs into Canada became operative from October 1975. Gliberman and Shapiro (1999) investigated the impacts of Canadian government policies

on both FDI inflows and outflows. They concluded that FIRA had no statistically significant impact on both flows of FDI.

The NEP was announced in October 1980. One of its objectives was to secure at least 50 percent Canadian ownership of the oil and gas industry in Canada. This program discouraged FDI into Canada especially in the oil and gas sector.

In 1985, the Canadian government made its FDI policy a bit supple. The Investment Canada Act which came into effect in June 1985 allowed foreign firms to invest freely in exempt sectors without any prior application. Instead of applying, the foreign investor just had to notify its venture in the exempt sector if it is above a certain size.

The FTA was negotiated between Canada and the USA in 1987. It, *inter alia*, gave US investors the same rights as Canadian residents to invest in non-exempt sectors in Canada. The FTA was extended to Mexico in 1994 and became NAFTA. The FTA and NAFTA have had positive impacts on both FDI inflows and outflows in Canada (see Globerman and Shapiro, 1999).

#### **4.1.2 FDI Policies in some LDCs**

Some corrupt regimes in LDCs, especially in Africa, without any rigorous economic agenda rely on and await foreign investors to save their economies from the crises and unemployment they have occasioned. Money is wasted to polish the image of the regime abroad and attract foreign investors. They are ready to grant tax concessions and overlook the negative externalities created by foreign firms. An investment project by a national agent from an opposite political party can be blocked or delayed, purposely, by local authorities. More attention is paid to the money-hungry foreign investor who is seen as a messiah. The consequence of this lack of wisdom is that FDI fails to contribute to economic growth in these LDCs. One reason for that is that the prerequisites for the growth effect of FDI, i.e. economic development, a developed financial system, etc, have not been created. Other reasons are the magnitude of the opportunity cost of tax concessions and the cost to the local environment and to the health of workers in the foreign-owned plants.

## **4.2 An Indirect but More Effective FDI Policy**

Monetary policy, especially open-market operations, seems to be a better way of attracting or discouraging FDI. It pushes domestic investment, FDI and domestic output in the same way. How this works and its effectiveness are treated here.

### **4.2.1 Open-Market Operations and FDI Inflows in Theory**

An open-market operation is the purchase or sale of government's securities by the central bank. This impacts directly on money supply and interest rate (see Froyen, 1999, p. 332). Assume that a country's central bank decides to buy government bonds from the public in exchange of money. This will result in an expansion of the **money supply and a**

fall in interest rate. Economic theory suggests a negative relationship between money and interest rate. This is illustrated by relation (4.1).

$$M^s = M^d M(r, Y)$$

$$\frac{\delta M}{\delta r} < 0, \frac{\delta M}{\delta Y} > 0 \quad (4.1)$$

where  $M^s$ ,  $M^d$ , and  $Y$  stand respectively for money supply, money demand, and domestic output (GDP).

The open-market operation will not only expand money supply and drop interest rate. It will also affect the country effective exchange rate (see Ethier, 1995, pp. 432-4). This latter will fall and later on rise. At this stage, the open-market operation has started influencing inflows of FDI since exchange rate is pointed to as a determinant of FDI (see pp. 12-4 of the dissertation). Exchange rate is not the only and main channel through which open-market operations are expected to affect FDI. It is said earlier that fall in interest rate will follow the expansion of the money supply. If interest rate falls, domestic direct investment will go up. Long-run interest rate is negatively related to domestic direct investment (I) as relation (4.2) suggests.

$$I = I(r, Y)$$

$$\frac{\delta I}{\delta r} < 0, \frac{\delta I}{\delta Y} > 0 \quad (4.2)$$

The national income identity suggests that an increase in domestic investment will positively impact on domestic output.

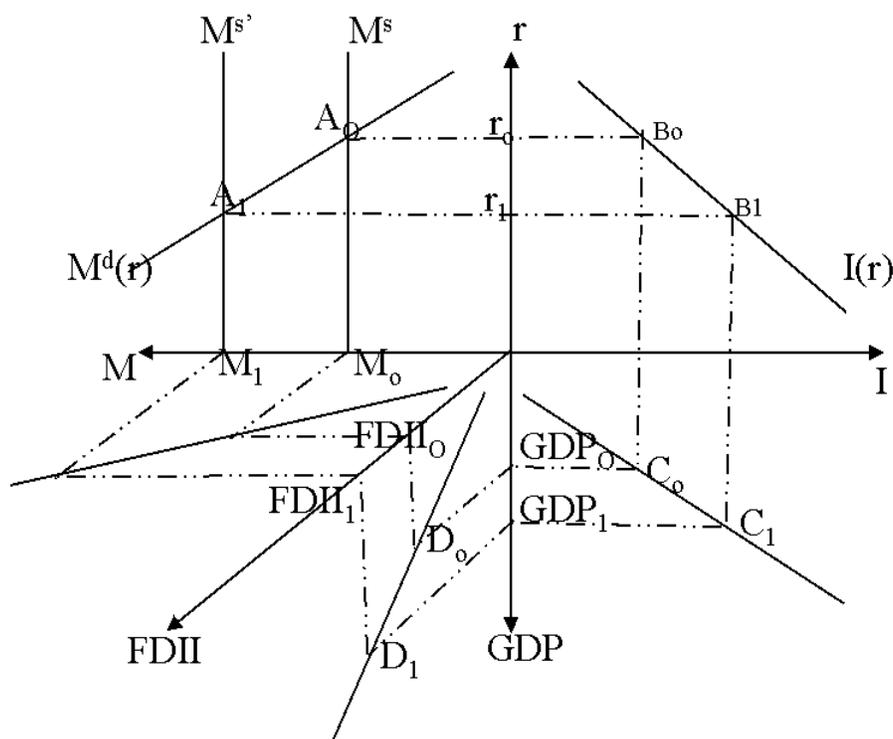
$$Y = C + I + G + X - M \quad (4.3)$$

$C$  and  $G$  stand respectively for consumption and government spending. If domestic output rises then FDI inflows will increase. Theoretically, an open-market operation consisting in buying government's bonds from the public will attract more flows of FDI. The way this works will now be illustrated using diagrams (see Figure 4.1 on the following page 48).

#### 4.2.2 Effectiveness of the Indirect FDI Policy

The analysis of US data helps conclude that an open-market operation will produce the expected effects on FDI inflows. Data on money M3 in the US, and on long-run interest rate proxied by the US government's 10-year bond yield are retrieved from the IMF IFS CD-ROM and added to the data used in Chapter 3. A correlation matrix has been produced using Eviews 4 (see Table 4.1 on page 48).

The data indicate a negative correlation between M3 and the long-run interest rate in the US. This does not imply causality but one can say that increase in the money supply induces actually a fall in the long-run interest rate. The data show as well a negative correlation between domestic investment and long-run interest rate. Now, both the findings from the investigations carried out in chapter 3 and the correlation coefficients in Table 4.1 are exploited. The results from the 2SLS estimations and Johnson procedure confirm that domestic private investment enters positively and significantly the GDP equation. This positive relationship between domestic investment and GDP is reflected in data in Table 4.1. The empirical investigations have also suggested that GDP causes FDI inflows.



**Figure 4.1: Representation of the transmission mechanism through which an open-market operation affects FDI inflows.**

**Table 4.1: Correlation Matrix made up of money M3, domestic and foreign direct investment, domestic output, and REER in the US.**

	M3	$\Delta M3$	r	GFCF	$\Delta GFCF$	GDP	FDII	REER
M3	1	0.648018	-0.83945	0.969044	0.042721	0.974278	0.663287	-0.02896
$\Delta M3$	0.648018	1	-0.34024	0.691624	-0.03502	0.580765	0.550489	0.379318
r	-0.83945	-0.34024	1	-0.80338	-0.14274	-0.87098	-0.48616	0.327546
GFCF	0.969044	0.691624	-0.80338	1	0.185518	0.978407	0.723671	-0.01182
$\Delta GFCF$	0.042721	-0.03502	-0.14274	0.185518	1	0.170662	0.172237	-0.12878
GDP	0.974278	0.580765	-0.87098	0.978407	0.170662	1	0.650915	-0.1448
FDII	0.663287	0.550489	-0.48616	0.723671	0.172237	0.650915	1	0.06383
REER	-0.02896	0.379318	0.327546	-0.01182	-0.12878	-0.1448	0.06383	1

US data confirm the effectiveness of the indirect FDI policy put forward in section 2.1 of this chapter. However, it is important to mention two things. First, the data do not indicate that the increase in the money supply is attributable to an open-market operation or other expansionary monetary policy. The effectiveness of open-market operations in expanding money supply is therefore assumed. Second, the correlation coefficients were

computed just for the purpose of description. More sophisticated econometric techniques are needed to test the effectiveness of open-market operations.

## Summary

1. Countries' FDI policy is about either fostering the entry of more FDI flows or discouraging them.
2. Canada had an ambivalent attitude towards FDI inflows. Various policy measures were adopted in order to reduce and increase inward flows of FDI.
3. Open-market operations may have better effect on FDI than tax concessions granted to foreign investors. Data have shown that increase in money supply in the US is likely to lead to an increase in FDI inflows.
4. Open-market operations are likely to do a better job in attracting more flows of FDI than other type of monetary policy. The reason is because they impact on two determinants of FDI inflows' exchange rate and GDP.





# Conclusion

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You cannot judge a book by its title.  
- Conventional Wisdom

This is an attempt to assess the achievements of the objectives of the dissertation. The limitations in the analyses as well the significant contributions to the economic analysis are pointed out. Finally, some unexplored issues related to FDI are recommended for further research.

## 1 The Limitations in the Analyses

### 1.1 The Survey of the Economic Literature on FDI

One may say that the survey of the economic literature on foreign direct investment has been confined to the contributions of English-speaking economists and that no endeavor has been produced to find out what economists who do not speak the *lingua franca* think about the issue. It is true that all the references used were written in English but among them there are some written by researchers from institutes based in non-English-speaking countries. Also there are some papers and books on FDI written in French and Spanish read but not quoted in the dissertation because they are not pioneering works and their contributions are not as significant as the ones of those listed in the references. Anyway the purpose of the survey of the economic literature on FDI presented in chapter 1 and 2 is not to account for what everyone has said but to present the most popular theories on FDI. However, it is acknowledged that there are some papers worth of reading which have not been used as references.

### 1.2 The Empirical Investigations

The simultaneous equation model estimated in chapter 3 is the following:

$$\begin{aligned} \text{FDII}_{it} &= \alpha_{2i} \text{GDP}_{it} + \alpha_{3i} \text{DO}_{it} + \alpha_{4i} \text{REER}_{it} + \alpha_{5i} \Delta \text{LC}_{it} + u_{it} \\ \text{GDP}_{it} &= \gamma_{1i} \text{FDII}_{it} + \gamma_{2i} \Delta \text{GFCF}_{it} + \gamma_{3i} \Delta \text{TB}_{it} + w_{it} \end{aligned} \quad (3.6)$$

In the first equation of the model, cost of labor in the recipient country is one the variables explaining the level of FDI inflows. The motivation for FDI into, say Madagascar, is it, *ceteris paribus*, the cheap labor cost in this country or the cheaper labor cost, i.e. labor cost in Madagascar compared with the one in Canada, France or the UK? It is clear that, *ceteris paribus*, it is the cost of labor in the host country compared to that elsewhere which motivates the decision of foreign investors. So instead of using the labor cost in the host country as regressor, one could have used the ratio of labor in the host country compared to that in other countries. Can anyone

suggest how to calculate such a ratio? When one has to study the flows of FDI from a given country to another one, such a ratio can be computed easily. But when it comes to study flows from many source countries into a particular country, there is no alternative better than using labor cost in the host country.

Another criticism of the empirical investigation is that the idea of endogenizing all the variables that are explained by other variables of the model has not been fully implemented. GFCF, for instance, could have been treated as an endogenous variable explained by GDP, FDI, and other variables such as long-run interest rate and FDI outflows. Some variables are omitted in the model. That may be the reason why the test for the selection of the maximum number of cointegrating relations has suggested 2 cointegrating vectors. This criticism is taken into account and a broader FDI model is proposed for further investigations.

## 2 The Main Contributions to Economic Analysis

An endeavor has been made to produce something different and original. Here are the main contributions of this paper to Economics.

### 2.1 The Necessary and Sufficient Conditions for FDI

The necessary and sufficient conditions for FDI were defined by Aliber (1993). The contribution made in this dissertation to Aliber's explanations is the illustration of these conditions using the concept of marginal efficiency of capital (MEC). These illustration enables to see clearly when an investor may decide to undertake an FDI (see Box 1.1 on page 9). This illustration allows to postulate a relationship between FDI and FPI in terms of the interest rate which Aliber did not suggest in defining the conditions for FDI. When the long-run interest rate abroad is higher than MEC of the FDI project and the MEC of the FDI project is higher than interest rate at home, an agent may chose to make FPI. If it happens than the long-run interest rate abroad falls after, assume, an expansionary monetary policy, the agent will find his investment in portfolio less profitable than building plants or acquiring a share of business in the recipient country.

### 2.2 The Concept of Trade Creation and Trade Diversion

A criticism has been made to the concept of trade creation and trade diversion put forth by Viner (1950). It has been argued that these effects do not hold true if one takes into account the fact that firms from countries which are not part of a customs union can make FDI to avoid the tariff barriers (see Appendix to Chapter 2 pp. 25-6).

### 2.3 The Modeling of the Feedback between FDI Inflows and Economic Growth

Some economists have ignored this feedback. Those who took it into account did not test it (see Chapter 3, pp. 27-34). This paper is the first having suggested that economic growth is unlikely to enter significantly the long-run FDI equation and is more likely to explain the dynamic FDI equation. Besides, a non-negligible contribution has been to literature on 2SLS. A way to extend the Engle-Granger residual-based ADF test to simultaneous equation models has been proposed.

## 2.4 The Relationship between FDI Inflows and Outflows

The predictions of the theory of factor-endowments have been weakened using 11 developed countries' FDI data (see pp. 35-8). The hypothesis of positive relationship between FDI inflows and outflows was tested and confirmed before. The main contribution in this dissertation has been to apply various techniques of estimating models with panel data, cointegration analysis, and test for causality to the analysis. This has enable a more cogent demonstration of the clustering of FDI among DCs.

## 2.5 Open-Market Operations and FDI Inflows

How open-markets operations can influence FDI inflows has been shown. The mechanism has been drawn and checked using US data (see Chapter 4, pp. 46-8).

### 3 Points for Further Investigations

An extended version of model (3.6) is advanced as point for further investigation. In this extended version, many variables will be accounted for simultaneously. Four structural equations made up the model. To the two equations of model (3.6), investment and money demand equations are added. Domestic investment is explained by GDP, FDII, FDIO, and long-run interest rate.

$$\text{GFCF} = F(\text{GDP}, \text{FDII}, \text{FDIO}, r) \quad (1)$$

In the GFCF equation, the explanatory variables FDII and FDIO are highly correlated (see results of the investigations in Appendix 1, pp. 35-8). To avoid the violation of one of the assumptions underlying estimation by OLS method, FDIO will be replaced by its linear combination with FDII. Relation (1) becomes:

$$\text{GFCF} = F(\text{GDP}, \text{FDII}, r) \quad (2)$$

The money equation is explained by GDP, long run interest rate, and price. The simultaneous equations to estimate are:

$$\begin{aligned} \text{FDII}_{it} &= a_{2i}\text{GDP}_{it} + a_{3i}\text{DO}_{it} + a_{4i}\text{REER} + a_{5i}\text{LC}_{it} + u_{1it} \\ \text{GDP}_{it} &= b_{1i}\text{FDII}_{it} + b_{2i}\text{GFCF}_{it} + b_{3i}\text{TB}_{it} + u_{2it} \\ \text{GFCF}_{it} &= c_{1i}\text{GDP}_{it} + c_{2i}\text{FDII}_{it} + c_{3i}r_{it} + u_{3it} \\ \text{M}_{it} &= d_{1i}\text{GDP}_{it} + d_{2i}r_{it} + d_{3i}P_{it} + u_{4it} \end{aligned} \quad (3)$$

Relation (3) can be modified depending on the results of the ADF tests. In relation (3), it is supposed that the residuals of the first equation explain economic growth.

Another area for further investigation is the relationship between FDI and FPI. A framework for this analysis has been provided in Box 1.1 on page 9.





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