Article

Short-term and long-term cointegration analysis of foreign direct investment and value added generation in the manufacturing industry

Marcelo Leon[1,2,*], María de la O. Barroso Gonzalez[3], Hector Florez[4]

[1] Universidad Estatal Península de Santa Elena, La Libertad 240207, Ecuador

2 Universidad Tecnológica Ecotec, Samborondon 092302, Ecuador

3 Universidad de Huelva, Huelva 21007, Spain

4 Universidad Distrital Francisco Jose de Caldas, Bogota 110231, Colombia

* Corresponding author: Marcelo Leon, mleon@upse.edu.ec

Abstract: The contraction of manufacturing economic activity in Latin American countries has been affected by the health crisis in the last few years. This phenomenon has negatively impacted the Latin American countries' economies. In order to evaluate the impact of the manufacturing economy, this research integrates the impact of Foreign Direct Investment (FDI) on the growth of the Ecuadorian manufacturing sector, from 1981 to 2019, considering the role of the state through public spending using cointegration. The results are not consistent considering the empirical framework used; thus, FDI has a negative and significant influence on the manufacturing sector. Also, the manufacturing sector has a strong relationship with FDI in the short run and a less significant one in the long run. The results presented in this research suggest promoting domestic and FDI in the manufacturing sector, not only towards overexploited and monopolized sectors such as mining and telecommunications.

Keywords: value added; manufacturing sector; foreign direct investment; cointegration; innovation

1. Introduction

Due to the health crisis provoked by different diseases around the world such as Zika virus outbreak, Ebola virus epidemic, H1N1 influenza virus pandemic among others, manufacturing activity in Latin America has lagged further behind than other economies. This is due to the contraction of the activity in Mexico, Brazil, and Argentina. Considering the data from the United Nations Industrial Development Organization, industrial manufacturing production in March 2020 showed a contraction of 4.8% in Mexico, 9.9% in Brazil and 19.2% in Argentina, affecting the various productive sectors in different ways (Santiago and Vargas, 2020). There was an average weekly reduction of 4.8% in Mexico, 9.9% in Brazil and 19.2% in Argentina. In the case of Ecuador, there was an average weekly reduction of 41.74%, i.e., a weekly loss of sales of approximately 240 million USD, being the most affected the common the metallic and mining sector with a reduction of 87% in both cases, in addition to the textile and clothing sector with a reduction of 75%.

For a region with low public support for innovation, it is necessary to diversify the portfolio of instruments for economic reactivation (Rivera et al., 2023). In this sense, FDI has accounted for 7% of the increase in productivity in the Chilean manufacturing sector (Fernandes and Paunov, 2012). In addition, FDI has had positive spillover effects on the technical efficiency of low-efficiency Indonesian manufacturing firms (Suyanto et al., 2014). Furthermore, FDI is only possible with

respect to manufacturing value added in the long run (Morante et al., 2017); which supports the hypothesis of the present research that FDI has a significantly positive effect on the development of the manufacturing industry in Ecuador (Leon et al., 2022), and can be used as an instrument of long-term economic revival (Agu and Okoli, 2015).

This research aims to determine the existence of a short-term and long-term relationship between the net inflow of FDI and the value added of Ecuador's manufacturing industry in the period between 1981 and 2019, using cointegration techniques and impulse-response analysis to determine the feasibility of the variable as an instrument of economic reactivation. It is done using the vector autoregressive methodology. With this in mind, we analyze the elasticity of the variables under study, and verify the existence of a long-term relationship by means of the Autoregressive Distributed Lag (ARDL) cointegration technique according to the methodology proposed by Pesaran and Shin (1995). The results indicate the existence of a negative and significant relationship of FDI in Ecuador's manufacturing industry. In addition, the results show a positive and significant relationship with public expenditure.

This article is structured as follows. Section 2 presents the related work focused on the impact of FDI on output and value added and manufacturing sector. Section 3 presents the materials and methods describing the data and the methodology used in the research. Section 4 presents the results while section 5 discusses de results. Finally, section 6 concludes the research.

2. Related work

In order to understand in a proper way, the economic phenomena involved in this research, the present section is divided into two main sections that show the essential aspects of the empirical basis on which the research is based.

2.1. Impact of foreign direct investment on output and value added

Martínez and Hernández (2012) indicate that FDI is manifested in fixed investment, human capital, wages, and total factor productivity; thus, being determinant for the increase of production, among other aspects. Pérez (2015) mentions that collaboration between the state and foreign entrepreneurs has shown that it is possible to reduce risk and uncertainty, create confidence, solve the needs of capital and technology shortages, and channel the search for profits into economic projects that contribute to the well-being of society in general. González and Xóchitl (2016) state that FDI participation in the economy can be beneficial when it contributes to the scaling up of the labor force, creates and or strengthens productive linkages with other economic activities, and generates technological spillovers.

Herranz et al. (2009) analyze the impact of FDI on Latin American productivity, but they do not find a process of improvements in factor utilization or technological improvements, instead, they find a positive effect of foreign fixed capital growth (FDI accumulation), domestic private and public on labor productivity, but with very different relative values in each period, reflecting the importance of structure in determining the impact of FDI. Torres et al. (2017) argue that FDI dynamics are characterized by a strong process of regional divergence. Morales (2010) indicates that FDI is considered as an indispensable factor for the development of every country, and

it has been expected to bring to the countries industrial modernization, technology imports, as well as jobs creation. As a result, FDI has been highlighted as an important contribution to economic equilibrium, which is consistent with Buitrago and Luz (2015) who indicate that FDI moderately affected the growth of the economy in Colombia; consequently, based on the conditions of the Colombian economy and the global economic climate, FDI supported the increase of the Colombian Gross Domestic Product (GDP).

2.2. Impact of foreign direct investment on the manufacturing sector

The evidence differs on the effects of FDI. Initially, Globerman (1979) studied the direct economic benefits of foreign investment in Canadian manufacturing industries, concluding that differences in labor productivity of domestically owned plants, which is used as an independent variable including, among other measures, the amount of foreign ownership in an industry. Jeon (1992) provides determinants of FDI by Korean firms in the manufacturing industry at the microeconomic level stating that FDI is a resource used to minimize the cost of production, either by avoiding non-tariff barriers to foreign trade in developed countries or by exploiting cheap labor in developing countries. Subsequently, Chuang and Mei Lin (1999); Potter et al. (2002) and Suyanto et al. (2014) found that in the case of Taiwanese, UK, and Indonesian manufacturing firms respectively, FDI has a positive impact, which together with innovation and development shows a spill-over effect on productivity in local firms, suggesting that governments should adopt policies to encourage it, so that the whole industry benefits. However, Ruane and Uğur (2005) argue that in the Irish case, empirical evidence shows that technology spillovers have been minimal, despite the government's dedication to getting local manufacturing firms to work in harmony with foreign firms. Alfaro (2003) with data from several countries, analyzed the effects of FDI between 1981 and 1999, concluding that it has a positive and significant impact on the manufacturing sector, in this case and although the terms, the coefficients range between 0.8 to 1.8 become slightly less significant. In the Chilean case, Fernandes and Paunov (2012) indicated that FDI had a positive impact on total factor productivity in manufacturing firms, which explained 7% of its increase as well as boosting innovation in local firms. Similarly, Agu and Okoli (2015) suggested that the government should promote foreign capital inflows as the results showed positive effects on Nigeria's manufacturing sector especially in the long run, also embark on domestic investments and improve the skills of human capital. Complementarily, Pérez (2015) argued that collaboration between the Cuban state and foreign entrepreneurs is important and has shown that it is possible to reduce risk and uncertainty, build confidence, address Cuba's needs for scarce capital and technology, and channel the search for profits into economic projects that contribute to the well-being of society at large.

Chiatchoua et al. (2016) indicate that despite the increase in FDI in the manufacturing sector, the greatest growth in production and employment generation is concentrated on the services sector. Barbero (2013) mentions that for the Argentine economy of the 1920s, FDI was crucial for the diffusion of new methods of production, distribution and management. The development of the manufacturing sector in the

1920s was crucial because it provided the basis for industrial growth after 1930, a stage in which the market was much more closed and in which expansion was largely possible by taking advantage of the capacity installed in the previous decade. Mendoza (2011) shows that the impact of FDI is positive but not statistically significant. The model estimating the impact of FDI on manufacturing value added growth showed a negative and statistically non-significant coefficient. Also, it is highlighted the existence of positive effects of FDI on manufacturing growth at the sub-sector level.

Taylor (2020) mentions that the role of foreign direct investment in the Tanzanian economy is more representative in the primary sector, than in the manufacturing and services sectors from 1988 to 2017 and from 1999 to 2017 foreign investment shows positive and statistically significant effects in the primary sector, which contrasts in the case of the manufacturing and services sectors. Kolisi (2021) examines the long-term relationship between FDI in the manufacturing sector and economic growth in South Africa from 2006 to 2018 using the autoregressive distributed lag (ARDL) model to investigate the long-term relationships between the variables. The results reveal that FDI in the manufacturing sector has a negative impact on long-term economic growth. According to the findings, it is necessary to implement policies that ensure a skilled workforce and infrastructure development to achieve greater economic growth in South Africa. In the case of Nigeria, Bank-Ola and Akintaro (2020) using an autoregressive distributed lag (ARDL) model and time series data from 1986 to 2018 found a positive relationship between FDI and the manufacturing industry; however, it is not significant and statistically does not explain the growth of the manufacturing industry. Keji (2023) in his analysis from 1985 to 2020 found that there is a short-term and long-term relationship between FDI and the growth of the country's industrial production.

In addition, Lin et al. (2020) present the case of China where foreign investment has a positive and significant impact on the wood products industry from 1999 to 2007 through a business census of 78,555 forestry companies. Li et al. (2021) highlight the influence of foreign direct investment in the equipment manufacturing industry from 2003 to 2015, through a panel data analysis, they show that FDI has a positive and significant effect on the factor productivity of this industry. Likewise, Zhang and Zhang (2022) through generalized moment panel data estimation techniques analyze the indirect effects of FDI in 26 industries in Guangdong Province, China from 2000 to 2018 where the results showed a positive and statistically significant relationship between the competitive effects of FDI and energy efficiency. However, the demonstration effects of FDI showed an opposite relationship, moreover, these indirect effects were more pronounced in low or medium energy consuming industries.

Duramany et al. (2021) analyzes the short-term and long-term impact of Foreign Direct Investment (FDI) on manufacturing output in Sierra Leone, using time series data from 1970 to 2018 where the results of the Granger causality test indicate that FDI has a significant impact on manufacturing output (MQ) suggesting that an increase in FDI could lead to an increase in MQ. In addition, the Johansen cointegration method was used to determine the long-term relationships between the variables, the results revealed a positive relationship between FDI and the manufacturing sector, the error correction model (ECM) was employed to examine the short-term relationships and highlighted that the exchange rate and the availability of

FDI are the main factors affecting manufacturing output in Sierra Leone. The authors conclude that it is crucial for the Sierra Leone government to recognise the importance of FDI and improve the business environment to make it safer and more attractive to investors, which requires the formulation of impartial policies and the implementation of reforms that boost gross domestic product (GDP), along with infrastructure development and controlling inflation by strengthening monetary policy.

Oduola et al. (2022) have conducted empirical studies on how foreign direct investment (FDI) influences industrialization focusing on the role of institutions in the relationship between FDI and industrialization in 43 sub-Saharan African countries from 1996 to 2018 employing estimation methods such as pooled ordinary least squares, fixed effects and generalized method of moments for empirical analysis, the findings show that there is serial autocorrelation in the case of industrialization, that is, the persistence of industrialization in the past significantly influences current industrialization in sub-Saharan Africa. Thus, FDI has a negative and significant impact on industrialization; in terms of policies, the authors recommend the implementation of institutional reforms that strengthen economic, political and institutional governance in the region. Esquivias and Yasin (2022) investigate how foreign direct investment (FDI) impacts wages in Indonesia's manufacturing sector, considering three dimensions: industry, province, and technology intensity, using annual data of Indonesian manufacturing firms from 2011 to 2015 and applying a fixed effects model found that the spatial dimension is the most significant, since inward FDI tends to reduce wages in the host province, when segmenting by firm size, it was observed that FDI in technology-intensive subsectors decreases wages; however, FDI in host industries supports higher wages in small local firms and improves labor productivity, so the authors underline the importance of coordination between central and local governments to ensure that local firms are sufficiently competitive against foreign firms. Djokoto et al. (2022) examine the impact of foreign direct investment in the manufacturing sector (FDI) in developing and developed countries, using an unbalanced panel data from 44 countries (18 developing and 26 developed) from 1991 to 2018, with fixed effects estimators and the general method of moments, the results show that FDI has a positive impact on human development in both developing and developed countries, the authors recommend that economic decision-makers in developing countries improve the macroeconomic environment to encourage foreign investment in the food manufacturing subsector; likewise, it is suggested to reallocate FDI towards developing countries, with the help of international organizations such as the United Nations Conference on Trade and Development.

Asamoah and Alagidede (2023) investigate the influence of foreign direct investment (FDI) on real sector growth considering financial development as a key factor, using a recent financial development dataset and Lewbel's two-step GMM estimator with instrumental variables (IV-GMM). The data analyzed if from 1990 to 2017. The initial results indicate that overall FDI does not promote growth and in some cases may even reduce growth in the agricultural sector; however, when decomposing the real sector, it is found that the interaction between FDI and financial development does enhance the growth of the real sector and its components in nominal terms, the analysis shows that the positive impact of FDI on real sector growth and industry is observed from the 25th percentile of financial development, while in the

manufacturing sector, this impact is evident only at the 90th percentile. Although financial development can partially mitigate the negative impact of FDI on the agricultural sector, it does not completely eliminate its initial adverse effect. Finally, Marasco et al. (2024) investigate the relationship between foreign direct investment (FDI) and manufacturing sector growth, based on a collected data from 28 countries from 1989 to 2019 and employed GMM techniques for analysis. They used the United Nations International Standard Classification (ISIC) Revision 3 to classify FDI and followed OECD criteria to distinguish it according to technological content. The results show that technology is crucial to the relationship between FDI and growth, a U-shaped relationship is observed between FDI and economic growth depending on the technological content; in particular, FDI with high technological content has a positive relationship with growth in the manufacturing sector, while a positive relationship is also identified at the low-technology end.

3. Materials and methods

3.1. Data

To analyze the use of the FDI as a tool of economic reactivation, the present research uses secondary information taken from the database of the Mundial Bank for Ecuador from 1981 to 2019. The variables used to explain the econometric model are: as independent variables: value added in the manufacturing sector (M vab) and FDI. The control variable used is general government expenditure (GP), which, according to the World Bank, is the value added in the manufacturing sector (M), that, according to Santiago and Vargas (2020) and Pérez (2015) is also important for economic recovery for countries. **Table 1** shows the details of the variables.

Table 1. Variables used in the study.

Variable	Definition	Measure
Gross Added Value of the Manufacturing Sector (Mvab)	It measures the values added to goods and services at different stages of the production process.	US dollars at current prices
Foreign Direct Investment (FDI)	It collects securities that enter as an investment with the purpose of creating a link for long-term economy and business by foreign investors in the host country.	US dollars at current prices
Public Spending (GP)	It includes every government current and capital expenditures for buying products and services.	Constant 2010 US dollars.

To understand it more properly, and considering the analysis of the results for the nominal variables expressed in US dollars at constant 2010 prices, the natural logarithmic scale is applied. **Table 2** details the descriptive statistics of the variables, the research is based on data from 1981 to 2019. In particular, FDI has had a high standard deviation due the analyzed data has increased after the year 2010.

Table 2. Statistics of the variables.

Variable	Observations	Mean	Std. Dev.	Min	Max
Mvab	39	22.647	0.324	22.156	23.105
FDI	39	18.681	5.947	−16.970	21.052
GP	39	22.690	0.346	22.353	23.377

Figure 1 shows the degree of dispersion and correlation of the dependent variable with the independent and control variables. Tt shows a high degree of dispersion between manufacture and FDI, while a low degree of dispersion between Manufacture and public spending. Furthermore, the correlation coefficient (r) indicates that there is a moderate and direct relationship between the two variables, while the r-value indicates that there is a strong and direct relationship between the variables. Finally, it indicates a moderate degree of dispersion between Mvab and GP, where the r value means that there is a moderate and direct relationship between the variables.
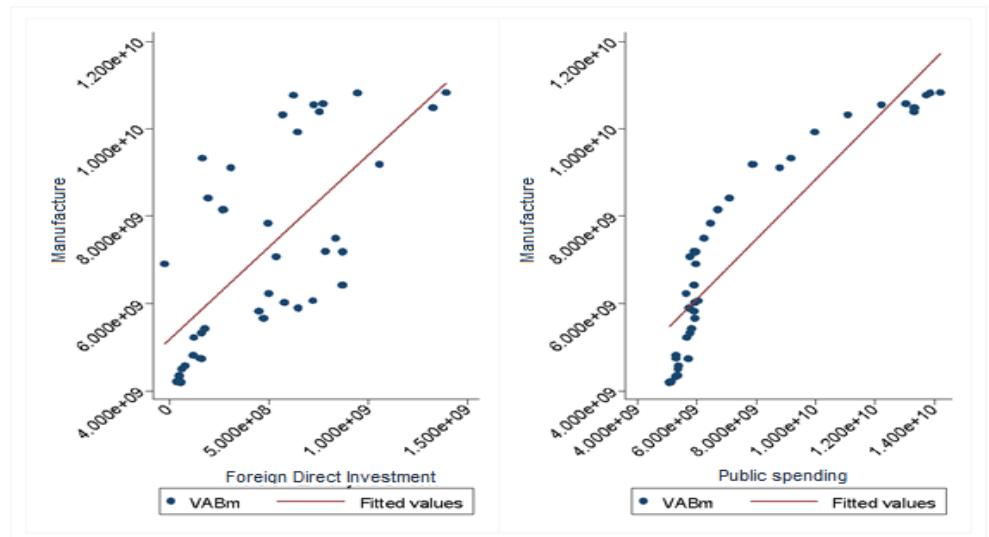

Figure 1. Dispersion and correlation of the gross value added of the manufacturing sector with FDI and public expenditure in Ecuador from 1981 to 2019.

Camino et al. (2018) mention that the manufacturing sector in Ecuador includes activities such as the manufacture of food products, sporting goods, chemical substances and products, printing and reproduction of recordings, rubber and plastic products, metal products for structural use, tanks, reservoirs, metal containers and steam generators, clothing, other mineral products, textile products, pharmaceutical products, medicinal chemicals and botanical products for pharmaceutical use, and machinery and equipment; according to Central Bank data, it is the largest contributor to GDP.

Figure 2 shows the evolution of the value added of the manufacturing sector, which shows an increasing behavior in the study period, with an important break in 2000 when the country was going through a tough financial and economic crisis, which led to the dollarisation of the economy. Furthermore, from 2012 onwards it shows decreasing returns in the evolution of the variable, since in these years, growth was mainly driven by public spending and consumption.

According to the Banco Central del Ecuador from 2015 to 2019, FDI has mainly gone to sectors such as natural resource extraction, manufacturing, commerce, and other industries; with foreign resources being used in the incorporation of new companies or the domiciliation of existing ones, also by increasing capital in national companies.

FDI in Ecuador has been growing and not very regular until 2004, when, due to the great recession, FDI decreased to its minimum values in 2000, being irregular for two years, recovering slightly until 2015, when it suffered a new setback due to the fall in the price of natural resources, due to the implementation of a higher tax on the outflow of foreign currency and radicalization of left-wing policies taken by the government in power, especially in the labor sphere. The behavior of the variable in the period under study shows trend traits, except in the years in which the economic and social phenomena described above have occurred.

In addition, public spending increased considerably in 2004, due especially to the considerable investment in oil infrastructure projects, mainly since 2007 with the change of government which aimed at investment in health, education and infrastructure as a driving force of economic and social development in the country.

Figure 2. Evolution of the gross value added of the manufacturing sector, FDI, and public expenditure in Ecuador from 1981 to 2018.

3.2. Methodological strategy

Based on the objective of examining the effect of FDI in the Ecuadorian manufacturing industry from 1981 to 2019, this research was carried out using an ordinary least squares model. The hypothesis to be verified is the existence of a direct relationship between the two variables, using general government expenditure as control variables, as shown in Equation (1).

$$Mvab_t = \beta_t + \beta_t lnIED + \beta_t lnGP + \mu_t \tag{1}$$

where, *Mvab* is the gross value added of the manufacturing sector, FDI is the foreign direct investment, *GP* is the general government expenditure, and μ is the error term.

Novales (2017) indicates that the Vector autoregression (VAR) model is very useful when there is evidence of simultaneity among a group of variables, and their relationships are transmitted over a certain number of periods.

The series, with the exception of FDI, shows trend behavior as presented in **Table 3**, according to the statistical test of Dickey and Fuller (1979). The calculated statistics are less than the critical value at 5%, confirming the existence of a unit root in the series; therefore, we proceeded to extract the first differences, converting the series with trend effect into stationary series, which shows that *Mvab* and *GP* are series of integration order I, while *FDI* is a series of integration 0.

Table 3. Unit root test statistics of the variables.

Variable	Stat	Critical value 1%	Critical value 5%	Critical value 10%
Mvab	−0.588	−3.662	−2.964	−2.614
FDI	−6.199	−3.662	−2.964	−2.614
GP	1.702	−3.662	−2.964	−2.614
D1.Mvab	−9.739	−3.668	−2.966	−2.616
D1.FDI	−6.199	−3.668	−2.966	−2.616
D1.GP	−3.788	−3.668	−2.966	−2.616

To determine the optimal number of lags, the information criterion of Akaike (1974) was used having the same order of integration and the Autoregressive Distributed Lag (ARDL) cointegration test proposed by Pesaran and Shin (1995) were used, which allows the evaluation of the long-run relationship condition even if the variables are not mutually integrated, that is, they are I (0) and I (1), which is indicated in Equation (2):

$$\Delta y_t = \alpha + \phi[y_{t-1} - \theta\mu_{t-1}] + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} \delta_j \Delta\mu_{t-j} + \varepsilon_t \tag{2}$$

where the term θ establishes the long-run relationship between the explanatory variables and manufacturing value added, Φ measures the speed of adjustment of manufacturing value added towards long-run equilibrium following the given change in FDI and public expenditure, and $\Phi<0$ ensures the existence of the long-run relationship. If the *F* and *t*-statistics are closer to zero than the critical values at the different confidence levels, the null hypothesis of no cointegration between the variables is not rejected. In case of both values were more extreme than the critical values, a cointegration relationship between the variables is established.

4. Results

The measurement of elasticities is a way to know the impact that independent variables have on the country's manufacturing output in the study period. **Table 4** shows the elasticities of FDI and public expenditure with respect to the gross value added of the manufacturing sector, the *R*-value[2] indicates that 30.42% of the changes

in Mvab are explained by changes in the explanatory variables. FDI is statistically significant at 5%. A 1%-point increase in FDI would result in a 0.004% decrease in M, but not a negative impact 0.004% decrease in Mvab.

As a result, FDI has a negative and significant impact on the Ecuadorian manufacturing economy because it is mostly intensive in sectors such as natural resource extraction and telecommunications, and an increase in these activities would provoke a change in the allocation of market resources, decreasing manufacturing activity in the country.

Table 4. Elasticities of the independent variables related to the dependent variable.

D1.M(ln)	Coefficient	Std. Error	*t*	*P > t*
FDI (ln)	−0.0036862	0.0009632	−3.83	0.001
D1.GP(ln)	0.1006469	0.142752	0.71	0.485
Constant	0.0912341	0.0193647	4.71	0.000
Adjusted R = 0.3042 F (2, 35) = 7.65				

As stated in the methodological strategy according to Novales (2017), the VAR model is useful when there is evidence of simultaneity among a group of variables, and their relationships are transmitted over a certain number of periods. In the present paper, the data without unit roots, suggests that the gross value added of the manufacturing sector is a function of the explanatory variables, their lags, and their lags; which are statistically significant. Considering Akaike's (1974) information criterion, as shown in **Table 5**, the optimal number of lags in the proposed VAR model is one lag.

Table 5. Information criterion of optimal number of lags.

Backlog	Log Likelihood Logarithm	p-value	AIC	HQIC	SBIC
0	14.4307				
1	33.3281	0.000	−1.2546	−1.07088	−0.71588
2	36.4630	0.713	−0.909588	−0.588082	0.03316
3	41.7861	0.301	−0.6933	−0.234007	0.65349
4	52.3904	0.012	−0.78767	−0.190589	0.96316

We consider 1 lag in each explanatory variable, resulting in an ARDL (1, 1, 1), the results of the $F = 22.138$ and $t = −7.687$ statistics indicate the existence of the long-run relationship between manufacturing value added and FDI, as they exceed the 1% band, so the null hypothesis of no cointegration is rejected.

We consider 1 lag in each explanatory variable, resulting in an ARDL (1, 1, 1), the results of the $F = 22.138$ and $t = −7.687$ statistics indicate the existence of the long-run relationship between manufacturing value added and FDI, as shown in **Figure 3**, as they exceed the 1% band, so the null hypothesis of no cointegration is rejected.
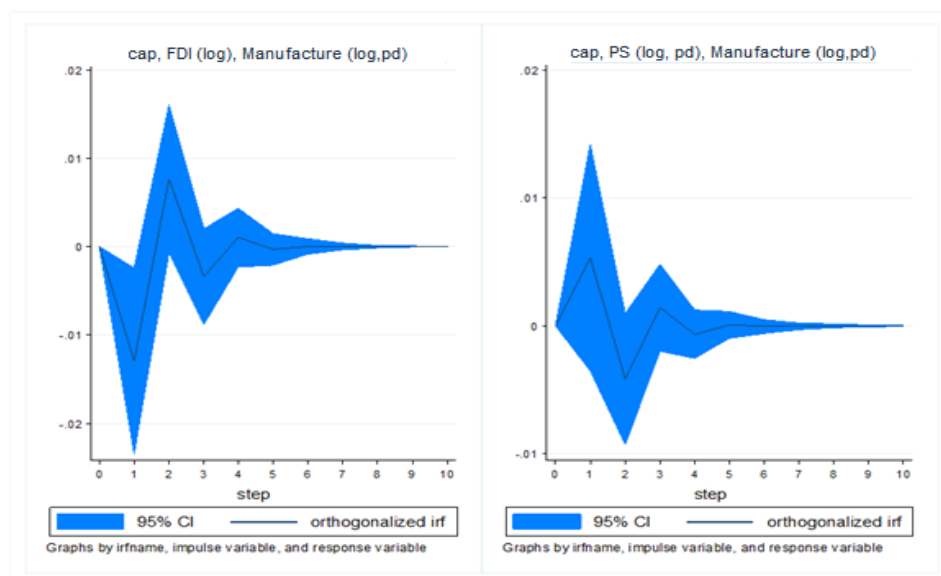
Figure 3. Response period of the impact of FDI and public expenditure on Ecuador's GVAm from 1981 to 2019.

The post-estimation tests indicate additional features of the vector auto-regressor model, and the autocorrelation test indicates that the null hypothesis is not accepted, i.e. there is autocorrelation in the residuals of the specified model. However, the normal test shows that the residuals are well distributed, which leads us to confirm the null hypothesis. Finally, the stability test shows that the parameters are stable in the long run.

5. Discussion

According to the results obtained for Ecuador, there is a contradiction between these results and the results provided by Martínez and Hernández (2012), González and Xóchitl (2016), Morales (2010), and Buitrago and Luz (2015). The differences lie in certain features that the aforementioned studies refer to economies with greater competitiveness in terms of fiscality, labor, and exchange rate legislation. Likewise, the results agree with Herranz et al. (2009) and Chiatchoua et al. (2016) who mention that FDI has a negative impact on the manufacturing sector, as it is mainly concentrated on economic sectors such as mining, services, and technology. Then, they do not represent a major direct boost to the Ecuadorian manufacturing economy because foreign capital is mainly interested in strategic sectors such as oil extraction, telecommunications, and mining.

As a long-run equilibrium relationship is found, the results can be compared to those shown by Agu and Okoli (2015) for the case of the Nigerian manufacturing sector, the impact is positive and the technological and productivity spillover is significant.

The results also contrast with those presented by Keji (2023) and Bank-Ola and Akintaro (2020) who find a short-term and long-term relationship between FDI and the growth of the manufacturing industry in an economy, thus highlighting the need for governments to create a favorable environment to attract and retain foreign direct investment by modifying foreign trade legislation, as well as Duramany et al. (2021)

who state that the importance of FDI should be recognized and promoted through the formulation of impartial policies and the implementation of reforms that boost the gross domestic product (GDP), together with the development of infrastructure and the control of inflation by strengthening monetary policy.

6. Conclusion

This research shows that FDI imposes a strong constraint on industrial growth. This result is reinforced in a dollarized economy, where the main source of foreign exchange is exports of raw materials and primary production. Although the objective of analyzing and determining that foreign investment has short- and long-term effects, it is negative, since manufacturing is not one of its main destinations in a labor-intensive economy that is currently dependent on public spending, and is purely consumption-based, where the higher the income, the higher the marginal propensity to import manufactured goods. Therefore, the hypothesis put forward at the beginning of the research, establishes that FDI is not an efficient instrument for economic reactivation after the health crisis. It can also be concluded that although public spending has a positive effect, it is not significant for the reactivation of this economic sector.

Given the results, when examining the effect of FDI on the Ecuadorian manufacturing industry from 1981 to 2019, it is necessary to point out that economic policies should be directed towards the development of the industrial sector by establishing measures that favor the entry of financial and human capital in order to provide improvements to the national industry and ensure equal conditions to compete in international markets; promoting the entry of capital for technological innovation, the creation of factories for higher value-added products such as telephony, computers, exportable food products and clothing, could boost the growth of added value in the industrial sector and improve the macroeconomic conditions of the country. One of the limitations that arose during the research process is the estimation of causality between variables. In addition, future analysis can be done including new variables such as economic growth, gross fixed capital formation and Gross Domestic Product.

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