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Strategies for DFI in the Caribbean and Latin America under Trade Liberalization [2009-2022]

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Abstract

This paper determined the differential impacts of factors that affect inward direct foreign investment [DFI] in the Caribbean and Latin America. The variables considered explained 65 % and 66% of the variations in DFI in the Caribbean and Latin America.

Of these variables, the capital to labor ratio in the infrastructure group, private sector access to credit in the human capital/private sector group, and the exchange rates in the trade policy group had a stronger positive impact on DFI in the Caribbean than in Latin America. Of the production sector variables, the agriculture sectors had a greater impact than the service on DFI over the [mining and construction] sector. The real interest rate in the monetary/fiscal policy group and the tax on trade in the trade policy group had a more detrimental impact in the Caribbean than in Latin America.

In Latin America, the market size in the market group has a greater positive impact on DFI than in the Caribbean, and of the production sectors, the impact of manufacturing was greater impact than the service sector over the other [mining and construction] sector. DFI in the Caribbean has a stronger negative correlation with carbon dioxide emissions in the Caribbean and in Latin America, the political rights variable was more detrimental.

Keywords: DFI; Latin America; Caribbean; International Trade; Finance**.**

1. Introduction

DFI has always played a role in Caribbean development, especially as it relates to transmitting new technology, building human capital, job creation, promoting exports, and in general, uplifting the standard of living. New challenges have been emerging through trade liberalization, which are forcing Caribbean countries to reorganize their economies and find ways to compete in the international markets. Such changes require capital, and despite the setback facing the Caribbean, in terms of withdrawal of preferential markets and concessions, and the loss of capital through the reduction of foreign aid, and tariff revenue, the Caribbean must respond. Domestic taxation, as a source of revenue, offers little scope and causes misery at the domestic level, and borrowing from development banks and other sources has proved to be an infeasible option and has left many countries in financial debt.

Each new wave of trade liberalization brings with it its own set of structural changes. Preparing to face the new challenges requires capital, as Countries may need to revise their strategies and change their productive infrastructures and institutions to meet the new challenges. Countries have been turning once again to Foreign Direct Investment [DFI], as a source of needed capital and technology.

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Historically, the main sources of DFI to the Caribbean has been the United States, which supplies about forty percent of it DFI, and Europe, which account for about seventeen percent. But these sources have tended to fluctuate from year to year. In particular, over the last decade, DFI has shifted emphasis from Europe to Asia and the Pacific, and to Africa and the Middle East [ECLAC, 2022], DFI to the Caribbean being very limited. But partly accounting for this fluctuation is the competing demands for DFI from neighbouring Latin America. In more recent years, because of the pandemic, and other international demands [wars, food, medical supplies, etc.], Global DFI has decreased, but has in 2022 and 2023, the region saw a rebounded.

Caribbean countries are constantly being urged to develop strategies, not just to attract DFIs, but to attract them in areas that will help develop strategic capabilities [ECLAC, 2022]. In particular, to have a strong and flexible economic base and being able to compete in the international markets, the Caribbean is advised to aim more at improving such areas as innovation and productivity, the diversity of its economic base, and productivity efficiency.

In this context, the objective of this paper is to determine the differential impact of strategies to influence inward DFI in the Caribbean and Latin America, as a means of advising policies to attract DFI in the Caribbean.

Both the long-run and short-run and DFI strategies will be examined as the length of the investment horizon may influence the strategy and thus the policies developed.

This paper focuses on DFI in general, not strictly US DFI in the Caribbean, even though DFI from the U.S. constitutes the single major source of DFI to the Caribbean.

2. Theories on DFI

Foreign direct investment [DFI] refers to investments which an investor makes in a country other than his own. DFI is similar to any capital investment, but in DFIs, the investor exercises ownership and control, and would usually have an office with the country of investment.

Stephen Hymer [1976] was documented as the first to postulate a theory that dealt specifically with DFI. He noted that unlike capital investment, which is also known as portfolio investment, DFIs, with at least ten percent voting stock, exercised effective or substantial control over decision making regarding the investment.

As in the case of any other investor, the general view is that DFIs are driven by profit motives, and it is reasonable to argue based on that, that from an economics point of view, DFIs would exploit any means or opportunity to satisfy this motive.

But in order to understand the foundation of DFI, it is necessary to go back to Adam Smith [1776 in Fleischacker, 2004] who created the groundwork for DFI with his theory of division of labor and specialization. He showed that an individual may specialize in an activity based on his ability and by acquiring tools and the skills to use them effectively, and by the same argument, an organization may specialize by acquiring specialized equipment and hiring and training skilled operators.

Richardo's theory [1817] developed the idea of factor endowment and comparative advantage by showing that countries can specialize in producing goods in which they are better endowed with the necessary factor of production and so can produce more efficiently. They can then trade with each other and each would be better off.

The Heckscher–Ohlin mathematical model of international trade, built on David Ricardo's theory of comparative advantage and showed that the patterns of commerce and production based on the factor endowments in a trading region can be predicted [Heckscher, 1919 & Ohlin, 1933 in Branko,1999].

Under the assumption of perfect competition and factor cross-border immobility, the division of labor and specialization was the motivation behind comparative advantage. This inspired the profit-making opportunity that further inspired cross border capital investment and trade.

Mundell [1957] extended Ricardo's theory of comparative advantage by developing a model encompassing two countries, two products, two factors of productions and two identical production functions in both countries.

The logical step was that if markets were efficient, with no barriers to trade or competition, international trade would be the only mode of participation in the global markets. It is against this background that Hymer [1976] advanced his 1960 theory of Direct Foreign Investment.

Following the Second World War, other theories of DFI, based more on market inefficiency imperfect markets followed. These theories are as follows:

2.1. Location-based theories

Factor or resource endowment provides a strong incentive for DFI, but whether a DFI is pursuing market efficiency or asset seeking opportunities, the profit motive takes cognizance of any other location [country]-specific factors, such local market size, productive infrastructure, labor availability and Government policy and these can also influence its investment decision.

The Gravity theory [Popovici & Calin, 2014], which argues that similarities, whether it is geographical, economic, and cultural, between a host country and a recipient country can influence a DFI's decision to invest. Gravity variables include such factors as country size, level of development, distance from a DFI country, common language, and institutional considerations such as shareholder protection and trade openness. As long as each can contribute towards profitability, it is considered to be a factor determining FDI.

But limitations to the Location Theory or the Gravity Theory can be pointed out. For example, neither explains how the geographic closeness between the DFI recipient country and the DFI host country relates to input costs.

Product Life Cycle Theory. Vernon's [1966] product life cycle theory argues that new products follow a production cycle: innovation, growth, maturity, and decline, and within this cycle, a firm can develop a comparative advantage. In the early stages in the production of a product, production and consumption occur in and remain in the home country. If the product is successful [maturity stage], mass production techniques are developed and the product becomes standardized, and the product is exported. At some point, with competition from other producers at home, the product reaches a declining stage. If the product is still successful abroad, the production of the standardized product is shifted overseas [through DFI] to take advantage of a comparative advantage there, and exports take place from there; the home country now imports the product from that country.

Some researchers have criticized the Product Life Cycle Theory in that it is too time invariant in that with modern technology and applications of internation agreement, firms do not follow the sequence as set out in the Product Life Cycle Theory, and that a new product does not even need to start its development at home anymore.

Capital Market Theory. Aliber [1970] argues that foreign investment, in general, arises as a result of capital market imperfections and FDI is the result of differences in cost between the home and the host country. He suggested that countries with weaker currencies are better able to attract DFIs from countries with strong currencies. This theory suggests that the exchange rate determines the direction of DFI.

Nayak and Choudhury [2014] argues that theory does not explain DFI between countries equal exchange rates of how a country like China with a weaker currency than the US holds sizable DFI in the US.

Firm Internalization Theory. This theory was proposed by Buckley and Casson [1976]. Based on this theory, firms will organize their internal activities, through research and development or through invention, and develop specific advantages, which then are exploited to compete [Donisia 2010].

An invention may be protect through intellectual property rights such as patents and trademarks, and this would prevent, at least for some time, the public from being able to exploit it.

The Eclectic Theory. Dunning [2001] OLI model specifies that the firm will locate where they have control over three sets of advantages. Ownership [O]: Firms must possess net ownership advantages, as a result of patent or trademark, which will confer a comparative advantage in the form of cost reduction or revenue maximization, that that can exploit to compete with other firms. Location [L]: Firms must exploit location specific advantages, immovable advantages, as would accrue in natural resources and raw materials, or favorable business advantage [as would accrue from terms of taxes, tariffs, low wages, education] to gain a comparative advantage. Internalization [I]: Firm must exploit advantages derived from the organization of its own internal process.

The firm may also seek to maintain exclusive rights through patents and other similar property rights. The firm may then seek to use their ownership advantages for itself rather than sell or lease them to foreign firms through licensing or contracts.

Shin [1998] questioned the applicability of the theory to LDCs which generally do not guarantee monopolization of firm-specific advantages such as unique technology or specific skills or knowledge. Another criticism of the eclectic theory is that it incorporates so many variables that makes it operationally impractical as it does not explain FDI at the firm, industry, or country levels.

Microeconomic and Macroeconomics Theories. The Microeconomic Theory [Lipsey, 2004] view examines FDI motivation from the investor's perspective, whether firm level or industry-level, in deciding where to locate their firm or subsidiaries and how penetrate these locations. Such factors as land, labor, capital and their availability and costs are important in their decision making. Branding and patents, and the exclusive right and competitive edge they give to the holder are also part of this theory.

The Macroeconomic theory [Lipsey, 2004] viewpoint suggest that DFI locate where they do because of macroeconomic considerations, and include such as cross-border flow of capital from home countries to host countries, exchange rates, interest rates, market size, GDP, GDP growth rates, infrastructure, natural resources, and institutional factors such as political rights, civil liberty, etc.

The idea of a Microeconomics Theory or a Macroeconomics Theory as theories explaining why DFI firms locate where they do is criticized as simply putting all the theories suggested into one or the other basket because each theory so far suggested falls into the general area of microeconomics or macroeconomics [Kojima et. al.,1984].

2.2. Institutional FDI Fitness theory

Developed by Wilhems and Witter [1998], this theory attempts to explain the uneven distribution of FDI flows between countries based on certain institutional attributes within the host country. Wilhem uses a pyramid in which he sets out in order of hierarchical importance, socio-cultural fitness, education, market, and government, with the socio-culture factors at the base and government at the apex of the pyramid.

Groups of factors, religion, relationships, social norms; education, comprehension, physical and mental skills, the level of human capital; land, labor, capital, finance, productive infrastructure, and other factors that influence productivity and costs are all set out in the pyramid from the base up. And, at the top of them all is governmental factors, such as the system of protective regulations, economic liberty, tariffs, exchange rate, all factors that governments control or that hinge on the system of government and the level of political liberty it allows [including such considerations as the level of corruption, attitude towards DFIs, etc.].

Governments policies, at the apex, shape all the factors below it in the pyramid, and ultimately it is the government of the host country, through its policies, which determines the decision of the DFI firm where to locate.

A drawback of this model is that it does not address the importance of location and natural endowment factors, factors which also affect DFI location choice.

3. The Variables and Models

No single theory provides a full explanation of DFI and why firms invest in certain locations in preference to others, but various theories provide different justifications as to why firms invest in specific locations. In this study, the relationships between 15 variables in 8 categories is examined. A summary of the variables used, their definition and hypothesized relationships with the dependent variable, together with the rational for including them, are presented in Table 1.

3.1. Market Related Variables

Two variables fall into this group, the host market size, and the income per capita level in the host market.

Market size influences direct foreign investment [Culem, 1988; Kumari and Sharma, 2017]. Foreign firms seek to spread the fixed costs associated with entry into the host country's market across the quantity of commodity sold to achieve scale and scope economies Thus, the larger the host country's market, the better is the opportunity for firms

to achieve these economies and spread costs. Mahmoodi and Mahmoodi [2016], and Sijabat 2023] found a positive relationship, using the GDP as a measure of market size, between GDP and DFI. The same measure for market size [GDP] was used in this study, and the relationship between the two variables is expected to be positive.

Gross domestic product per capita (GDP) is used as a measure of income level within the country. Microeconomics Theory as a DFI theory explaining DFI location choice supports the notion that higher income levels reflect a greater demand for goods [and services] supplied by a DFI firm, unless the good is inferior goods. Hakizimana [2015] and Alshamsi [2019] also found evidence supporting this relationship. Thus, a higher per capita GDP should be directly correlated with DFI.

Human capital/private sector related variables. Based on the location theory, the level of education and technical skills, and in general the literacy rate, of the host country's labour force, reflected in this study by the government expenditure on education on a per capita basis, and represented as EDU. EDU is likely to be an important consideration in the DFI decision making process, especially for manufacturing and high technology firms. Firms are likely to invest in countries with a more educated populace, since this is likely to reflect higher learning and decision-making capabilities and levels of skill. Kumari and Sharma, [2017]; Asiamah et al. [2019] and Alalawneh [2020] found a direct relationship between the education level and DFI.. It is expected that the greater EDU is, the higher the DFI will be.

As it were, per capita domestic credit to the private sector [CR] reflects the extent to which the private sector is encouraged to participate in economic development through private investment. If the level of CR is low, participation in domestic investment is low, and it is more likely to be substituted for by DFI [ceteris paribus]. However, in the case of the Caribbean domestic credit to the private sector, if available, is usually used for less capital-intensive small-scale production, which is less likely to be in competition with the activities of DFI, which usually engages in more capital-intensive large-scale production. Anaman, [2018] found a negative relationship between domestic investment, not DFI, and the availability of credit to the private sector. Considering how domestic credit is used in the Caribbean it is likely that the relationship with DFI would be positive.

Infrastructure Related Variables. DFI decisions are likely to be influenced by the state of productive infrastructure [Rolfe and White, 1992; Guisinger, 1985] Firms are more likely to invest in countries with better physical infrastructure, such as roads and bridges, communication systems, etc., since physical infrastructure positively influences productive efficiency [Lall, et. al, 1997], and thus, lowers costs of production and increase productive competitiveness. Thus, the presence of better productive infrastructure in a host country is more likely to attract DFI, compared with countries with poorly developed productive infrastructures. Two variables are used to reflect productive infrastructure: gross capital formation per capita [K] and the percent of the population with access to electricity [ELEC]. Maune et. Al. [2023] found a positive correlation between capital formation and DFI. Nguea et. al. [2022] found a positive correlation between the percent of the population with access to electricity and DFI. Both variables, K and ELEC, are expected to have a positive correlation with DFI.

Monetary/Fiscal Policy Variables. In this group, there are two variables, the inflation rate [INF] and the real interest rate [R]. The response to DFI to inflation is not clear-cut; it depends on the level of inflation. Predictable low inflation rates in the DFI recipient represent low investment risk and lowed cost of inputs, and cheaper exports, and is likely to attract DFI. On the other hand, high and unpredictable levels of inflation might induce skepticism about the currents and high risk in maintaining asset value, in which case, it is likely to deter DFI. Kumari and Sharma [2017] and Kolstad and Villanger [2004] found a negative relation between inflation and DFI. Without a clear cut of what the relationship is likely to be in the Caribbean, the variable used for inflation, INF, which simply represents the level of inflation, is likely to have a negative or positive correlation with DFI in the Caribbean.

In terms of R, the real interest rate determines the investment climate. For investment to take place the returns from investment must be greater than the returns from saving, and both activities are determined by the interest rate [Kumari and Sharma, 2017; Kolstad and Villanger, 2004].

Trade Policy Variables. Aliber (1970) observed that DFI is associated with the relative value of currency [exchange rates, ER_{ij}] between the host and the investing countries. When, for example, the currency of the investing country depreciates, it becomes more expensive for firms of that country to establish plants and buy assets in foreign countries. Thus, capital outflow by the investing firms tends to decrease in countries where the value of the host country's currency is relatively high and to increase in countries where it is relatively low.

Ning and Reed [1995] suggested that it might not be the actual exchange rate that matters but rather expectations about the exchange rate. If, for example, the value of the DFI recipient currency decreases thus lowering the DFI's costs, and

this is expected to be transitory, this is likely to increase short-run DFI. If, however, this decrease in the recipient currency is expected to be persistent, then both the long and short run DFIs is likely to increase. Thus, ER is likely to be negatively correlated with DFI in the long run and may also be negatively correlation with the short run DFI. Zaman et. al. [2018] and Froot and Stein [1991] found negative correlation between DFI in long run DFI.

The purpose of free trade is to encourage more trading between countries. Trade theory [Grosse, 1980] however suggests that restrictive trade policies is like to encourage DFI, and this allows them to circumvent these trade policies. However, given the current moves towards trade liberalization, tariff levels are expected to diminish in importance in determining DFI decisions. Nevertheless, trade policies, and in particular openness to trade may still be an important determinant of DFI in some developing countries (Kumari and Sharma (2017). Liargovas and Skandalis [2012] and Zaman et.al. [2018] found a positive correlation between trade openness and DFI. In this paper, Taxes on International Trade [TTr] is used as a proxy for openness to trade. The variable is expected to have a negative correlation with DFI.

The production sector related variables. In this group are four variables, [AGRI], manufacturing [MAN], service [SERV] and other [OTHER, which includes mining, which mineral mining, quarries, drilling; and construction, each expressed as a percentage of GDP. Each is expected to reflect whether the sector contributes to the value of exports. In estimating the model, since the four variables added up to one hundred percent, OTHER was dropped to avoid multicollinearity in the model. The caveat in interpreting the result was noted; the coefficient of each variable is interpreted relative to that of OTHER.

It is important in terms of domestic policies to determine the sector that is more directly correlated with exports, as this would determine how investment is utilized. The is no a priori expectation on which sector is more correlated with export overall, but each sector is emphasized, some in one country than the others.

Environmental variable. The issue of climate change has become an important consideration in the production process. If the level of carbon dioxide in a recipient is low, the DFI firm would need likely need to maintain it to a low level. If the carbon dioxide level is high, the DFI firm would need to ensure that its production process in not contributing to increasing it. Carbon emission [metric tons per capita] is used as a proxy for the state of the environment. It is expected that whether the carbon dioxide level is high or low, the DFI firm would need to keep it low. Derindag et. al. [2023] suggest the need to curtail the CO2 emission produced by DFIs, which suggests a negative correlation between DFI, and CO2 level. The higher the per capita level of carbon dioxide is, the more costly it would be for the firm to operate in that country, thus there should be a negative relationship between DFI and CO2. On the other hand, if the CO2 level is high because it is not considered important in a country, then it would depend on the viewpoint of the DFI, and the relation between DFI and CO2 could be positive or negative.

Location related variables. Political stability (PR_i) is likely to be a consideration in DFI decisions, particularly in the Caribbean and Latin America regions. Unstable political situations usually result in short lived economic policy, thus constituting increased risks from investments. Thus, an investing firm is more likely to invest in countries with more stable political climates. The political right score (PR_i) from Freedom House, [2023] is used as a measure for the degree of political stability. The index seeks to represents the meaningfulness of elections as an expression of the will of the polity and include such considerations as 1. Electoral Process, 2. Political Pluralism and Participation (3), and Functioning of Government. The civil liberties questions are grouped into four subcategories: Freedom of Expression and Belief, Associational and Organizational Rights, Rule of Law, and Personal Autonomy and Individual Rights

Unfortunately, this was the only measure that could be identified as a proxy or approximate indicator of political stability. Empirical findings on the correlations between this variable and DFI have been mixed. While those of Wisniewski and Pathan [2014] and Reuber (1973) and Kolstad and Villanger (2008) were positive, Schneider and Frey [1985] found negative correlation. The mean for the index, PR, in the Caribbean and Latin America [34.69 & 27. 95] are relatively high [compared with the maximum of 40] indication that the countries included in this study were stable politically. For this reason, it is expected that the correlation between DFI and PR will be positive.

3.2. DFI Model

The long run DFI variables is modelled as DFI, as in Ning and Reed (1995), direct foreign investment position abroad (DFI) and the short run DFI variables as the inter annual change in DFI. expressed in per capita terms. The DFI data were obtained from the World Indicator [World Bank Open Data [2024] as Foreign Direct Investment.

The data used in this study span Years 2009 to 2022. The general form of the model used to examine the relationships between policy factors and direct foreign investment is as follows: Model1 represent the long run relationship and Model 2 represent the short run relationship.

$$lDFI_{i\,j} = \alpha_o + \alpha_1 lGDP_{ij} + \alpha_2 lGDP/C_{ij} + \alpha_3 lDU_{ij} + \alpha_4 lCR + \alpha_5 lCAPL_{ij} + \alpha_6 lELEC_{ij} + \alpha_7 lINF_{ij} + \alpha_8 lR_{ij}\ \alpha_9 lEXR_{ij} + \alpha_{10} lTTr_{ij} + \alpha_{11} IlAGRI_i + \alpha_{12} lMAN_{ij} + \alpha_{13} lSERV_{ij} + \alpha_{14} lCO2_{ij} + \alpha_{15} PR_{ij\,+} + e_{ij} \quad (1)$$

$$\Delta lDFI_{i\,j} = \alpha_o + \alpha_1 \Delta lGDP_{ij} + \alpha_2 \Delta lDP/C_{ij} + \alpha_3 \Delta lDU_{ij} + \alpha_4 \Delta lCR + \alpha_5 \Delta lCAPL_{ij} + \alpha_6 \Delta lELEC_{ij} + \alpha_7 \Delta lINF_{ij} + \alpha_8 \Delta lR_{ij}\ \alpha_9 \Delta lEXR_{ij} + \alpha_{10} \Delta lTTr_{ij} + \alpha_{11} \Delta lAGRI_i + \alpha_{12} \Delta lMAN_{ij} + \alpha_{13} \Delta lSERV_{ij} + \alpha_{14} \Delta lCO2_{ij\,j} + + e_{ij} \quad (2)$$

where: i and j are the country and year, respectively; DFI_{ij} is the variable representing DFI (i.e., DFI or ΔDFI) expressed percentage of GDP; the other variables are as defined in earlier discussion and in Table 1; and $e_{ij,}$ represents unexplained random errors. In Model 2, the symbol, Δ, represent the first order change in the variables [i.e. years $t_i - t_{i-1}$]. To facilitate expressing the coefficients to be expressed in percent terms instead of 'percent point' terms, each model was estimated in its log form, indicated by the letter '*l*' in front of each variable.

Table 1 The variables, their acronym, hypothesize relationship with DFI and rational.

	Variable	Description	Acronym	Ho	Rationale
Market Related variables					
	Market size	GDP [100M]	GDP	+	Increased market size means increased sales/increased DFI.
	Income	GDP/C [Thousand]	GDPC	+	Higher income level means greater buying potential/Increased DFI.
Human capital/Private sector related variables					
	Literacy [Education]	% of GDP expended.	EDU	+	Higher literacy means higher productivity.
	Credit	$ Amt of credit to private sector	CR	+	Higher credit to private sectors may actually impact literacy or supply of needed input to DFI.
Infrastructure Variables					
	Fixed Capital formation/Lab.	$ spend on K	K	+	Greater capital formation means better productive infrastructure.
	Electricity	% of pop. with access to elec.	ELEC	+	More access to electricity means availability of power to DFI.
Monetary/Fiscal Policy Variables					
	Inflation Rate	%	INF	+ or –	Higher INF means higher cost, may deter DFI especially in the SR.
	Real Interest rate	%	R	-	A higher R means borrowing is more expensive and vice versa.
Trade Policy Variable					
	Tax on trade	% of Revenue	TTr	-	Higher taxes [higher cost] on trade could deter DFI involved in trade
	Exchange Rate	Ratio	ER	-	Lower exchange rates attract DFI; may make their products more price attractive.
Production sector related variables					

	Agriculture	% GDP	AGRI	+	Likely to increase DFI more than the other sector
	Manufacturing	% GDP	MAN	+	Likely to increase DFI more than the other sector
	Service	% GDP	SERV	+	Likely to increase DFI more than the other sector
	Other	% GDP	OTHER	+	Likely to increase DFI more than the other sector
Environmental policy variable					
	Carbon dioxide	Carbon dioxide emissions	CO2	-	High Co2 level means higher cost of managing the CO2 to a benchmark level.
Political rights related variable					
	Political right Index	0=min; 40 = max	PR	+	A higher index means more political stability/more attractive to DFI

4. Data and Estimation Procedure

The estimation procedure used was the generalized least squares, enabling adjustments to be made for the effect of heteroscedasticity, with each variable being weighted by the standard deviation of the error as suggested by Ramanathan (1989). No evidence of multicollinearity was found in the data, in which four models were estimated. A separate model was estimated for Caribbean and Latin American countries. The analysis was confined to countries for which complete data were available. These included 9 Caribbean countries (i.e., Belize, Guyana, the Bahamas, Barbados, Jamaica, Trinidad and Tobago, Saint Lucia and Saint Vincent and the Dominican Republic) and 11 Latin American countries (i.e., Argentina, Brazil, Bolivia, Chile, Columbia, Ecuador, Uruguay, Mexico, Costa Rica, Honduras and Nicaragua), thus resulting in pooled data of 126 and 154 observations for the Caribbean and Latin America, respectively. The means and standard deviations of each of the variables for the Caribbean and Latin America data set are shown in Table 2.

Table 2 The mean and standard deviation of variables [2009-2022].

			Caribbean		**Latin America**	
Variables		**Acronym**	**Mean**	**Variance**	**Mean**	**Variance**
Market Related variables						
	Market size	GDP	173.93	236.15	4019.77	6037.09
	Income/year	GDPC	12.30	7.92	7.54	4.65
Human capital/Private sector related variables						
	Literacy	EDU	0.46	0.24	0.37	0.25
	Credit/Capita	CR	6.55	5.49	3.06	2.59
Infrastructure Variables						
	Fixed capital formation	K	1.84	2.48	1.62	0.89
	% of popolation with access to electricity.	ELEC	96.59	4.68	94.94	6.32
Monetary/Fiscal Policy Variables						
	Inflation Rate	INF	2.96	6.26	4.90	2.73
	Tax on Income, profit & capital gain,	R	6.18	3.79	5.78	2.86
Trade Policy Variable						
	Tax on trade	TTr	3.13	1.92	0.83	0.62
	Exchange Rate	ER	47.97	71.61	437.55	937.50

Production sector related variables						
	Agriculture	AGRI	0.071	0.151	0.081	0.059
	Manufacturing	MAN	0.113	0.373	0.145	0.041
	Service	SERV	0.719	1.578	0.595	0.121
	Other	OTHER	0.270	0.681	0.218	0.064
Environmental policy Variable						
	Carbon dioxide	CO2	4.54	3.66	1.87	0.95
Location related variables.						
	Political right Index	PR	34.69	3.70	27.95	8.24
	0=min; 40 = max					

The estimation procedure used was the generalized least squares, enabling adjustments to be made for the effect of heteroscedasticity, with each variable being weighted by the standard deviation of the error as suggested by Ramanathan (1989).

No evidence of multicollinearity was found in the study, in which three Long Run models were estimated using Equation 1; separate models were estimated for Caribbean and non-Caribbean (i.e., Latin American) countries, and because neither of these models captured the effect of the Language (LAN) and Distance [DIS] variables, a third model, which included both Caribbean and non-Caribbean countries, was also estimated.

Two Short Run models were estimated for Equation 2.

5. Results and discussion

The results obtained for the long run DFI and short run DFI for the Caribbean, Latin America and the combined sample of countries are shown in Tables 3 and 4. In interpreting the results, each coefficient, represents a percent [log] measure. Comparison of variables across the two regions are based on statistical differences using the 'P' scores and a significance level of at least 0.05.

5.1. Regression Results: Long Run

In the long run models for the Caribbean 7 variables in 8 groups were signification.

Table 3 Long run regression results

Variables	***LP***	***Coefficients***	***P-value***			***Coefficients***	***P-value***	
Market Related variables								
	GDP	0.052	0.027	**		0.176	0.033	**
	GDPC	-1.008	0.002	***		-0.380	0.345	
Human capital/Private sector related variables								
	EDU	0.069	0.005	***		0.246	0.031	
	CR	0.910	0.008	***		0.187	0.195	
Infrastructure Variables								
	Cap/Lab	0.158	0.013	**		0.248	0.016	
	ELEC	2.133	0.053			2.444	0.507	***

Monetary/Fiscal Policy Variables								
	INF	-0.057	0.022	**		-0.008	0.906	
	Real interest rate (%)	-0.355	0.001	***		-0.025	0.014	
Trade Policy Variable								
	EXR	-0.182	0.018	**		-0.076	0.004	***
	TTr	-0.099	0.019	**		-0.149	0.047	***
Productive sector related variables.								
	AGRI	0.324	0.024	**		-0.615	0.024	***
	MAN	-0.185	0.182			-1.310	0.003	***
	SERV	-0.208	0.011	**		1.690	0.000	***
Environmental policy Variable								
	CO2 emissions (metric tons per capita)	-0.659	0.010	**		-0.137	0.549	
Political rights related variable								
	PR	0.012	0.559			0.018	0.018	***
	Intercept	1.918	0.682			18.832	0.000	***
	R Square	0.6547				0.6629		

** and *** means significance at the 95% and 99% CI.

With the groups being, the market group, the human capital/private sector related group, the infrastructure group, the monetary/fiscal policy group and the environmental policy group. The following groups had no significant variables: the trade policy group and the political rights group.

In Latin America, 9 variables in 8 groups were significant. The groups were similar to those in the Caribbean except there were no significant variables in the human capital/private sector group and the monetary/fiscal policy group and the environmental policy group.

With regards to each significant variable, their impacts were as follows.

Market related variables: These variables represent the market size [GDP] and the per capita income level [GDPC] within the country.

GDP was significant in the Caribbean, with the coefficients being 0.052. The results for GDP in the Caribbean matched the results obtained by Mahmoodi and Mahmoodi [2016], and Sijabat l2023], and suggest that DFI would increase as the market size increases. The variable was also positive in Latin America [0.176] and slightly higher than in the Caribbean.

The result for GDP/C was negative in the Caribbean [-1.008] and suggests that DFI is likely to decrease as the income per capita increases. This result contradicts the findings of Hakizimana [2015] in which cases, a positive coefficient was obtained. It also contradicts that of Alshamsi [2019]. In Latin America, the variable was not significant.

Human Capital/ Private Sector Related variables: In this section, there are two variables. These variables in general looked at how DFI would respond to the level of education [EDU] which is used as a proxy for literacy rate, human capital, and the level of credit available to the private sector, measured as credit/capita [CR]. EDU was significant in

both the Caribbean and Latin America and the coefficient for both had the expected positive sign, 0.069 and 0.246 respectively, suggesting that DFI is likely to increase in both regions as the literacy rate increases. Kumari and Sharma, [2017]; Asiamah et al. [2019]; Alalawneh [2020] also found a direct relationship between the education level and DFI. Of the two regions, the DFI response to EDU is likely to be in favor of Latin America.

The availability of credit [CR] to the private sector was significant in the Caribbean, but not in Latin America, and it was positive [0.910], which suggests that on account of CR in the Caribbean, DFI is likely to increase, perhaps as a result of an increase in training for skilled jobs.

Infrastructure variables. In this category are the capital per unit labor [CAPL] and the percentage of the population with access to electricity [ELEC]. These variables represent a proxy for productive infrastructure development, such as roads, bridges, communication technology, etc., in a country and they should reflect whether infrastructure in a DFI destination country is important to attract DFI.

CAPL was significant in the Caribbean with a coefficient of 0.158, suggesting that DFI is likely to increase as productive infrastructure improves. This result suggests that the state of infrastructure in a country is an important consideration in DFI decision making as shown in Rolfe and White [1992] and Guisinger [1985]. Lall, et. al. [2003] and Maune et. al. [2023] found a positive correlation between capital formation and DFI. The variable was also significant and positive in Latin America but was slightly higher in Latin America [0.248].

ELEC was insignificant both in the Caribbean and Latin America [2.133 & 2.444]. Nguea et. al. [2022] found a positive correlation between the percent of the population with access to electricity and DFI. DFI was more responsive to the variable in Latin America compared with the Caribbean.

Monetary/Fiscal policy variables. In this group, two variables are examined, the inflation rate [INF], which increases costs, especially in the short run, and the real interest rate, R, which is the cost of money. These variables reflect monetary/fiscal policies and the state of money control within countries. Both variables were significant in the Caribbean with the expected coefficients of -0.058 and -0.335, suggesting that the lower INF and R are the greater DFI is likely to be. Kumari and Sharma [2017] and Kolstad and Villanger [2004] found similar negative relationship between DFI and inflation rate and between DFI and interest rate.

In Latin America, only R was significant, and the coefficient was -0.025 indicating that higher real interest rate is likely to deter DFI in this region as well. The impact of the variable was more negative in the Caribbean compared with Latin America.

Trade policy variables: In this group there are two variables, the exchange rate [ER] and Tax on trade [TTr]. ER was supposed to reflect costs in doing business within specific countries. And TTr, which also adds to costs, was supposed to reflect the openness of these countries to trade. DFI that engage in production are usually involved in external markets.

ER was found to be significant and positive in both the Caribbean and Latin America [-0.182 and -0.076], suggesting that DFIs find the exchange rates favorable in both regions, more in the Caribbean than in Latin America. Zaman et. al. [2018] and Froot and Stein in [1991] also found negative correlation between exchange rates and long run DFI in the countries they studied. The tax on trade [TTr] was also significant in both regions and was negative, as expected. Kumari and Sharma [2017], Liargovas, et. al. [2012] and Zaman et.al. [2018] found a positive correlation between Trade Openness, which is the inverse of tax on trade, and DFI in some countries. Openness to trade is likely to be beneficial to both regions, more in the Caribbean than in Latin America [-0.099 vs. -0.149].

In terms of the sectoral related group, there are four variables [AGRI], manufacturing [MAN], service [SERV] and other OTHER [which includes mining, construction, etc.], each expressed as a percentage of GDP. Each is expected to reflect whether the sector contributes to DFI relative to the contribution of OTHER.

In the Caribbean, AGRI and SERV, were significant, MAN was not. The result [0.324 & 0.208] suggests that both AGRI and SERV were more likely to attract DFI than OTHER, with more DFI likely to go to AGRI than SERV in this region. In Latin America, all three sector were significant, Compared with OTHER, AGRI and MAN are less likely to attract DFI [-0.616 & -1.310], but SERV is more likely to attract DFI [1.310 & 1.690]. The service sector in Latin America is likely to outperform the Caribbean in terms of attracting DFI.

Environmental policy variable. Only one variable is included in this category, the amount of carbon dioxide [CO2] produced into the atmosphere [metric tons/capita], but the variable is supposed to reflect the kind of production technology and the type of energy sources used in the production process. A significant amount of carbon dioxide produced as a biproduct of the production process represents a significant cost to the DFI firm, because DFI would need to invest in more improved technology or otherwise pay the penalty for a high carbon footprint. The variable was significant in the Caribbean but was not for Latin America which means that for every one unit of CO2 produced in the Caribbean region, DFI is likely to decrease by 0.659 [-0.659] percent as the coefficient suggests. Although Derindag et. al. [2023] did not suggest cost when discussing DFI and carbon dioxide, they did suggest the need to curtail the CO2 emission produced by DFIs, and that the correlation between CO2 levels and DFI is negative.

Political rights related variables: In this group, the variable measured the level of political freedom [PR] the DFI host county.

With regards to PR, empirical findings show that the correlations between PR and DFI has been negative [Kolstad and Villanger [2008], Schneider and Frey [1985] and Kim [2018]. The mean for the index [Table 2] for PR in the Caribbean and Latin America [34.69 & 27. 95] are relatively high [compared with the maximum of 40] indication that the countries included in this study were stable politically. However, the result obtained was significant only in Latin America and the coefficient was positive [0.018] suggesting that as PR increases by one percent, DFI is likely to increase by 0.018 %.

5.2. Regression Result, Short Run.

The short run models measured the correlation between the log of the first difference change in each variable against that of DFI, ΔDFI. In the Caribbean, 6 variables in 7 groups were significant.

Table 4 Short run regression results

Variables		***Coefficients***	***P-value***			***Coefficients***	***P-value***	
Market Related variables								
	GDP	4.994	0.582			0.293	0.815	**
	GDPC	-4.237	0.636	***		1.146	0.908	
Human capital/Private sector related variables								
	EDU	1.181	0.043			-1.132	0.183	
	CR	0.304	0.772	**		-1.185	0.134	
Infrastructure Variables								
	Cap/Lab	0.217	0.064	**		1.535	0.011	
	ELEC	7.136	0.286			0.568	0.871	***
Monetary/Fiscal Policy Variables								
	INF	-0.095	0.108			-0.017	0.832	
	Real interest rate (%)	-0.028	0.775	***		-0.021	0.697	
Trade Policy Variable								
	EXR	-1.160	0.614			-0.094	0.859	**
	TTr	-1.377	0.006			-0.115	0.338	***
Productive sector related variables								
	AGRI	0.113	0.035	**		-0.615	0.359	***
	MAN	-0.077	0.673			-1.310	0.272	**
	SERV	-0.025	0.017			1.690	0.020	**
Environmental policy Variable								

	CO2 emissions (metric tons per capita)	-1.431	0.073	**		0.295	0.682	
	Intercept	-0.053	0.256			0.029	0.617	
	R Square	0.366				0.330		

** and *** means significance at the 95% and 99% CI.

The groups in questions were the market, the human capital/private sector, the infrastructure, the monetary, the productive sector and the environmental policy groups. In Latin America 6 variables in 4 groups were significant. The groups were the same as in the Caribbean except the human capital/private sector, the monetary/fiscal policy, and the environmental policy groups.

The impacts of the significant variables are as follows:

In the market group, of the two variables, in the Caribbean only GDP/C was significant with a coefficient of -4.237, showing that policies to increase GDP/C are likely to be correlated with DFI growth. The causation remains questionable as DFI may the increase in DFI may be the result of DFI. In Latin America, only GDP was significant with a coefficient of 0.293, suggesting that as the market size increases, DFI is likely to increase.

In the human capital/private sector group, of the two variables in this group, only CR, the availability of credit to the private sector was significant, with a coefficient of 0.304, indicating that DFI is likely to increase as CR increases. In Latin America, no variable was significant in this group.

With regards to the infrastructure group, of the two variables in this group, only CAPL was significant with a coefficient 0f 0.217 suggesting a positive correlation with DFI. ELEC was not significant in the Caribbean, but it was significant in Latin America with a coefficient of 0.568, indicating that DFI is likely to increase as ELEC increases. Perhaps electricity provided the energy needed for work in some sectors, maybe in the service sector, in this region. Although CAPL was not significant in this region, the positive sign for ELEC shows that infrastructure improvement would likely stimulate the engagement of DFI in this region.

In the monetary group, the real interest rate [R] was significant in the Caribbean and had its coefficient was negative [-0.028], indicating that policies related to decreasing R must be looked into, as DFI could increase as R decreases. R was not significant in Latin America, and neither was the inflation rate.

Of the trade policy variables, neither variable was significant in the Caribbean, but both variables, EXR and TTr were significant and negative in Latin America [-0.094 & -0.115] indicating that any increase in the exchange rate or rate of tax on trade is likely to decrease the rate of DFI to the region. Neither variable was significant in the Caribbean.

In the productive sector group, AGRI was significant, and the coefficients [0.113] indicate that the rate of DFI is likely to be greater in the agriculture sector, than in the other sector, OTHER [mining and drilling]. In Latin America, each variable in this group was significant. Based on the coefficients, SERV is likely to attract more DFI that the OTHER sector, but AGRI and MAN are likely to do worse [-0.615 & -1.310] worse than OTHER with regards to attracting DFI.

With regards to the environmental related variable, CO2, the variable was significant only in the Caribbean and with a coefficient of -1.431, an increase in CO2 is likely to be correlated with a decrease in DFI.

6. Conclusion

This paper determined the factors that affect inward direct foreign investment [DFI] and their impacts in the Caribbean and compared the results obtained for these in the Caribbean with results for the same factors in Latin America. The Caribbean and Latin America have always been competitors for the same source of DFI and comparison can serve as a guide in policy making.

The results obtained were as follows: In the Caribbean, factors in the market, human capital/private sectors, infrastructures, monetary/fiscal and trade related and productive sector variables, and other variables related to the environment, and specific regional factors explained about sixty five percent [R Square = 0.6547] of the variability in DFI.

The variables that were significant and had a positive impact in the Caribbean, were the size of the market, the income level in the market group, literacy and private sector access to credit in the human capital/private sector group, capital to labor ratio in the infrastructure group, the agriculture and service sectors in the productive sector group. Of these variables, the capital to labor ratio, private sector access to credit, and the exchange rates had a stronger impact on DFI in the Caribbean than in Latin America. Of the production sector variables, the agriculture sectors had a greater impact than the service on DFI over the OTHER sector, which includes mining and drilling.

The variables with negative impacts on DFI were the inflation rate, the real interest rate and the tax on trade and controlling these variables could increase DFI in the Caribbean, especially the real interest rate and the tax on trade as their impact are more detrimental in the Caribbean than in Latin America.

Of the environmental group, the single variable, the carbon dioxide emission rate was significant in the Caribbean and reducing it could have a positive impact on DFI.

Variables that had relatively strong impacts on acquiring DFI in Latin America were market size, and in the production sectors, manufacturing has a greater impact than the service sector over the other sector. Latin America also has a comparative advantage over the Caribbean in attracting DFI in the service sector.

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