Determinants of FDI in the Chilean Case: A FMOLS Analysis, 1970-2016

Miguel D. Ramirez[1]

[1] Professor of Economics in the Department of Economics, Trinity College, Hartford, CT.

Correspondence: Miguel D. Ramirez, Professor of Economics in the Department of Economics, Trinity College, Hartford, CT.

Abstract

This paper examines some of the major economic and institutional determinants of foreign direct investment (FDI) flows to Chile during the 2000s. It reports econometric results which suggest that standard economic variables and major changes in the institutional-legal status of foreign capital are, in large measure, responsible for the rapid increase in FDI flows to leading sectors of the Chilean economy. Cointegration analysis in the presence of structural breaks and FMOLS estimates for the 1970-2016 period suggest that market size, the real exchange rate, the debt-service ratio, education, physical infrastructure, and the Fraser Institute's economic freedom index are economically significant in explaining the variation in the stock of net FDI to the country. Dummy variables, designed to capture qualitative factors such as the impact of economic crises and institutional reforms, are also included and they have their anticipated signs and are statistically significant. The paper also addresses the long-term negative effects of rapidly growing profit and dividend remittances on the financing of capital formation and the Chilean balance of payments in recent years.

1. Introduction

With the onset of the decade of the 1990s and continuing into the first two decades of the 21st century, foreign direct investment (FDI) flows undertaken by transnational corporations (TNCs) have become one of the leading factors in promoting the process of economic globalization. Between 1990 and 1999 these flows averaged $264.3 billion on an annual basis, while during the 2000-2020 period they averaged a staggering $1,372.2 billion, or more than five times as much (see UNCTAD, 2003 and 2021). The acceleration in FDI inflows during the 1990s and early 2000s was notable because an increasing proportion of these funds were directed to the developing nations, including the countries of Latin America and the Caribbean. From a relative standpoint, Latin America's share of FDI inflows to developing countries rose from 29 percent in 1995 to an-all time high of 39.5 percent in 2000, before falling to 28.3 percent during the recession year of 2009, and then rebounding, respectively, to 30.5 in 2010 and 29.2 percent in 2012. The region's share fell sharply to an estimated average of 23 percent in 2013-19 following a significant decline in cross-border mergers and acquisitions in Central America, lower commodity prices resulting from the slowdown in the Chinese economy which reduced investment in extractive industries, particularly in South America, and the completion of major privatizations in industry, banking, and mining (see ECLAC, 2020; UNCTAD, 2021). Needless to say, the impact of the COVID-19 pandemic, beginning in 2020, on FDI inflows to the region has been quite severe as attested by the precipitous fall in inflows from $160.5 bn 2019 to an estimated $87.5 bn in 2020, and it remains to be seen whether these flows can resume their pre-pandemic levels (UNCTAD, 2021).

The increase in net FDI flows (the difference between inflows and outflows) channeled to these countries, particularly Chile, has been nothing short of spectacular when you factor in the relatively small size of Chile's economy. Between 1990 and 1997 Chile averaged net FDI inflows of $1.2 billion, while during the 1998-2018 period it raised its average more than fourfold to $7.2 billion (ECLAC, 2020, Table A1.10, p. 125). During the latter period, Chile's average ranked only behind Brazil ($67.2 billion), Mexico ($22.4 billion), and Argentina ($8.5 billion), much larger economies in terms of their ability to attract net FDI inflows (ECLAC, 2020, Table A1.10, p. 125). Supporters of market-based reforms contend that Chile's ability to attract FDI flows has been due, in large part, to Chile's relatively successful adoption and implementation of macroeconomic stabilization measures and market-based structural reform programs. In their view, stabilization programs have insured high and sustained rates of economic growth with relatively low inflation rates

since 1985, while structural reform policies have enhanced the overall efficiency of the economy via privatization and debt conversion programs, the liberalization of the tradeable sector, and the removal of overly restrictive FDI legislation concerning the repatriation of profits and local content and export requirements. The adoption of these macro stabilization and structural reform policies has reassured both foreign and domestic investors in the country's commitment to market-based, outward-oriented reforms (see Armendariz and Larrain, 2017, pp. 246-252; Edwards, 1999; Edwards and Lederman, 2002; ; Ffrench-Davis and Agosin, 1999; and Irwin, 2020).

However, critics of the neoliberal model argue that the rapid and far-reaching liberalization of the tradeable sector was undertaken with little or no regard to its negative impact on domestic industry, employment, and the environment; moreover, they contend that the removal of restrictions on the remittances of profits and dividends has generated in recent years a growing reverse flow to parent companies which has become a significant constraint on the balance of payments; in addition, they point out that the removal of local content requirements limits the ability of domestic firms to supply intermediate inputs to TNC's and thus partake in the process of "learning-by-doing" (see Chang, 2008; Cypher, 2014, 527-572; Ffrench-Davis and Agosin, 1999; Rodrik, 2018; and Weisbrot, 2015). Only time will tell if these market-based reforms are sustainable in the long run, particularly in the wake of recent economic and financial crises that have buffeted the region, as well as the current COVID-19 pandemic. What is indisputable, however, is that FDI flows will continue to play a strategic role in modernizing Chile's--and Latin America's—economy via the transfer of technological and managerial knowhow, as well as in providing future income and employment opportunities.

In view of the above, this paper analyzes the recent evolution, rationale, and major economic and institutional determinants of FDI flows to Chile. Chile was one of the earliest countries in the region to adopt and implement market-based reforms, albeit at great social and political cost. The process of economic and financial liberalization began following the brutal military coup of 1973 and, in recent years, Chile has further liberalized its FDI regime by modifying Decree Law 600 and its debt capitalization mechanism (Chapter XIX of the Central Bank's Compensation of International Exchange Regulations). FDI flows in the Chilean case have, historically, been channeled to traditional sectors such as mining and energy sectors. However, with the return of democracy during the nineties, a significant proportion of these funds have been channeled to export-oriented manufacturing operations or to non-traditional sectors such as renewable energy (wind farms) and industrial machinery using innovative technological processes and managerial techniques (see Alatorre and Razo, 2010). An analysis of the evolution and determinants of FDI flows to Chile during the decade of the nineties and beyond should uncover important trends and provide valuable policy insights to government officials seeking to attract these flows to the country.

The layout of the paper is as follows: First, it reviews the extant literature on the major economic and institutional determinants of FDI. Second, the paper gives an overview of net FDI flows to Chile in terms of their absolute magnitude and relative contribution to the financing of private capital formation. Third, the paper undertakes cointegration analysis and presents FMOLS estimates based on the cointegrating regression that identify some of the major economic and institutional determinants of the stock of FDI to Chile during the 1970-2016 period. The concluding section summarizes the major arguments and offers some policy prescriptions for attracting FDI into the region and enhancing its positive direct and indirect effects.

2. Conceptual Framework

One of the most comprehensive explanations of why TNC firms undertake cross-border investments has been put forth by John Dunning (1981;1988). He argues that TNCs invest abroad when three sets of relative advantages are present. First, the establishment of TNC subsidiaries gives the parent firms exclusive ownership rights over patents, trademarks, commercial secrets and production processes, thereby effectively denying access to both foreign and domestic competitors. Second, they generate for TNC affiliates locational advantages that arise from direct access to growing markets and lower unit labor costs, reduced transportation and communication costs, avoidance of tariffs and non-tariff barriers, and last but not least, direct access to raw materials, low-cost unskilled labor, and intermediate products that are indispensable for the production of certain goods. Michael Mortimore (2003), building on Dunning's work, argues that the relative importance of location specific determinants depends on TNC motivations for investing, *viz.,* whether FDI is motivated by market-seeking (access to internal and export markets), natural resource-seeking (access to natural resources and low-cost labor) or efficiency-seeking reasons (cost and quality of human resources and physical infrastructure resources).

Third, Dunning points to the relative advantages TNCs derive from internalizing certain operations because using market mechanisms can involve costly transaction and monitoring costs. For instance, many TNCs would rather establish a subsidiary abroad and assume directly the contractual and administrative costs associated with research, development, production, and marketing of a given product or service, thereby avoiding the transaction costs associated with leasing licenses and securing patents to undertake production or hiring the services of advertising agencies to market and distribute their products. In this connection, Markusen (1995) argues that firms choose direct investment

rather than licensing primarily because of the non-excludability property of new knowledge capital; *viz.,* it is too costly for TNCs to prevent licensees from "defecting" and copying the new technology at little cost and setting up their own domestic firms in direct competition with the TNCs (p. 182).

In addition to the relative advantages highlighted by Dunning, the more recent literature has emphasized the important role played by host country determinants in either attracting or discouraging FDI flows to developing countries. For example, countries that exhibit a greater degree of political and macroeconomic stability, the existence of well-defined and enforceable property rights when it comes to the transfer of technology, liberal legislation governing the remittance of profits and dividends, and limited or non-existent local content or export requirements tend, on average, to attract greater flows of FDI. However, from the standpoint of the host country, the very factors which act as an incentive for FDI flows in the short run may prove detrimental to long-term economic development if they lead to a net outflow of resources, few backward and forward linkages, and limited transfers of technology and managerial knowhow (see Blomstrom and Wolff, 1994; Cypher, 2014; Rodrik, 2018; and Yeager, 1999).

These institutional factors along with relevant economic policies are also a highly important factor in explaining FDI flows to developing economies such as Chile. For example, FDI is likely to be attracted to countries where governments ensure an adequate provision of economic and social infrastructure in the form of paved roads, ports, airfields, relatively cheap energy supplies, and a well-educated and disciplined work force. In this connection, several investigators have found that the availability of skilled workers and adequate physical infrastructure are important determinants of FDI flows because it enables TNCs to strengthen both their ownership and locational advantages, thus allowing them to expand their market not only in the host country but the region as well (see Cypher, 2014; Ramasamy and Young, 2004). In addition, FDI flows are likely to be encouraged by government policies that lead to the establishment of a legal-institutional framework that is conducive to business activity; *viz.,* one that significantly reduces the transactions costs associated with negotiating contracts, improves information about the quality of goods and services, and make sure that the parties to a formal agreement honor their commitments (see Yeager,1999).

Finally, a country's exchange rate policy plays a key role in altering its relative attractiveness to net FDI inflows. Not surprisingly, economists are not entirely of one mind when it comes to the optimal exchange rate strategy to pursue. For example, some investigators argue that a policy that keeps the real exchange rate undervalued relative to that of its key investment partners is, *ceteris paribus*, likely to enhance FDI flows because it artificially reduces the unit costs of the country's factors of production and thus enables investors to make a significantly larger investment in terms of the domestic currency. They also contend that it enhances the profitability of the export-oriented sector which, in turn, attracts FDI flows to them. Therefore, the amount of FDI should increase with a real devaluation of the domestic currency after a reasonable lag (see ECLAC, 1998; De Vita and Lawler, 2004).

Other researchers contend that a policy that leads to a real appreciation of the domestic currency is likely to encourage FDI inflows because it enhances the foreign currency (dollar) value of the remittances of profits and dividends back to the parent company (see Cypher, 2014; De Mello, Jr., 1997; and De Vita and Lawler, 2004). They underscore that it is the real rate of return on their initial (dollar) investment that matters to the parent company. In light of the conflicting views in the literature on the impact of the exchange rate on FDI flows, it is best, from a policy standpoint, to pursue a credible strategy that maintains the country's real exchange rate in line with that of its key trading and investment partners.

3. FDI Flows to Chile

The onset and aftermath of the debt crisis of the first half of the 1980s led to an absolute decrease in net FDI inflows to Latin America and the Caribbean, after which they began to increase steadily during the second half of the 1980s and posted a dramatic upward surge during the decades of the 1990s and 2000s. Net FDI flows to the countries of Latin America and the Caribbean rose dramatically from $8.4 billion in 1990 to $77.2 billion in 2000 and almost 100 billion in 2008, before falling precipitously to $72.2 billion in 2009 as a direct result of the adverse effects of the U.S. Great Recession of 2007-09 (see UNCTAD, 2016). However, in the wake of the dramatic commodity-induced economic recovery experienced by South America (particularly, Argentina, Brazil, Chile, and Peru) during the 2010-13 period, these net flows are estimated to have risen sharply to $150.2 bn in 2011, $160.9 bn in 2012 and $151.8 bn in 2013, before falling between 2014 and 2017 as a result of the unwinding of the commodity boom (see ECLAC, 2021; and UNCTAD, 2019). From a relative standpoint, the importance of these flows is revealed by Figure 1 below which shows that during 2011-2013 they averaged almost 3
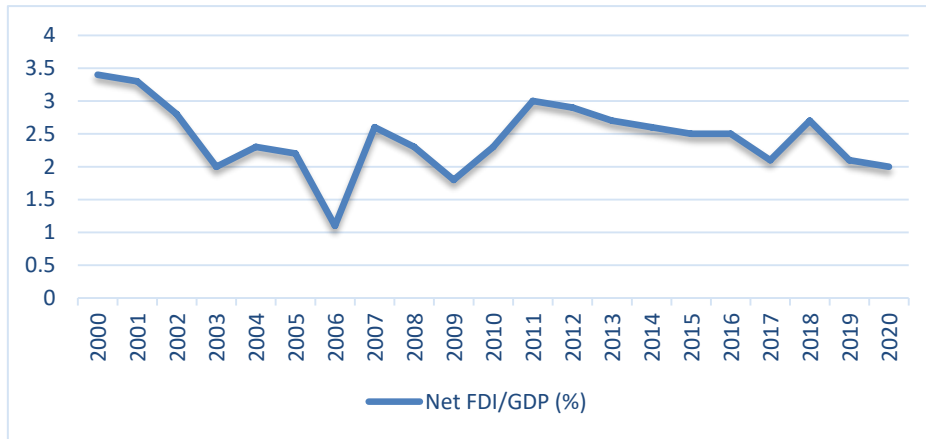
Figure 1. Net FDI Flows as a Percentage of Latin America's Gross Domestic Product: 2000-2020

Source: ECLAC (2021, Table A.14).

percent of the region's GDP, and despite the decrease in recent years—with the notable exception of 2018--net FDI flows as a percentage of GDP have not fallen below 2 percent.

The strength and resilience of FDI flows is revealed by the fact that despite the serious economic and financial crises that have buffeted the region, including the "Tequila crisis" of 1994-95, the 1997-98 Asian crisis, the Argentinean economic collapse of 2001-02, and the U.S.'s Great Recession of 2007-09, they have, time and again, managed to stage a remarkable recovery, particularly after 2002. Of course, in the wake of the COVID-19 pandemic beginning in 2020, net FDI flows to the region have been adversely affected falling to an estimated $92.2 bn in 2020, and it remains to be seen whether they can regain their former dynamism given the severity of the present crisis (see ECLAC 2021). In absolute terms, the major recipients of FDI flows have been concentrated in a few major countries of the region, in order of importance of the cumulative level of net inflows during the 2000-2019 period, they are Brazil, Mexico, Chile, Argentina, Colombia, Peru, and Venezuela. The major supplier of FDI flows to Latin America during the decades of the 1990s and 2000s (and historically) has been the United States followed, in order of importance, by Great Britain, Japan, China, Germany, and France (see ECLAC, 2021). In relative terms, Figure 2 below shows net FDI flows as a percentage of GDP for Chile and Mexico during the 2002-2019 period. The figure reveals that during the decade of the 2000s and beyond, both Chile and Mexico exhibited a strong record of attracting net FDI inflows, and with the exceptions of 2017 for Chile and 2012 for Mexico, these flows have not fallen below 1.0 percent of their countries' respective GDPs. More remarkably, in the case of Chile there are only two years when the ratio falls below 2 percent: barely in 2010 and significantly in 2019; in fact, for the entire 18-year period, net FDI inflows averaged a remarkable 3.2 percent for Chile, and a respectable 1.9 percent in the case of Mexico. FDI flows in the case of Chile have been directed primarily, but not exclusively, attracted to extractive and natural resource-based industries such as mining, fishing, and agriculture, while in the case of Mexico, the manufacturing and financial services sectors have been the major destinations of these flows.

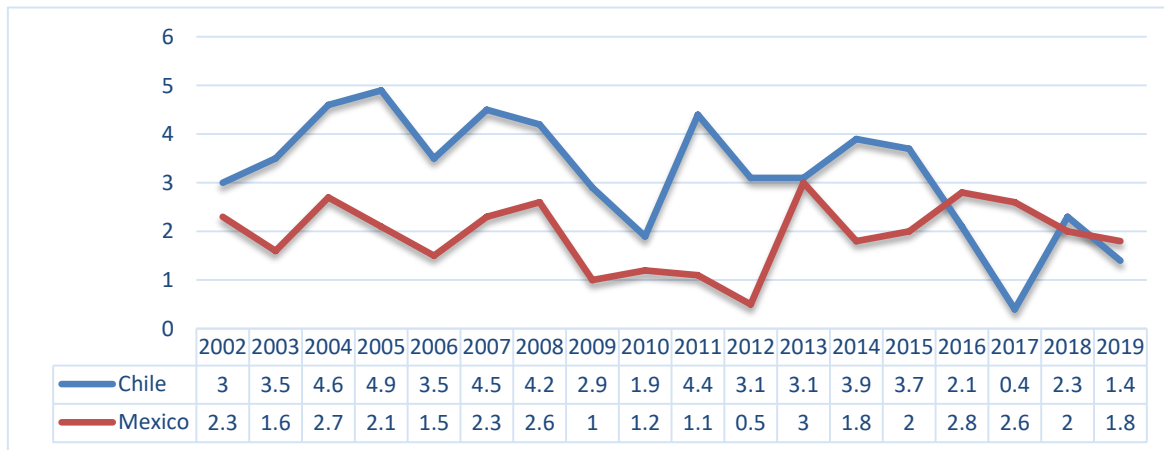|	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Chile	3	3.5	4.6	4.9	3.5	4.5	4.2	2.9	1.9	4.4	3.1	3.1	3.9	3.7	2.1	0.4	2.3	1.4
Mexico	2.3	1.6	2.7	2.1	1.5	2.3	2.6	1	1.2	1.1	0.5	3	1.8	2	2.8	2.6	2	1.8

Figure 2. Net FDI Flows as a Percentage of GDP, 2002-2019

Source: ECLAC (2021; 2012).

The importance of these net inflows is more fully appreciated by focusing on their evolution relative to their countries' gross fixed capital formation, since they are viewed as a source of investable resources to the host nation. Figure 3 below shows that throughout the decade of the 2000s, and particularly after 2003, net FDI flows represented for several years at least 15 percent of Latin America's gross fixed capital formation (GFCF), only falling below 12 percent in 2015 and 2017. In the case of Chile, these flows were particularly high up until 2015 and thereafter fell as a result of reduced investment in extractive industries following the unwinding of the commodity boom in South America, partly the result of the slowdown in the Chinese economy. Still, Chile's net FDI flows averaged 20 percent of gross fixed capital formation during the 2003-2019 period--the highest figure among the major countries of the region, or for that matter, the developing world.
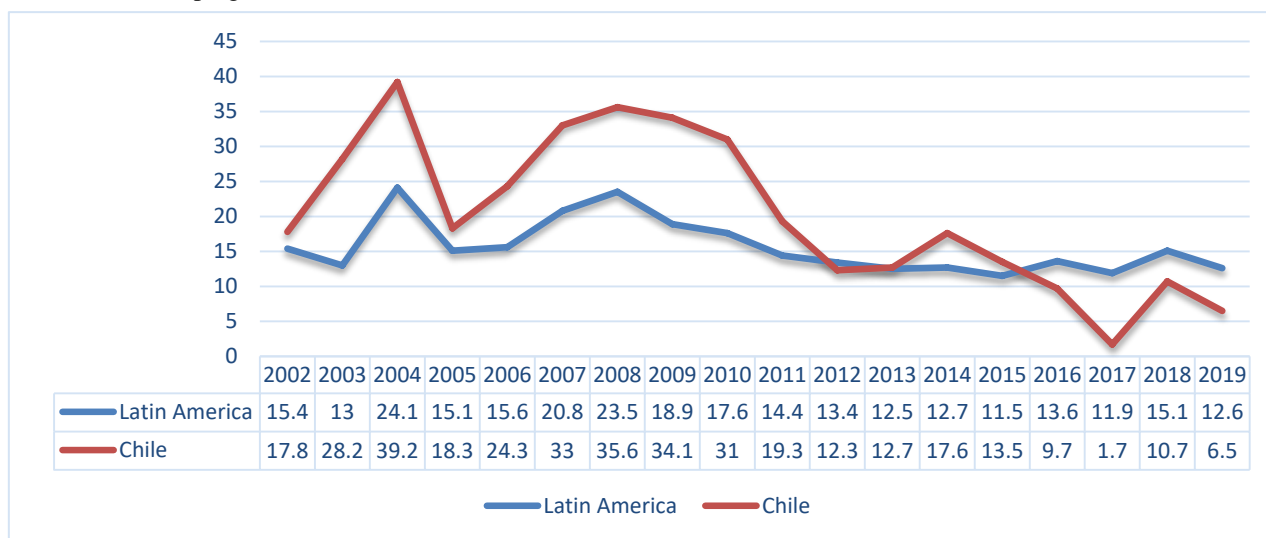

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Latin America	15.4	13	24.1	15.1	15.6	20.8	23.5	18.9	17.6	14.4	13.4	12.5	12.7	11.5	13.6	11.9	15.1	12.6
Chile	17.8	28.2	39.2	18.3	24.3	33	35.6	34.1	31	19.3	12.3	12.7	17.6	13.5	9.7	1.7	10.7	6.5

Figure 3. Net FDI Flows as a Percentage of GFCF, 2002-2019

Source: ECLAC (2021; 2012).

Critics of FDI , however, contend that instead of increasing the investable resources of the host nation, FDI flows divert resources away from capital formation because they generate a substantial reverse flows in the form of remittances of profits and interest to the parent companies, as well as through the widespread practice of intra-firm transfer pricing (see Chang, 2008; Cypher and Dietz, 2003; Cypher, 2014; Figueroa, 1998; Plasschaert, 1994; Ram and Zhang, 2002; and Rodrik, 2018). In their view, in order to assess the net contribution of FDI to the financing of private capital formation, one must first deduct from gross (or net) FDI inflows the repatriation of profits and interest to the parent companies, often residing in the U.S. for many of the countries in question.

Partial support for this contention can be surmised from the following figures: profit and interest remittances by Latin America and the Caribbean to the developed countries more than quadrupled between 2004 and 2012, from $33.6 billion to $158 billion (see ECLAC, 2012, Table 2.2.1.1, p. 97; and ECLAC, 2016, Table A1.1, p. 88). To put these figures in perspective, in 2004 and 2012, net FDI inflows to the region were respectively $50.8 and $148.5 billion; that is, reverse outflows in the form of profits and interest from Latin America and the Caribbean to the developed countries grew from an already high 66 percent of net FDI inflows in 2004 to over 100 percent (106.4 to be exact) in 2012! That is, during the year 2012 the outflow of resources (in the form of profits and interest) from the region exceeded the inflow in the form of net FDI by practically $10 billion. Insofar as Chile is concerned, given its highly liberal policies towards the repatriation of profits and dividends, it experienced a large outflow of net profits during the decade of the 2000s and beyond (see Edwards and Lederman, 2002). Figure 4 below shows that for the 2002-2016 period, the repatriation of net profits on FDI rose from $2.1 bn in 2002 to $10.3 bn in 2005 and a staggering $20 bn in 2007, and thereafter fell to $9.5 bn in 2014 and $6.2 bn in 2016. The preliminary figures for 2017 and 2018 indicate that after bottoming out at $5.1 bn in 2015, the net transfer of resources abroad resumed its previous pace rising to almost $10 bn in 2018. To put these figures in perspective, the outflow of net profits in 2014 alone represented 41.3 percent of the gross inflows of FDI into the country that year, and about as much as the net inflow of FDI which stood at $9.4 billion (ECLAC, 2016, p. 97; and UNCTAD, 2018)! In fact, relative to the country's gross inflows of FDI, Chile's repatriation of net profits on FDI during the 2002-2016 period averaged 77 percent (computed from ECLAC, 2017; and UNCTAD, 2016).

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Net Profits on FDI	2.1	3.9	7.2	10.3	18.7	20	14.5	11.8	14.8	13.8	11.8	12.3	9.5	6.6	5.1	5.7	9.7

Figure 4. Chile: Net Profits on FDI ($ bn): 2002-2018

Source: ECLAC (2020); and UNCTAD (2021).

Table 1 (Part B) below shows that the contribution of net FDI inflows, adjusted for the remittances of profits and dividends (and expressed as a proportion of fixed capital formation), is far less than that advertised by the *unadjusted figures* in Part A (or Figure 2 above). It even reveals that net FDI actually diverted resources away from the financing of capital formation during the 2002-2007 period, and in the more recent year 2017. In fact, Chile's remittances of profits and dividends during the 2000-2017 period far exceeded those of Mexico's, a much larger country which received far more net FDI inflows over the same interval (see ECLAC, 2021).

Table 1. Part A. Chile: Net FDI Flows as a Percentage of Gross Fixed Capital Formation, 1990-2017

1990	1993	1995	1997	1998	2000	2001	2002	2003	2005	2007	2009	2011	2013	2015	2016	2017
8.3	7.2	12.1	27.9	22.9	22.9	31.4	17.8	28.2	18.3	33.0	34.1	19.3	12.7	13.5	9.7	1.7

Part B.   Chile: FDI Inflows adjusted for the Remittance of Profits and Dividends as a Percentage of Gross Fixed Capital Formation, 1990-2017.[1]

1990	1993	1995	1997	1998	2000	2001	2002	2003	2005	2007	2009	2011	2013	2015	2016	2017
4.8	0.8	10.9	17.4	17.8	8.1	2.1	- 0.5	-11.3	-9.3	-17.8	2.2	4.9	8.4	3.1	0.4	-8.1

Source: United Nations, *World Investment Report*, 2019. New York: United Nations, 2019, Annex Tables 1 and 2; ECLAC, *Statistical Yearbook for Latin America and the Caribbean*, 2006. Santiago, Chile: United Nations, 2006, Table 2.1.1.54, p. 132, and Table 2.1.1.57, p. 135; and ECLAC, *Statistical* Annex, 2016, Tables A1-A3.[1]A negative value indicates that profits and dividend payments exceeded FDI inflows for that year, thereby diverting resources away from fixed capital formation.

Economic theory, however, suggests that rather than focus on the flows of FDI to the countries of Latin America, it is theoretically more appropriate to concentrate on the accumulated stock of FDI, because increases in the latter raise the host country's marginal productivity of private capital (and labor), a process that eventually translates into higher levels of output, employment creation, and potential tax revenues (see Bosworth and Collins, 1999). The stock of net FDI in Latin America (1990 dollars) rose from $175.6 billion in 1990 to $285.6 billion in 2000, and an impressive $1,133.3 billion in 2010; the preliminary figure for 2020 is $1460.1 bn (see ECLAC, 2007; and UNCTAD, 2021, Annex Table 2, p. 254). Just between 2000 and 2010, Latin America's stock of net FDI almost quadrupled—a cumulative increase which is greater than that of the entire "lost decade" of the 1980s and the first half of the 1990s! In this connection, Chile's performance mirrored and excelled that of the region, in view of the relatively small size of its economy compared to Brazil and Mexico—the major recipients of FDI flows in the region. Chile's stock of net FDI rose continuously from $34.6 billion in 2000 to $99.8 billion in 2010, and an impressive (preliminary) level of $127.1 bn in 2020, again, practically four times the level registered in 2000! (computed from UNCTAD, 2021, Annex Table 2,

p.254). From a relative standpoint, the rise of Chile's stock of inward FDI is even more striking, increasing from 59.1 percent of GDP in 2000 to 73.8 percent of GDP in 2010, and 77.8 percent in 2013; this is, by far, the highest share of any major country of the region, including Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela (see ECLAC, 2007; and UNCTAD, 2021). In addition to the direct effects associated with a greater stock of FDI, several investigators argue that there are indirect positive spillover effects on overall efficiency that arise from enhanced competition generated by foreign firms, the transfer of needed technology and managerial knowhow to local firms, and trade-induced learning-by-doing effects as local firms attempt to overcome competition in the global market (see Armedariz and Larrain, 2017; Cypher, 2014; De Mello Jr., 1997; Irwin, 2020; Ram & Zhang, 2002; and Vadlamannati and Tamazian, 2009).

4. Empirical Model and Results

In recent years, empirical work on the determinants of FDI flows to the region have arisen as a result of the renewed surge in net flows to these countries beginning in the second half of the 1980s and due to the availability of reliable and methodologically consistent time series data for a number of countries (see Armedariz and Larrain, 2017; Agosin, 1995; Bloomstrom and Wolff, 1994; DeMello, Jr., 1997; ECLAC, 1998 and 2000; Figueroa, 1998; Ramasamy and Yeung, 2004; Ramirez, 2000; Ros, 1994; and Zhang, 2001).

4.1 Model

Using a conceptual framework pioneered by Agosin (1995), Ramasamy and Yeung (2004), Ros (1994) and Zhang (2001), this study estimated a foreign direct investment (FDI) function of the following general form:

$$FDI_t = f(GDP_{t-i}, REX_{t-i}, DS_{t-i}, SED_{t-i}, PAVED_{t-i}; EFI_{t-i}, D_i) + \varepsilon_t \tag{1}$$

The included variables are: real GDP, the real exchange rate (REX), the ratio of debt service payments to exports of goods and services (DS), the number of students enrolled in secondary education (SED) as a proxy for human capital, the total kilometers or the percentage of paved roads as a proxy for physical infrastructure, the economic freedom index (EFI) generated by the Fraser Institute, and dummy variables (D_i) to explain the variation in the stock of net FDI (FDI) to Chile during the 1960-2016 period.[1] ε_t is a normally distributed error term. Chile's potential market size is proxied by the lagged value of real GDP because foreign investors make their investment decisions based on expectations generated, in part, by what the level of real GDP was in the preceding year. The sign associated with this variable is expected to be positive. The real exchange rate is included in the model because it is the most important link between economic policy and international competitiveness and, as explained in Section II, it is expected to have an indeterminate sign in the Chilean case.[2] On the one hand, a considerable proportion of net FDI flows to Chile, in recent years, are concentrated in foreign affiliates which have a strong export orientation, such as cellulose and paper, telecommunications, fishmeal, and manufacturing. A *ceteris paribus* real depreciation of the domestic currency (a rise in REX) should increase the profitability of these sectors and, *ceteris paribus*, induce an increase in the stock of FDI over time. On the other hand, a real depreciation of the domestic currency reduces the (dollar) value of the remittances of profits and dividends back to the parent company, thereby reducing the real rate of return on the parent company's initial (dollar) investment. According to this rationale, a *ceteris paribus* depreciation of the domestic currency will reduce the stock of FDI to the country. This variable is introduced with a lag because the decision to invest in new plant, machinery, and equipment in a foreign country takes time due to recognition, implementation, and institutional-legal delays.

The debt service payments- to- exports ratio, was included to measure country risk; *viz.,* the higher the ratio, the greater the probability that a BOP crisis will emerge which may lead to the imposition of restrictions on profit and dividend remittances, thereby depressing FDI flows to the country. This variable is also designed to capture the influence of external factors on the Chilean economy, such as the increase in the cost of credit and/or demand for the country's exports. It is anticipated to have a negative and statistically significant effect on the stock of FDI.

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[1] Agosin (1995) was the first to estimate a simple regression model that tries to explain the variation in FDI flows to Chile during the 1975-93 period. The results suggest that both the level of real GDP in constant dollars and the real depreciation of the exchange have a positive and statistically significant effect on FDI flows. A Dummy variable is used to capture the adoption of the debt conversion program (Chapter XIX), and he finds that it also has a positive and statistically significant impact on FDI flows. The major problem with this otherwise interesting paper is that the author does not undertake a cointegration and unit root analysis of the FDI investment relationship.

[2] It would be preferable to use a more direct measure of costs such as unitary labor costs. Unfortunately, data on Chilean unit labor costs for the period under review (going as far back as the sixties and early seventies) is not available in a consistent and reliable form.

The final quantitative variables, the number of students enrolled in secondary education (thousands) and the kilometers of paved roads (hundreds), were included, respectively, as crude proxies for the quality of the country's human and physical capital. Insofar as the education variable is concerned, it would have been preferable to have used the secondary enrollment ratio, but this variable was not available for the entire period. In the case of the physical infrastructure variable, the percentage of paved roads was also utilized and, as reported below, the results were not significantly different. The rationale for including these variables is relatively straightforward. For example, it is hypothesized that, *ceteris paribus*, the higher the level of education in the country, the more attractive it is to foreign investors both from a cost standpoint (lower unit labor costs) and a demand-side perspective (greater purchasing power and more informed consumers). In the case of physical infrastructure, it is hypothesized that the higher the percentage of paved roads in the country, the more attractive it is to TNCs because it allows them to move resources and distribute goods at lower cost (see Ramasamy and Yeung, 2004).

Turning to the qualitative variables, the economic freedom index generated by the Fraser Institute for Chile was included in the estimation for the 1980-2016 period due to unavailability of data before 1980. The general idea is that countries with greater economic freedom have a legal-institutional framework that is more conducive to business activity and economic growth than countries that adopt policies that restrict "economic freedom." This index is a summary measure of a number components of "economic freedom" such as monetary policy and price stability, the top marginal tax rate, legal structure and property rights, viability of contracts, and the rule of law. The index has a scale that ranges from 1 to 10, where a score of 10 represents the highest attainable level of economic freedom.[3] It is anticipated that this variable will have a positive and statistically significant effect on the accumulated stock of FDI to Chile. It should be noted that all of the countries in this study report indices that range between 2 and 8, with Chile and Costa Rica at the high end and Ecuador and Peru at the low end.

Dummy variable D_1 equals 1 for the economic crises years of 1970-1973 (administration of president Salvador Allende Gossens and 1973 military coup), onset and aftermath of debt crisis in 1982-83, and the downturn in economic activity induced by the 2008-09 Great Recession; it is 0 otherwise; this variable is anticipated to have a negative and statistically significant effect on foreign (and domestic) investment because of the uncertainty generated for expected returns from political turmoil and depressed economic activity. Again, these events may induce government officials to adopt a more nationalistic stance and impose restrictions on foreign investors in terms of the sectoral destination of FDI flows and the repatriation of profits and dividends. D_2 is set equal to 1 for the 1987-97 period (acceleration of real economic growth associated with the Chilean government's decision to pursue vigorously an outward-oriented strategy of economic development beginning in 1986-87. D_3 equals 1 for the debt-led growth years of 1978-81. Both D_2 and D_3 are expected to have positive and statistically significant coefficients. The model was also estimated with dummy variable D_2 multiplied by real GDP. By estimating this variable interactively with real GDP one can assess whether the consolidation of market-oriented reforms had a positive and significant effect on the capacity of market size to affect the stock of FDI.

4.2 Data

Economic data (including foreign direct investment) used in this study were obtained from official government sources such as the Instituto Nacional de Estadisticas (various issues), the Banco Central de Chile's Memoria Anual (various issues) and the Banco's comprehensive longitudinal publication entitled, Indicadores Economicos y Sociales, 1960-2001 [see August 2003 Excel edition]; and ECLAC, Statistical Yearbook for Latin America and the Caribbean (2020, Excel edition). Data was also obtained from UNCTAD, World Investment Report 2016-21.

The net FDI stock variable (KDI) in millions of 1977 pesos was generated using a standard perpetual inventory model. Initial stocks of private foreign capital were estimated by aggregating over four years of gross investment (1957-1960), assuming an estimate of the rate of depreciation of 5 percent.[4] Figure A1 in the Appendix shows the trajectory of the

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[3] It is important not to confuse economic freedom with political and civil liberties. Countries may confer upon their citizens a substantial amount of political and civil liberty in the form of fair and competitive elections and freedom of the press, but still pursue policies that are inimical to economic freedom such as high levels of taxation and excessive government intervention and regulation.

[4] There are no initial estimates for the foreign capital stock in Chile in 1960 or, for that matter, its rate of depreciation. This study constructed the stock of foreign capital in Chile based on the assumption that its general trend does not differ significantly from that of the country's total fixed private capital stock. The capital growth rate and depreciation estimates were obtained from Hoffman (2000, Appendix H, p. 277). The initial private capital stock is constructed on an assumed private capital stock growth rate of 3 percent (equal to the growth rate of GDP in 1940-60) and the following estimates for depreciation: 2.5 percent for construction (40 years of service life) and 7 percent for machinery and equipment (14 years). In view of the fact that there are no disaggregated data on the composition of foreign capital

natural log of this variable over the 1960-2016 period. GDP is real gross domestic product in millions 1977 pesos. REX is the real exchange rate (1978=100), where an increase represents a real depreciation of the domestic currency. DS is the ratio of debt-service payments- to- exports of goods and services variable; debt-service payments include both amortization (gradual payment of principal) and interest payments on the country's total external public debt. SED refers to the number of students matriculated in secondary education, and PAVED is defined as the total number of paved roads (in kilometers).

4.3 Cointegration Analysis

The variables were tested for unit roots given that macro time series data tend to exhibit a deterministic and/or stochastic trend that renders them non-stationary; i.e., the variables have means, variances, and covariances that are not time invariant (see Dickey and Fuller, 1979). Engle and Granger (1987) have shown that the direct application of OLS or GLS to non-stationary data produces regressions that are mispecified or spurious in nature. Table 2 below presents the results of running an Augmented Dickey-Fuller test (one lag) for the log of the variables in both level and differenced form under the assumption of a stochastic trend.[5] It can be seen that the variables in level form are non-stationary. In the case of first differences, however, the null hypothesis of non-stationarity (unit root) can be rejected for the relevant variables at least at the five percent level.

In view of the above, it is necessary to determine whether there is at least one linear combination of these non-stationary variables (in level form) that is I(0). In words, does there exist a stable and non-spurious (cointegrated) relationship among the relevant variables over the period in question? The Johansen and Juselius (1990) test was used to determine whether there is a stable long-run relationship among the relevant variables in logarithmic form, *viz.,* the natural log of the stock of FDI (LKDI), the log of real GDP (LGDP), the log of the debt service-to-GDP ratio (LDS), the log of the real exchange rate (LREX), the log of the number of students enrolled in secondary education (LSED), and the log of total paved roads (LPAVED). Application of the likelihood ratio (L.R.) test showed that the null hypothesis of no cointegrating relationship can be rejected at the 5 percent level (trace statistic = 72.69 > critical value = 69.82 (p-value: 0.029); and Max-Eigen statistic= 44.96 > critical value = 40.07 (p-value: 0.013), thereby suggesting that there is at least one unique linear combination of these non-stationary variables (in level form) that is stationary. The cointegrating regression (normalized on LKDI) is given below.

Cointegrating Equation:
Normalized cointegrating coefficients:

LKDI	LGDP	LREX	LDS	LSED	LPAVED	C
1.000	-1.365	0.053	0.169	-1.477	-0.959	38.03
	(0.387)	(0.037)	(0.098)	(0.438)	(0.397)	
	[t=3.53]	[t=1.43]	[t=1.73]	[t=3.37]	[t=2.42]	

Note: Standard errors are in parenthesis and t-ratios are in brackets.

The signs are reversed because of the normalization process and they clearly show that, in the long run, LGDP, LSED, and LPAVED have a positive and significant effect on the stock of FDI (LKDI), while LDS has a negative and statistically significant effect. LREX has a negative but marginal effect (at the 10 percent level) on the stock of FDI. It

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flows to Chile for the period under review (viz., structures vs. machinery and equipment), this study used a 5 percent depreciation rate (20 years of service life). The latter figure is the same as that used by ECLAC (1998) in its computation of capital stocks for several major Latin American nations (including Chile, see Technical Note 2, pp. 162-165. To ensure the robustness of the econometric results, other estimates of the rate of depreciation were used (1 and 10 percent), as well as different estimates of the initial foreign capital stock (e.g., summing over 3 and 5 years), but the results were not altered significantly.

[5] Unit root tests under the assumption of a deterministic trend also indicated that in level form the variables were non-stationary. Thus, the common practice of de-trending the data would not render them stationary. This study also undertook the confirmatory Kwiatkowski-Phillips-Schmidt-Shin (KPSS 1992) stationary (no unit root) test and rejected the null hypothesis of stationarity at the 5 percent level for the variables in level form. However, the null hypothesis of stationarity was *not* rejected for the variables in difference form at the 5 percent level. The results are available upon written request.

should be noted that the null hypothesis of no cointegration was also rejected at the 5 percent level when the log of real exports (LX) rather than LGDP was used to proxy market size (at least one cointegrating vector was present) (available upon request).

4.4 Gregory-Hansen Single Break Tests

Given that the likely presence of structural breaks may reduce the power of the (Johansen) cointegration test, Gregory-Hansen (1996) cointegration tests were also performed with a level shift and a regime shift for the period under review. o cointegration. The G-H test treats all variables as endogenous a la Sims (1980), with a level shift and a regime shift for the yearly data, thus offering a significant improvement over the results considered only under the Johansen tests. Under the null hypothesis of no cointegration in the presence of an endogenously determined (single) structural break, the results, shown in the Table below, confirm the presence of cointegration for the period under review. The break date is found by estimating the cointegrating relationship for all possible break dates in the sample period. The Rats 9.2 program uses an algorithm that selects the break date where the modified ADF*= inf ADF test statistic is at its minimum. The number of lags, determined endogenoulsy by the Schwarz Criterion, was 0 for all tests except the test for the monthly data with a level shift, which was tested with 1 lag.

Gregory-Hansen Cointegration Test Results

	Minimum t-statistic	1% Critical Value	5% Critical Value	Break Date
Level break	-5.30	-5.77	-5.20	1970
Full break	-5.75	-6.02	-5.70	1970

The results reject the null hypothesis of no cointegration (in the presence of a structural break) in both the intercept and full break cases. The break date for the level break (intercept shift) is 1970, while the break date for the full break (intercept and slope of cointegrating vector) is also 1970.

4.5 FMOLS Results

Having shown that the individual variables in question are I(1), and that there is at least one unique linear combination of these non-stationary variables (in level form) that is stationary, eq. (1) can be estimated via long-run cointegration regression models. These include the fully modified ordinary least squares (FMOLS) proposed by Phillips and Hansen (1990) and the dynamic ordinary least squares model proposed by Stock and Watson (1993). In this study we utilize the Phillips and Hansen (1990) methodology because their findings showed that the FMOLS estimator is extremely consistent even in the presence of both endogeneity and serial correlation of any order. This is because the FMOLS estimator employs a semi-parametric correction to eliminate the problems caused by the long-run correlation between the cointegrating equation and stochastic regressors innovations, and thus generates asymptotically unbiased and fully efficient estimates. In view of the structural break for 1970 detected by the Gregory-Hansen test, the cointegrating regression based on FMOLS is estimated for the 1970-2016 period to insure the reliability of the results.

The long-run estimates for the various models estimated (with and without dummy variables to ensure robustness) are presented in Table 3 in the Appendix. As can be seen from Eq. 1 (without the dummies), all the variables in question have their anticipated signs and are significant at least at the 5 percent level. For example, a one percent increase in LGDP increases the level of the stock of FDI in the long run by 1.59 percent, while a one percent increase in the number of students matriculated in secondary education (LSED) generates a long-run rise of 1.8 percent in the level of the stock of FDI, ceteris paribus. The debt service ratio (LDS) variable has a negative and significant effect and suggests that a one percent increase in this ratio will decrease the level of the stock of FDI by 0.3 percent in the long run. Insofar as spending on infrastructure is concerned, the estimates suggests that a 1 percent increase in total paved roads will increase the stock of FDI by 0.61 percent, ceteris paribus. The positive sign for LREX is opposite to the one reported in the normalized cointegrating equation above, but the significance was marginal (at the 10 percent level) and, after all, the expected sign for this variable was indeterminate. The reported long-run estimates of the variables in Eq. 2 of Table 3 when all the dummy variables are included in the cointegrating regression are consistent with those reported in Eq. 1 (see also Eqs. 3 and 5).

The FMOLS model was also estimated with dummy variable D2 multiplied by the log of real GDP. By estimating this variable interactively with the log of real GDP one can assess whether the consolidation of market-oriented reforms had a positive and significant effect on the capacity of market size to affect the level of the stock of FDI in the long run. The results are reported in eq. (3) of Table 3 and they suggest that the reforms enhanced further the positive impact of market size on the stock of FDI. Finally, Eq. (4) in Table 3 reports estimates that include EFI as the relevant proxy for Chile's degree of "economic freedom" or the degree to which the legal-institutional framework of the country is conducive to business activity. The coefficient for the EFI variable suggests that it is positive and significant when lagged one period, viz., a 10 percent increase in the index generates a 1.3 percent rise in the stock of FDI to the country.

However, this long-run estimate should be interpreted cautiously because the sample period had to be shortened to 37 years due to the unavailability of data for the EFI.

5. Summary and Conclusions

First, the evidence for Chile suggests that gross and net FDI flows have been substantial during the decade of the nineties and the first two decades of the 21st century, particularly in relation to GDP and gross fixed domestic capital formation. However, once profit and dividend remittances are deducted from gross or net FDI inflows, the contribution of FDI to the financing of capital formation, although increasing in most years, is far less than advertised--and for some recent years, it has, in fact, diverted resources away from the financing of capital formation; that is, the outflow of profits has exceeded the net inflow of FDI.

Second, the Johansen cointegration test indicated that there is a stable relationship among the relevant non-stationary variables which keeps them in proportion to one another over the long run. This is a highly important contribution to the extant literature because previous econometric studies relating to Chile have failed to determine whether the estimated relationships were spurious or not. Given that the likely presence of structural breaks may reduce the power of the (Johansen) cointegration test, Gregory-Hansen cointegration tests were also performed with a level shift and a regime shift for the period under review. The results identify a structural break in 1970 and reject the null hypothesis of no cointegration in both the intercept and full break cases.

Third, the FMOLS results suggest that market size (proxied by real GDP), the real exchange rate, the debt-service ratio, the human capital variable, and the physical infrastructure variable had their anticipated signs and were statistically and economically significant in explaining the variation of the stock of net FDI to Chile over the 1970-2016 period. In addition, the included dummy variables and the economic freedom index (EFI) reported by the Fraser Institute had their expected effects and were statistically significant. In particular, the interactive dummy term suggests that institutional reforms have enhanced the effect of traditional variables such as real GDP in attracting FDI flows to the nation. The results for the EFI variable, however, should be interpreted with care given the paucity of the data for the index and its subjective nature.

From a future research standpoint, investigators may want to determine whether the massive inflows of FDI the country has received in recent years have been directed away from traditional (mining and agricultural) sectors and towards "greenfield" sectors (IT, renewable energy, and industrial machinery), where positive direct and indirect effects in the form of intangibles such as the transfer of technology and managerial knowhow are likely to be present. If econometric evidence from a *panel cointegration* study shows that FDI flows directed to these sectors over time have had a positive and economically significant effect on labor productivity growth, then it may help offset the short-term costs associated with generous subsidies, tax concessions, and pressures on the balance of payments as a result of the substantial growth in TNCs' remittances of profits and dividends from the country in recent years. The reported estimates suggest that net FDI flows will be attracted, on a long-term basis, to developing countries such as Chile provided that policy makers avoid sharp depreciations of the real exchange rate that lower the real (dollar) rate of return on FDI investments and implement policies that ensure the availability of a well-educated citizenry, provide adequate physical infrastructure, and promote and consolidate the rule of law. The experience of Chile also indicates that policies that disincentivize short-term inflows (via the use of unremunerative capital controls) can attract net FDI flows to developing nations.

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Appendix

Table 2. Chile: Unit Root Tests for Stationarity, Sample Period 1960-2016.

Variables	Levels	First Difference	5% Critical Value[a]	1% Critical Value
LKDI	-0.36	-3.14*	-2.92	-3.56
LGDP	0.65	-6.62**	-2.92	-3.56
LREX	-2.43	-3.61**	-2.92	-3.56
LX	0.34	-7.20**	-2.92	-3.56
LDS	-1.93	-7.01**	-2.92	-3.56
LSED	-1.61	-7.99**	-2.92	-3.56
LPAVED	0.83	-5.19**	-2.92	-3.56

[a]Total number of observations is 57 which exceeds critical threshold of 50. Mackinnon critical values for rejection of null hypothesis of a unit root under the assumption of a stochastic trend.* Denotes significance at the 5 percent level; **denotes significance at the 1 percent level. Estimations undertaken with Eviews 11.0

Table 3. Chile: FMOLS estimates, 1970-2016 (dependent variable = $LKDI_t$)

Variables	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)
Constant	-43.52	-32.71	-32.72	-32.83	-40.08
	(-13.03)**	(-10.01)**	(-10.18)**	(-7.53)**	(-13.65)**
$LGDP_t$	1.59	1.75	1.75	1.06	1.76
	(7.15)**	(11.17)**	(11.19)**	(4.10)**	(9.64)**
D_2*LGDP_t	----	----	0.02	----	----
			(2.97)**		
EFI_t	----	----	----	0.13	----
			(2.41)**		
$LREX_t$	0.04	0.09	0.09	0.17	0.05
	(1.92)**	(5.72)**	(5.73)**	(2.07)**	(3.03)**
LDS_t	-0.30	-0.28	-0.27	-0.13	-0.26
	(-7.85)**	(-9.77)**	(-9.77)**	(-2. 79)**	(-8.14)**
$LSED_t$	1.81	0.79	0.80	1.21	1.58
	(6.01)**	(2.51)**	(2.53)**	(3.22)**	(5.72)**
$LPAVD_t$	0.61	0.76	0.75	0.97	0.47
	(2.44)**	(3.89)**	(3.91)**	(3.92)**	(2.25)**
D_1	------	-0.15	-015	----	-0.17
		(-2.51)**	(-2.52)**		(-2.49)**
D_2	----	0.16	----	----	----
		(2.92)**			
D_3	----	0.17	0.17	----	----
		(3.91)**	(3.92)**		
Adj.R^2	0.99	0.99	0.99	0.99	0.99
S.E.	0.13	0.12	0.12	0.11	0.13
L.R. var.	0.02	0.01	0.01	0.01	0.01

t-ratios in parenthesis. *Significant at the 10% level; **significant at the 5% level. L.R. var. = Long-run variance. N=47 observations, except for eq. (4) where N=37.