The effects of financial development on foreign direct investment: An empirical Study in the Case Of Algeria Using the ARDL Model

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Abstract:

This study intends to examine the effects of financial development on foreign direct investment in Algeria during the period 1990-2020.

The findings of the ARDL model estimation showed that financial development has a short-term negative effect on foreign direct investment. However, in the long run, the study found that financial development does not significantly influence attracting foreign direct investment. This suggests that attracting foreign direct investment also depends on other crucial factors such as infrastructure, government initiatives, and political and economic stability.

Keywords: Financial Development, FDI, ARDL Model, Algeria.

Introduction:

Foreign direct investment (FDI) is crucial for economic development, especially in developing countries. It drives employment, productivity, competitiveness, and technological advancements, leading to higher exports, international market access, and foreign currency utilization. FDI also serves as a significant source of funding, replacing traditional bank loans.

Research reveals that a host country's financial system significantly influences foreign direct investment, attracting investors through credibility, trade openness, and market integrity. An efficient system effectively allocates resources to promising sectors.

Algeria, like many other developing nations, seeks to attract foreign direct investment to enhance its economic performance, achieve economic transformation, and promote sustainable development. However, there is a lack of comprehensive evidence in the literature regarding the effect of financial development on foreign direct investment. Therefore, this study aims to bridge this knowledge gap.

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Research Question:

What are the effects of financial development on foreign direct investment in Algeria during the period 1990–2020?

The objective of the Study: The main objective of this study is to assess the contribution of financial sector development to attracting foreign direct investment in Algeria between 1990 and 2020.

Methodology: The study employs a descriptive methodology, presenting theoretical concepts and empirical research on the relationship between financial development and foreign direct investment.

THE FIRST TOPIC: Theoretical Framework

In this topic, we will explore the theoretical concepts related to foreign direct investment and financial development. Furthermore, we will review and analyze the key findings from previous studies in this area.

FIRST REQUIREMENT: Financial Development and Foreign Direct Investment: Concepts and Effects

This requirement is dedicated to the concepts of both Foreign Direct Investment (FDI) and financial development, as well as the effects of financial development on Foreign Direct investment.

Firstly: **The Concept of Financial Development and Foreign Direct Investment (FDI)**

1-Financial Development

Financial development is seen as the greater offering of financial goods and services by a country to its residents and enterprises. The financial system serves as a vehicle for cost reduction as well as a resource allocator, a source of information, and more. Researchers concur that FDI can only produce real, long-term benefits when the host nation has a sophisticated banking system[1].

A broader definition of financial development encompasses the enhancement of five fundamental financial activities: (1) collecting and processing information on potential investments and allocating capital based on these assessments; (2) oversight of individuals and businesses and exercising corporate governance after capital allocation; (3) facilitating trading, portfolio diversification, and risk management; (4) mobilizing and pooling savings; and (5) facilitating the exchange of money. The quality of these essential services provided by financial institutions and markets

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journal Of Legal and Economic Studies   ISSN 2602-7321/ EISSN 2773- 2649

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varies significantly across the globe, and they facilitate the exchange of money. The quality of these essential services provided by financial institutions and markets varies significantly across the globe[1].

2- Foreign direct investment

There are different definitions for foreign direct investment (FDI), but the most comprehensive one is provided by the United Nations Conference on Trade and Development (UNCTAD). According to this definition, FDI refers to capital that establishes long-term relationships, demonstrates control of a legal or natural person located in one country in an enterprise situated outside the investor's country, and entails the expectation of obtaining economic benefits from the investment. In this type of investment, the investor acquires shares in a production unit and becomes a partner on its own, with the option to retain the shares indefinitely. Additionally, the investor is allowed to engage in the sale of goods and the provision of services both domestically and internationally.

Another commonly accepted definition of foreign direct investment, as proposed by the International Monetary Fund, states that it is an investment made to obtain a lasting interest in an entity located in a country other than the investor's home country. The investor aims to play a significant role in the management of the invested firm[2].

Secondly: The various effects of financial development on FDI

Theoretically, financial development can have both direct and indirect effects on foreign direct investment inflows to host countries.

1-Direct effect

According to Donaubauer et al. (2017), the presence of financially developed intermediaries can help mitigate the high fixed costs associated with FDI investments. When institutions in source countries are unwilling to fully finance or demand higher risk premiums, the advanced financial systems in destination countries can provide financing for FDI.

Desbordes and Wei (2017) argue that well-established financial conditions can enhance FDI inflows through opportunities for external finance. Khan and Khan (2019) support this theory by stating that financial development has various effects on FDI inflows, including efficient asset allocation by intermediary financial institutions, reduced costs of transactions through lower fee funds, the provision of

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relevant information to aid investor decision-making and reduce information asymmetry, and the maintenance of favorable financial positions.

Desbordes and Wei (2017) also suggest that financial development in source countries has a positive direct external financial effect on the outflow of FDI. This is because a firm's ability to secure external funding depends on its level of financial development[1].

2-Indirect effect

In addition to their direct benefits, higher domestic and foreign financial development can indirectly influence FDI by promoting overall economic activity, particularly in financially vulnerable sectors. Rajan and Zingales (1998), Braun (2003), Klapper et al (2006), and Manova (2013) conducted studies that support this. The presence of most domestic and foreign firms in a specific sector and location has a positive impact on the location choice of multinational enterprises (MNEs).

Increasing financial development leads to the growth of domestic manufacturing industries, which positively impacts FDI inflows by encouraging agglomeration effects and outweighing any potential negative effects of indirect competition. Additionally, heightened local competition can incentivize businesses to allocate a larger portion of their limited financial resources to international expansion rather than domestic expansion. Improved financial development enables businesses to supplement their internal financing with external financing.

In financially developed countries, higher levels of financial development lead to higher overall sales for U.S. MNEs, as well as increased levels of local sales and a higher proportion of local sales in total affiliate sales from subsidiaries[2].

SECOND REQUIREMENT: Literature Review

There are numerous significant studies for different countries, and the most current are included below:

(Lestari & al, 2015)[3] investigated the effects of financial development and corruption on FDI using panel data from 108 developing countries between 1993 and 2017. Utilizing the GMM estimator, the findings indicated that while corruption does not have a statistically significant impact on FDI, financial development has a positive and significant influence on it. However, the interplay of financial development and corruption has a detrimental effect on FDI. This suggests that when financial

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development is accompanied by an increase in corruption, FDI inflows tend to decrease. These findings compel policymakers to consider the impact of financial development and the corruption of FDI in developing nations.

(Sahini & Ege, 2015)[1] examined the causal relationship between financial development and FDI in Greece and neighboring countries (Bulgaria, Macedonia, and Turkey) over the period 1996-2012. The empirical findings demonstrate that, except for Macedonia, FDI can predict financial development in all the other countries. Additionally, the results suggest the existence of bidirectional causality in Turkey.

Using the vector error correction model (VECM) technique, (Nwosa & Emma-Ebere, 2017)[2] examined the relationship between FDI and financial development in Nigeria from 1980 to 2015. They discovered a short-term positive relationship between financial market development and FDI, while a long-term negative relationship existed between the two.

(Ayouni, 2018)[3] examined the nature of the relationship between financial development and FDI in Tunisia from 1988 to 2014 and found a nonlinear relationship between FDI and financial development.

(Bayar & Gavriletea, 2018)[4] utilized co-integration and causality tests to analyze the interactions between financial development and FDI inflows in CEEU countries between 1996 and 2015. The panel data analysis showed that a developed financial system encourages FDI inflows and provides better external financing for multinational enterprises.

(Alsmadi & Oudat, 2019)[5] employed the ARDL model and Granger causality test to analyze the relationship between foreign direct investment and financial development in Bahrain from 1978 to 2015. The results indicated a significant positive and bidirectional causal relationship between FDI and financial development in Bahrain.

(Islam M. A., 2021)[6] conducted a study on the role of financial development in attracting and retaining foreign direct investment (FDI). Using data from 39 countries

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in the OBOR region from 1999 to 2016, he found that the financial sector has a strong impact on attracting FDI, and this impact becomes stronger when the new broad measure of financial development from the IMF is used as a comprehensive measure.

(Keykanloo & al, 2020)[1] examined the impact of financial development indicators on the rate of FDI absorption in 11 countries, including Saudi Arabia, Argentina, Sweden, Poland, Belgium, Iran, Thailand, Nigeria, Austria, Norway, and Venezuela, from 1990 to 2014. The results indicated that increasing the size of the capital market improves the attraction of FDI in some countries. Conversely, for nations with underdeveloped capital markets, the financial market access index and the financial institution efficiency index had a significant negative impact on FDI absorption.

(Irandoust, 2021)[2] examined the causal relationship between financial development and FDI in eight post-communist Transcaucasian and central Asian economies from 1990 to 2016. The findings of the Granger causality test showed that there is a unidirectional causality connecting financial development to FDI in six out of eight nations, except for Turkmenistan and Kazakhstan.

For middle-income economies from 1980 to 2020, (Haque & al, 2022)[3] examined the long- and short-term effects of three different sources of financial development on FDI inflows while adjusting for the inflation rate, trade openness, and real growth rate. The findings of the panel ARDL estimation show that financial market growth significantly influences FDI inflow levels in middle-income economies, both in the short and long term. The resource-based hypothesis for middle-income economies is supported by these findings. However, overall financial development and financial institutional growth do not greatly boost FDI inflows in the target population. Additionally, a long-term increase in trade openness has a significant impact on FDI inflows to middle-income economies. Finally, the real growth rate strongly encouraged FDI inflows into middle-income economies from 1980 to 2020.

THE SECOND TOPIC: The Empirical Study

This topic is dedicated to measuring the effects of financial development on foreign direct investment in Algeria during the period 1990–2020.

FIRST REQUIREMENT: Data and Methodology

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This requirement is dedicated to presenting a description of the study variables, the utilized model, and the estimation method.

Firstly: **Model Specification and Data Source**
1-Data:
Table 01 describes the variables used in the study:

Table 01: Description of Variables

Variable	symbol	Description and measurement	Source
Foreign direct investment	FDI	Net inflows (% of GDP)	WDI
Financial Development Index	FI	Index	FMI
Trade openness	TOP	Trade (% of GDP)	WDI
Economic growth	GDP	GDP per capita growth (annual %)	WDI
Real Exchange rate	EXR	Real Effective Exchange Rate, based on Consumer Price Index	FMI

The study utilizes time series data for Algeria from 1990 to 2020, obtained from World Bank indicators (WDI) and FMI data.

2-MODEL:

This study employs a simple empirical model to investigate the connection between foreign direct investment and financial development in Algeria:

$$FDI_t = \beta_0 + \beta_1 FI_t + \beta_2 TOP_t + \beta_3 GDP_t + \beta_4 EXR_t + \varepsilon_t$$

Where FDI is foreign direct investment, FI is financial development, TOP is trade openness, GDP is gross domestic product per capita, and EXR is real exchange rate. ($\beta_1, \beta_2, \beta_3, \beta_4$) are coefficients of the independent variables, β_0

Is the intercept, and ε_t is the white noise error term.

Secondly: Method

The Autoregressive Distributed Lag (ARDL) method was employed in this study due to its advantages over conventional techniques used for co-integration testing. It can be applied when the variables under study have different orders of integration, whether they are integrated at rank zero I (0), rank one integer I (1), or at different degrees. The ARDL method provides robust results even with small sample sizes, which is in contrast to most traditional co-integration tests. Additionally, the ARDL

method allows for the estimation of long-term and short-term relationships simultaneously in a single equation, rather than separate equations[1].

The ARDL model's bounds-testing approach involves using different lags for independent variables; we interpret the results based on the ARDL methodology and the F-distribution developed by Narayan and Narayan (2005) for critical values. This F-distribution accommodates small samples. The model with the specified variables can be formulated as follows:

$$\Delta FDI_t = \theta_0 + \sum_{i=1}^{t} \theta_1 \Delta FDI_{t-i} + \sum_{i=1}^{t} \theta_2 \Delta FI_{t-i} + \sum_{i=1}^{t} \theta_3 \Delta TOP_{t-i} + \sum_{i=1}^{t} \theta_4 \Delta GDP_{t-i} +$$

$$\sum_{i=1}^{t} \theta_5 \Delta EXR_{t-i} + \beta_1 FDI_{t-1} + \beta_2 FI_{t-1} + \beta_3 TOP_{t-1} + \beta_4 GDP_{t-1} + \beta_5 EXR_{t-1} + \varepsilon_t$$

The null hypothesis is tested against the alternative hypothesis. A long-term relationship between the variables is confirmed if the test statistics are greater than the critical value, leading to the rejection of the null hypothesis.

When incorporating the Error Correction Model (ECM) into the model, it becomes as follows:

$$\Delta FDI_t = \theta_0 + \sum_{i=1}^{t} \theta_1 \Delta FDI_{t-i} + \sum_{i=1}^{t} \theta_2 \Delta FI_{t-i} + \sum_{i=1}^{t} \theta_3 \Delta TOP_{t-i}$$

$$+ \sum_{i=1}^{t} \theta_4 \Delta GDP_{t-i} + \sum_{i=1}^{t} \theta_5 \Delta EXR_{t-i} + \omega ECM_{t-i} + \varepsilon_t$$

The Error Correction Model (ECM) is used to capture short-term deviations from long-term equilibrium by employing an error correction mechanism to adjust for Short-term errors[2].

SECOND REQUIREMENT: Results Analysis

When using the ARDL method to measure the impact of financial development on foreign direct investment in Algeria during the period 1990–2020, a set of results has been obtained, this will be analyzed in this requirement.

Firstly: **unit root and bound test results**

1- Unit Root Test Results

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The Phillips-Peron unit root test (PP) is used to determine the integration properties of the time series variables in the ARDL model. The results of this test, summarized in Table 2, indicate that all variables are stationary at the first difference except for GDP and EXR. This satisfies the requirement for estimating the ARDL model, as the variables have a mix of I (0) and I (1) integration properties.

Table 2: The unit root results

Variable	Level			1st Difference			Status
	Intercept	Trend and Intercept	Without constant and Trend	Intercept	Trend and Intercept	Without constant and Trend	
FDI	0.0932	0.2855	0.2147	0.0000	0.0000	0.0000	I(1)
FI	0.5075	0.0693	0.6948	0.0020	0.0011	0.0001	I(1)
TOP	0.6450	0.9890	0.5787	0.0007	0.0016	0.0000	I(1)
GDP	0.2826	0.8464	0.0408				I(0)
EXR	0.0001	0.0000	0.0125				I(0)

Source: prepared by researchers based on EVIEWS.12.

2-Bounds Test Results:

The ARDL Bounds test is employed to examine the presence of a long-term co-integrating relationship among the research variables. The findings in Table 3 indicate that the calculated F-statistics (35) are greater than the upper critical value, leading to the rejection of the null hypothesis. This suggests that the variables under study are co-integrated.

Table 3: ARDL-bound test for co-integration

Lag structure	ARDL(1,2,4,4,2)	
F-statistics	35	
Level of significant	I(0)	I(1)
10%	2.46	3.46
5%	2.947	4.088
1%	4.093	5.532

Source: prepared by researchers based on Appendix 1.

Secondly: Estimation of Long-Run and Short-Term Coefficients:

By constructing a vector Autoregression (VAR) model, the optimal lag length of p= 4 is determined (by referring to Appendix 2, Table 1). The summarized results of estimating the ARDL (1, 2, 4, 4, 2) model are presented in Table 4.

Table 4: ARDL Long-Run and Short-Run Estimates

Variable	coefficient	Prob

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Long Run : Dependent Variable FDI		
FI	77.12045	0.0702
TOP	0.038062	0.0927
GDP	0.267911	0.0247
EXR	0.056672	0.0442
C	-17.24611	0.0552
Short Run: Dependent Variable FDI		
D (FI)	-8.120662	0.7215
D (FI (-1))	-58.59492	0.0138
D (TOP)	-0.012617	0.4518
D (TOP (-1))	-0.002407	0.9056
D (TOP (-2))	0.038292	0.0457
D (TOP (-3))	0.058686	0.0211
D(GDP)	-0.064259	0.0922
D (GDP (-1))	-0.339797	0.0004
D (GDP (-2))	-0.300788	0.0009
D (GDP (-3))	-0.147387	0.0097
D (EXR)	0.060157	0.0015
D (EXR (-1))	-0.039189	0.0100
CointEq (-1)*	-1.020368	0.0001

Source: prepared by researchers based on Appendix 2 (Table 2).

Based on the long-term coefficients, it appears that financial development and trade openness do not have a significant impact on foreign direct investment (FDI) in the long term. However, the results indicate that economic growth has a positive effect on FDI in the long run, with a 1% increase in economic growth leading to approximately a 0.26% increase in FDI. Additionally, the exchange rate has a positive impact on FDI in the long term, where each one-unit increase in the real exchange rate leads to a 0.06% increase in foreign direct investment.

The results of the short-term estimation can be summarized as follows:

- Lagged financial development (D(fi(-1))) has a significant negative impact on FDI in the short term, indicating that a one-unit increase in financial development from the previous period results in a decrease in FDI.

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- Economic growth exhibits a significant negative effect on FDI, implying that an increase in the economic growth rate leads to a decline in FDI.
- Lagged trade openness has a significant positive impact on FDI, suggesting that an increase in trade openness leads to an increase in FDI.
- The current exchange rate has a significant positive impact on FDI, meaning that an increase in the value of the current exchange rate results in an increase in FDI. However, FDI is negatively affected by a one-period lag in the exchange rate.

According to the findings in Table 4, the coefficient of the error-correction term (CointEq (-1)) is negative and statistically significant. With a coefficient of -1.05, this indicates that the error correction process varies dampeningly around the long-run value rather than immediately and monotonically converging to the equilibrium path. However, when this process is finished, convergence to the equilibrium path happens quickly.

Thirdly: Diagnostic and stability tests
1-Diagnostic Tests

After estimating the ARDL model, it is crucial to conduct a set of diagnostic tests to ensure that the estimated model is free from any statistical issues. Table 5 presents the results of different tests.

Table 5: Diagnostic Test

Tests	F-Stat	P-Value
Breusch –Godfrey LM test	1.87	0.207
Heteroscedasticity test(ARCH Test)	0.04	0.837
Normality test(Jarque-Berra)	5.01	0.081
Ramsey Reset Test	0.42	0.532

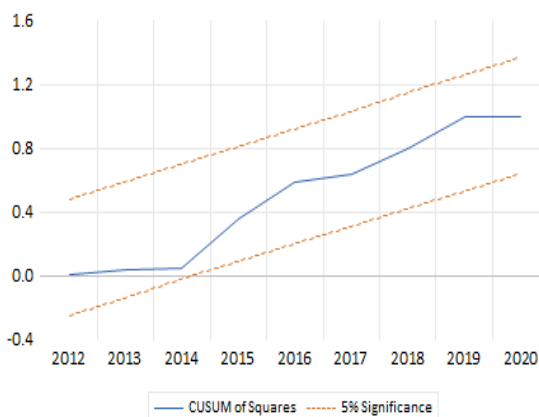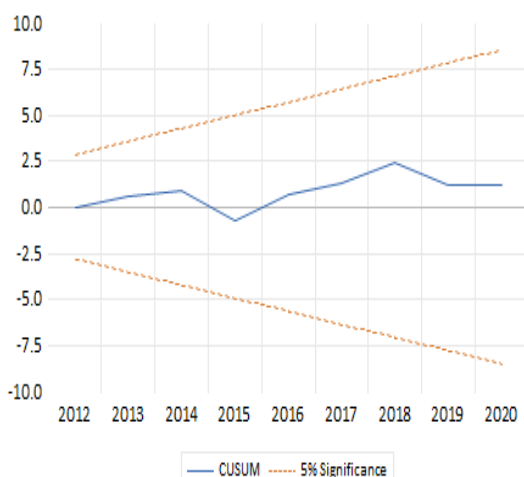Source: prepared by researchers based on Appendix 3.

The results in Table 5 indicate that the corresponding p-values of the tests are greater than 0.05. This means that the null hypotheses are accepted, suggesting that the model residuals follow a normal distribution, are not serially correlated, and do not exhibit heteroscedasticity. The Ramsey RESET test also supports accepting the functional form of the model.

2-Stability Test:

We performed the Cumulative Sum of Recursive Residuals (CUSUM) test and the Cumulative Sum of Recurrent Residual Squares (CUSUMQ) test to check the stability of the estimated parameters in the long run. These tests examine whether the coefficients of the ARDL model remain stable over time. If the plots of the tests fall within the critical bound at a 5% significance level, it indicates that the model parameters exhibit structural stability.

Figures 1 and 2 shows the stability of the coefficient because the CUSUM and CUSUMQ plots fall within the critical bounds of 5% significance.

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Figure 1: Plot of the CUSUM test.   Figure 2: Plot of the CUSUMQ test.

Source: prepared by researchers based on EVIEWS.12.

Conclusion:

Our research aimed to investigate the effects of financial development on foreign direct investment (FDI) in Algeria from 1990 to 2020. The study utilized a model incorporating variables such as financial development, FDI, economic growth, trade openness, and the real exchange rate. After analyzing the data, we derived the following key findings:

1. Financial development does not exhibit long-term effects on FDI. This suggests that attracting foreign direct investment over the long run is not solely dependent on the development of financial factors; infrastructure, governmental policies, and political and economic stability may play crucial roles. However, in the short term, financial development negatively impacts FDI. This implies that short-term fluctuations in the financial system, such as market swings and financial instability, can adversely influence investment decisions due to reduced confidence or uncertainty regarding potential financial gains.

2. Trade openness does not have a significant impact on FDI in the long run. Nevertheless, in the short term, an increase in trade openness will lead to a rise in FDI. This suggests that while trade openness may not directly affect long-term FDI decisions, it can contribute to an increase in short-term foreign investment due to existing trade opportunities and economic integration.

3. Economic growth has a positive impact on FDI over the long term but a negative impact in the short term. Improved economic growth, resulting in greater opportunities and favorable economic conditions, can enhance decisions regarding FDI in the long run. However, in the short term, rapid economic expansion may lead

journal Of Legal and Economic Studies   ISSN 2602-7321/ EISSN 2773- 2649

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to excessive demand or other consequences that negatively affect foreign direct investment.

4. In the long run, the exchange rate has a positive impact on FDI. Similarly, it has a positive effect on FDI in the short term. However, during a one-period slowdown, the exchange rate has a negative impact. Consequently, short-term changes in the exchange rate can attract FDI, but a temporary slowdown in the rate of exchange could have the opposite effect.

Recommendations:

Based on these research findings, we provide the following recommendations:

1. Enhancing financial stability in Algeria should be a primary goal of government measures, particularly in the short term. This can be achieved by improving the banking system, implementing effective financial regulation, and establishing robust measures to manage economic fluctuations.

2. Simplifying bureaucratic processes, reducing costs, increasing transparency, and protecting investors' rights contribute to improving the investment climate in Algeria, both in the short and long term.

3. Focus on enhancing the main economic sectors in Algeria, including energy, manufacturing, agriculture, and tourism. This can be accomplished through infrastructure upgrades, skill development of the local workforce, and offering incentives and policies for international enterprises involved in these industries.

4. Promote innovation and technology transfer to enhance Algeria's capacity to attract foreign direct investments.

5. Encouraging foreign companies to transfer technology and build capabilities should be a top priority, along with developing Algeria's existing technical and technological capabilities.

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Appendices

Appendix 1: bound test

journal Of Legal and Economic Studies   ISSN 2602-7321/ EISSN 2773- 2649

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F-Bounds Test		Null Hypothesis: No levels relationship			
Test Statistic	Value	Signif.	I(0)	I(1)	
			Asymptotic: n=1000		
F-statistic	4.642965	10%	2.2	3.09	
k	4	5%	2.56	3.49	
		2.5%	2.88	3.87	
		1%	3.29	4.37	
Actual Sample Size	27		Finite Sample: n=35		
		10%	2.46	3.46	
		5%	2.947	4.088	
		1%	4.093	5.532	
			Finite Sample: n=30		
		10%	2.525	3.56	
		5%	3.058	4.223	
		1%	4.28	5.84	

Appendix 2: long and short-term estimation
Table 1: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-167.2859	NA	0.239956	12.76192	13.00189	12.83327
1	-101.7791	101.8995*	0.012397	9.761412	11.20123	10.18955
2	-75.02234	31.71168	0.013471	9.631284	12.27095	10.41620
3	-46.58662	23.16985	0.019801	9.376786	13.21630	10.51848
4	22.29591	30.61446	0.004323*	6.126229*	11.16559*	7.624696*

Table 2: long-run and short-run estimation

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FI)	-8.120662	22.08005	-0.367783	0.7215
D(FI(-1))	-58.59492	19.21920	-3.048771	0.0138
D(TOP)	-0.012617	0.016041	-0.786560	0.4518
D(TOP(-1))	-0.002407	0.019729	-0.122011	0.9056
D(TOP(-2))	0.038292	0.016523	2.317473	0.0457
D(TOP(-3))	0.058686	0.021055	2.787334	0.0211
D(GDP)	-0.064259	0.034105	-1.884133	0.0922
D(GDP(-1))	-0.339797	0.061110	-5.560377	0.0004
D(GDP(-2))	-0.300788	0.062332	-4.825596	0.0009
D(GDP(-3))	-0.147387	0.045094	-3.268442	0.0097
D(EXR)	0.060157	0.013422	4.481940	0.0015
D(EXR(-1))	-0.039189	0.012064	-3.248499	0.0100
CointEq(-1)*	-1.020368	0.155003	-6.582883	0.0001

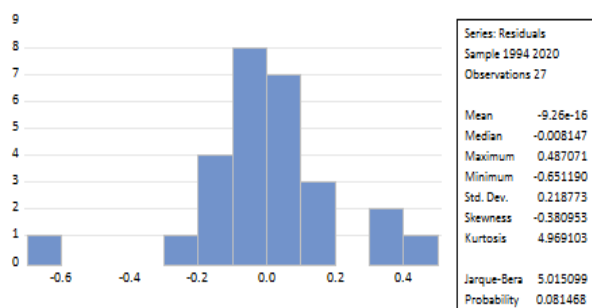|			
R-squared	0.858212	Mean dependent var	0.029217
Adjusted R-squared	0.736679	S.D. dependent var	0.580998
S.E. of regression	0.298138	Akaike info criterion	0.723661
Sum squared resid	1.244406	Schwarz criterion	1.347583
Log likelihood	3.230570	Hannan-Quinn criter.	0.909186
Durbin-Watson stat	2.585405		

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FI	77.12045	37.55299	2.053643	0.0702
TOP	0.038062	0.020236	1.880894	0.0927
GDP	0.267911	0.099490	2.692830	0.0247
EXR	0.056672	0.024238	2.338128	0.0442
C	-17.24611	7.834644	-2.201263	0.0552

EC = FDI - (77.1204*FI + 0.0381*TOP + 0.2679*GDP + 0.0567*EXR - 17.2461)

Appendix 3: Diagnostic tests

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Series: Residuals	
Sample 1994 2020	
Observations 27	
Mean	-9.26e-16
Median	-0.008147
Maximum	0.487071
Minimum	-0.651190
Std. Dev.	0.218773
Skewness	-0.380953
Kurtosis	4.969103
Jarque-Bera	5.015099
Probability	0.081468

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: FDI FDI(-1) FI FI(-1) FI(-2) TOP TOP(-1) TOP(-2) TOP(-3) TOP(-4) GDP GDP(-1) GDP(-2) GDP(-3) GDP(-4) EXR EXR(-1) EXR(-2) C

	Value	df	Probability
t-statistic	0.651856	8	0.5328
F-statistic	0.424916	(1, 8)	0.5328
Likelihood ratio	1.397303	1	0.2372

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	1.878498	Prob. F(1,8)	0.2077
Obs*R-squared	5.134328	Prob. Chi-Square(1)	0.0235

Heteroskedasticity Test: ARCH

F-statistic	0.043075	Prob. F(1,24)	0.8373
Obs*R-squared	0.046581	Prob. Chi-Square(1)	0.8291