Are Domestic Investments in Spain a Source of Economic Growth?

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Abstract:

This article investigates the impact of domestic investments on economic growth in Spain over the period 1970 – 2017. The stylized facts and empirical results indicate that domestic investments, thus, are seen as the source of economic growth in Spain. The study concludes that policy makers should pay attention to the relationship between domestic investments, exports, imports and growth. This also highlights the urgent need in formulating policies that enhance the role of exports in stimulating domestic investment and improving trade balance. We strongly suggest that the popularization of this study should be observed with caution. All the results are robust.

Keywords: Domestic Investments, Economic Growth, Policy, Spain.

JEL Classification: C13, E22, F14

1. Introduction

Without economic growth, it is difficult to improve the standard of living of a country's population in the medium and long term. The enrichment that results from economic growth can help reduce poverty and reduce unemployment. For the study of sources, mechanisms, determinants and impediments to economic growth is of paramount importance. It has always been considered as the final objective of economic policy.Today, economic growth is a fundamental process of contemporary economies, based on the development of the factors of production. One of the most important of these factors is investment. Levine and Renelt (1992) who showed that investment is the only factor that remains linked to the rate of economic growth whatever the specification, the periods or the countries studied. The increase in the volume of investment leads to an increase in productivity, which translates into satisfaction of consumption, which translates into an increase in the value of exports and therefore an improvement in the trade balance. Likewise, the increase in investments leads to an increase in jobs, which translates into a fall in the percentage of the unemployed and therefore a fight against poverty. In the same direction, the increase of investments in the country, leads to the increase of competition in the market, which results in an improvement in the quality of investments and produced goods and thus a reinforcement of the level of innovations. technologies.

According to UNICEF, Spain is one of the developed countries with the highest child poverty. In 2017, more than 1,400,000 children live in extreme poverty. In 2018, the National Institute of Statistics (INE) indicates that 21.6% of the Spanish population lives in poverty. With the crisis that started in 2008, unemployment affects 17.4% of the working population, the highest rate in Western Europe. According to the Spanish Statistical Institute, unemployment reached almost 21% of the active population in the second quarter of 2011. In March 2012 unemployment affected 4.75 million people, or 23.6% of the active population, the highest rate in the EU and it reached 26.02% in January 201320. In 2014, the rate started to fall, and this particularly quickly (at 19.1% in early 2017) but it is still very high .

All these indications show that the Spanish economy suffers from structural problems which have been complicated by the lack of vision and wisdom in dealing with pressing economic and social issues. This is a situation which calls for a critical re-examination of what has been done. It is the question of the link between domestic investment and economic growth in Spain between 1970 and 2017 that we will tackle in this article. Section 2 presents stylized

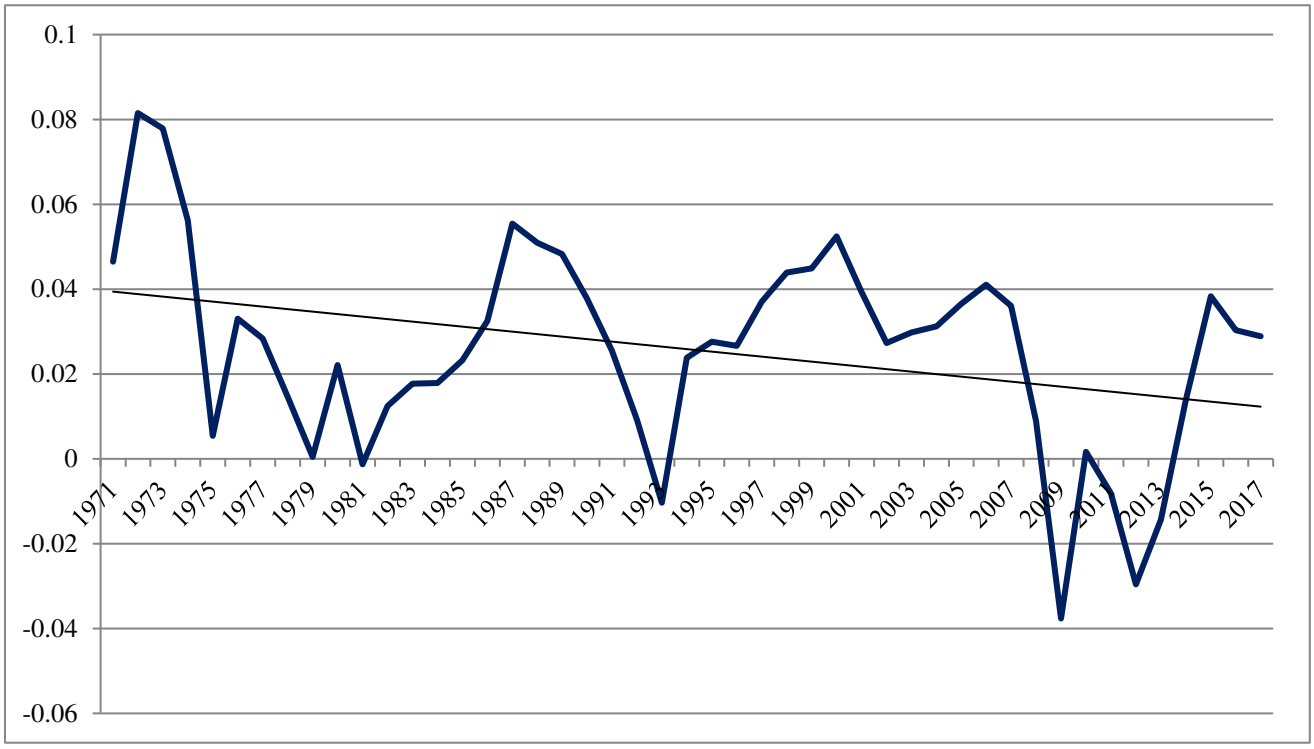
facts about growth and domestic investment in Spain. Section 3 deals with a review of the literature, in which we will collect a set of recent empirical work to understand and inspire the methodology that will be used in our investigation. Section 4 presents the empirical methodology in which we will explain the choice of the database and the variables that will be estimated. Section 5 discusses our empirical results. The last section is the conclusion of our work in which we will give recommendations that brings new economic policies and innovative strategies to better refine the relationship between domestic investments and economic growth in Spain.

2. Historical Background and Current Trends in Spain

In 2012, the economy of Spain was the twelfth economic power in the world and the fifth economy in the European Union. The economy of this country was marked during the 2000s by very strong economic growth, linked in part to a construction boom in real estate, whose sudden stop in 2008 shook the whole country. In 2010, Spain, like the euro zone, was hit hard by the financial crisis which began in 2008 (significant increase in public debt, rise in unemployment, crisis of investor confidence). Using the three figures below (figures 1, 2 and 3), the objective of this section is to study the history of the Spanish economy with an emphasis on the evolution of economic growth, on the evolution of domestic investments and on the link between domestic investments and economic growth during the period 1970-2017.

Figure 1 shows that for the whole period 1970 - 2017, the growth rate of economic growth in Spain increased with an annual average of 2.58%. The highest and lowest rates were recorded in 1972 and 2009 with almost 8.14% and -3.76%, respectively. It should also be noted that over the whole period 1970 - 2017, the trend in the rate of growth of economic growth was slightly downward. Likewise, Figure 2 shows that for the whole period 1970 - 2017, the growth rate of domestic investment in Spain increased with an annual average of 2.46%. The highest and lowest rates were recorded in 1972 and 2009 with almost 14.20% and -17.28%, respectively. It should also be noted that over the whole period 1970 - 2017, the trend in the growth rate of domestic investment was slightly downward.

Figure 1. Evolution of the Annual GDP Growth Rate in% During the Period 1970 - 2017



Source: Graph constructed by the author using data from the World Bank.

In the second half of the twentieth century, Spain experienced very significant socio-economic changes. It now has a very diverse economy. From 1959, a series of development plans contributed to the economic expansion of the country, such as the development of the metallurgical and textile industries, shipbuilding and mining. What makes Spain a great industrial and agricultural power in 20 years. In 1973, the Western world entered a major economic crisis called the oil crisis caused by the refusal of the producing countries to sell oil to the allies of Israel during the war of Yom Kippour (United States and its European allies). In 1975, Spain experienced an economic and political crisis due to the death of the dictator Francisco Franco and the proclamation of Juan Carlos as a king of Spain. The latter introduced a system of parliamentary monarchy. These events led in 1976 and 1977 to an increase in unemployment (more than 800,000 unemployed) and high inflation (20%).

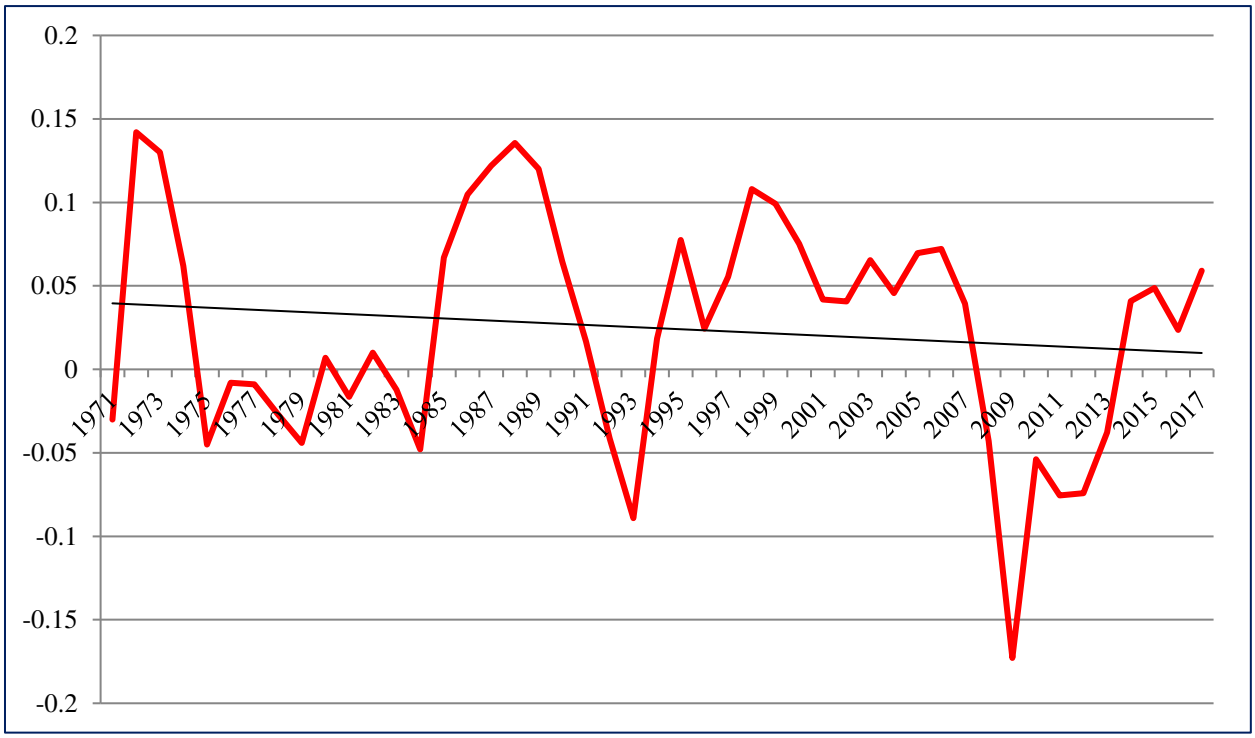
In 1977, the Moncloa Pacts were signed by the government, political parties, trade unions and professional associations, with the aim of ensuring a peaceful transition to a democratic system and adopting an economic policy in order to combat high inflation. But unfortunately, the results are not entirely satisfactory, even if they signify the unity of economic agents in the

face of the crisis. In 1982, Spain applied an economic policy marked by the control of inflation and the moderation of wages (with the entry of the socialist government).

In 1986, the entry of Spain into the European Economic Community accelerated and reinforced the economic impulse launched. The entry forced the country to open its economy, with a strong increase in foreign investments and a dynamic of modernization of the Spanish company in the face of foreign competition. In 1992, thanks to the Olympic Games in Barcelona and the Universal Exhibition in Seville, domestic investments were increased, especially in the infrastructure and services sectors. With that, Spain accelerated the growth of its GDP, reduced the public debt, reduced the unemployment rate from 24.4% to 15% in 3 years and reduced inflation below 3%. Since 1992, economic policy has been marked by the Treaty on European Union. The main measures have been to control inflation and the public deficit.

From 1995, the economic indices started to increase, leading to an expansion phase which lasted until the beginning of 2008, with an average annual increase in GDP of 3.5%, which was the period of most highest since 1975.

Figure 2. Evolution of the Annual Domestic Investment Growth Rate in% During the Period 1970- 2017



Source: Graph constructed by the author using data from the World Bank.

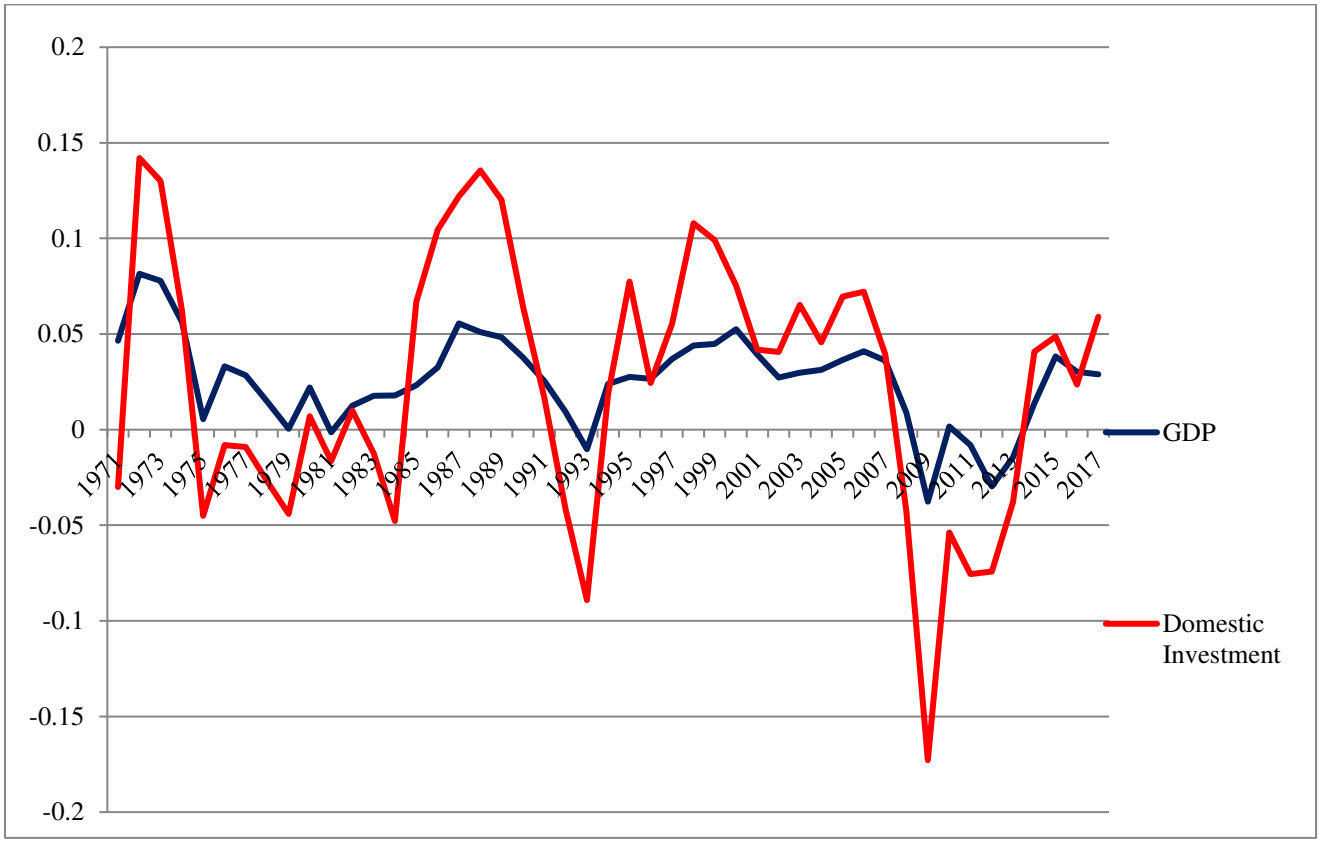
From 2008, the Spanish economy suffered a drop in its macroeconomic indices, giving way to a period of recession and crisis due to the structural problems typical of the Spanish economy and the strong external influence of the global financial crisis.

Given the historical scope of this economic crisis, a wide range of measures have been used to combat it. The government has pursued fiscal policy to stimulate demand through measures to support families and companies, measures to boost employment, measures to support the financial system, and measures to modernize the economy. The government also announced tax cuts and new spending of 31.2 billion euros, 3% of GDP, in 2009.

In 2010, the government also announced a gradual increase in retirement age to 67. This measure sparked strong rejection from unions, but received support from the CEO, the European Commission, and the Bank of Spain. In addition to this measure, it has been announced to raise the minimum age for early retirement to 58 years. In 2012, GDP decreased by 1.6%. This deterioration is due to the aggravation of the public debt crisis, due to the lack of confidence in the international financial markets regarding the hidden losses of Spanish financial institutions and their potential consequences on public treasuries.

This mistrust led to the closure of the international financial markets of the Spanish economy and the flight of foreign investors from Spanish assets. This year was a financial risk, although it seems that the greatest dangers inherent in this region are beginning to be overcome. Since the end of 2013, the economy has entered a recovery phase, with positive, though moderate, growth, which strengthened with the passage of 2014, as job creation began.

Figure 3. The link between the growth rate of economic growth and the growth rate of domestic investment in Spain during the period 1970 - 2017



Source: Graph constructed by the author using data from the World Bank.

During the period 1970 - 2017, Figure.3 shows that the increase in the growth rate of domestic investment is accompanied by an increase in the growth rate of economic growth in the years 1972, 1976, 1980 , 1982, 1987, 1994, 1995, 1997, 1998, 2003, 2006, 2010, 2013 and 2014. Similarly, a decrease in the growth rate of domestic investment is accompanied by a decrease in the growth rate of economic growth over the years 1973, 1974, 1975, 1975, 1979, 1981, 1984, 1990, 1991, 1992, 1993, 1996, 2001, 2004, 2007, 2008, 2009, 2012, 2015 and 2016. Analysis of the rates of growth of economic growth and growth rates of domestic investment in Spain, gives us a robust index that domestic investments are a source of economic growth for Spain during the period 1970 - 2017.

After analyzing the evolution of economic growth and domestic investment in Spain in this section, our interest will focus in the following section on an overview of the literature on the relationship between domestic investment and economic growth. In this literature, the analysis of the link between these two variables has often been carried out while taking into account the effects exerted by other variables.

3. Literature Survey

The objective of this section is to provide an overview of the main recent studies that have examined the link between domestic investment and economic growth based on their results. In fact, our choice consists in collecting recent works, which relate to an empirical analysis of time series as our case which will be studied.

Olufemi (2012) investigated whether domestic investment helps as a channel through energy could foster economic growth in Nigeria during the period 1970 - 2010. He applied in his study as empirical methodology the cointegration analyzes and Vector Error Correction Model (VECM). The results indicated that the potential of domestic investment to catalyze economic growth is greatly reduced by dependence on energy resources. Although public investment has proven to be a channel through which energy resources have stimulated economic growth in Nigeria. There is evidence that the abundance of energy is significantly detrimental to Nigeria's economic growth. In other hand, Chakraborty and Mukherjee (2012) have attempted analysis attempts to understand the link between domestic investment and economic growth in India. An analysis of the monthly time series between 1996 and 2009 was estimated using the cointegration techniques of Gregory and Hansen (1996), the ARDL model and the causality tests of Toda and Yamamoto (1995). Empirical results indicate the absence of a causal relationship between domestic investment and economic growth. Stressing that because of the decline in the share of infrastructure and manufacturing sectors in domestic investment during the present decade associated with a gradual deceleration of agriculture (especially in food grains), the maintenance of the rate High growth over a longer period is a major concern, making domestic investments not able to stimulate Indian economic growth. Moreover, Ghazali (2010) empirically examined the causality between domestic investment, foreign direct investment and economic growth in Pakistan during the period 1981 - 2008. To achieve its goal, Ghazali (2010) used cointegration analyzes, the VECM model and Granger's causation tests. Empirical results have shown that there is a two-way relationship between domestic investment and economic growth, a two-way relationship between domestic investment and foreign direct investment, and a one-way relationship from foreign direct investment to economic growth. He concluded that it is clear that foreign direct investment inflows to Pakistan complement domestic investment and stimulate economic growth. Finally, he recommended in his analysis that the Pakista, must apply and must adopt a prudent policy concerning foreign direct investments which not only attract foreign investors, but also influence them to play their role in the promotion of national investments and economic

growth in Pakistan. Using a multivariate VAR system with an error correction model (ECM) and innovation accounting (variance decomposition) and impulse response function analysis), Tang et al (2008) studied the link of causality between foreign direct investment (FDI), domestic investment and economic growth in China for the period 1988-2003. The results show that while there is a two-way causality between domestic investment and economic growth, and that foreign direct investment has also stimulated economic growth by complementing domestic investment in China. Also, Yovo (2017) examined the link between the composition of public spending, public investment, private investment and economic growth in Togo over the period 1980 - 2013. Empirical results have shown that public investment and private investment have a positive effect on economic growth. On the other hand, the composition of public spending has a negative effect on economic growth. In view of the results, this study invites the Togolese government to modify the composition of public spending by giving priority to investment by carefully balancing private and public spending. In the same way, Javid (2019) examined the relationship between investment in infrastructure and economic growth for Pakistan over the period 1972 to 2015. He employed Johansen Co-Integration Tests and fully modified ordinary least squares (FOLS). The principal punch line of this investigation is that public and private investment in infrastructure has positive impacts but different on economic growth. In other words, the marginal productivity of private and public investment in infrastructure differs across different sectors of the economy. In most cases, investment in public infrastructure has a greater impact on economic growth than investment in private infrastructure. Furthermore, Tran and Hoang (2018) examined the impact of foreign direct investment, domestic investment, human resources and the rate of trained workers on economic growth in 47 provinces of Vietnam during the period 2012 to 2015. Using a Regression analysis by panel of data, the empirical results indicate foreign direct investment, domestic investment and the rate of trained workers have a positive effect on economic growth. Only human resources have no effect on economic growth. For the case of Vietnam, Nguyen and Trinh (2018) searched the influence of public investment on economic growth and check the hypothesis that whether public investment promotes or demotes private investment in the short term and in the long run during the period of 1990 - 2016. The results from this research mark that public investment and private investment in Vietnam affect economic growth in the short run and in the long run. Their empirical findings can be applied for conducting a more dynamic policy in restructuring the state sector investment in Vietnam. In contradiction, Bakari (2017a) investigated the impact of exports and domestic investment on economic growth in Gabon using annual time series data for the

period 1980 – 2015. He used in his investigation cointegration analysis and error correction model (ECM). Results point out that in the long term exports and domestic investments affect negatively on economic growth. However, exports and domestic investments cause economic growth in the short term. As a conclusion, Bakari (2017a) underlined that exports and domestic investments are necessary in the Gabonese economy and are presented as an engine of growth. But they are not executed and treated in a solid and fair manner, which offers new perspectives on the investment and international trade policy of Gabon to promote economic growth and to ensure sustainable development. Again, Bakari (2020) attempted to exploit the relationship between domestic investment and economic growth in Tunisia during the period 1965 - 2016. Applying as an empirical strategy the Cointegration Analysis, VECM and Granger Causality Tests, he found that there is a two-way negative relationship between domestic investment and long-term economic growth. Likewise, he found that domestic investments cause short-term economic growth. The author analyzed these results by several explanations among them: (i) Tunisia has not yet reached the required level of reforms, which is relatively acceptable for the country's security crisis, drought and natural disasters; (ii) Lack of transparency and the presence of corrupt practices; (iii) The absence of a pure and perfect competitive market; (iv) the absence of a clear economic policy to encourage investment for this reason, investors are not capable of better knowing the economic environment in which they carry out their projects; (v) The weak entrepreneurial mentality which characterizes Tunisian investors simply expressed by the total absence of different types of innovations in their investments leading to the bankruptcy of the different projects; and (vi) The consequences of increases in interest rates and inflation rates in the face of the low profitability of these companies, which makes it impossible to pay debts.

Although there is a theoretical agreement that the impact of domestic investment on economic growth must be positive, the conclusions of the pilot works are contradictory. This has made the relationship between investment and economic growth a subject of debate. And this is also one of the reasons that led us to focus in Section 5 on examining the relationship between domestic investment and economic growth in Spain. Before arriving at this stage, we will begin by clarifying our empirical approach in section 4.

Table 1. Studied related to the nexus between domestic investment and economic growth

Authors	Country	Period	Control Variables	Methodology	Results
Bakari et al (2020)	Peru	1970 – 2017	Exports and Imports	Cointegration Analysis, VECM and Granger Causality Tests.	DI # Y: LR DI # Y: SR

Raboloko (2019)	Botswana	1980 – 2015	Inflation Rate, Domestic Credit to the Private Sector, Foreign Direct Investment, Gross National Expenditure and Trade.	Bounds Test, ARDL Model and WALD Tests.	DI # Y: LR
					DI => Y: SR

Bakari and Tiba (2019)	USA	1970 – 2016	Foreign Direct Investment (net inflows and net outflows), Military Expenditure, Tax Revenue, Imports, Final Consumption Expenditure and Exports.	Cointegration Analysis, VECM and Granger Causality Tests.	DI => Y (+) : LR DI # Y: SR
Bouchoucha and Bakari (2019)	Tunisia	1976 - 2017	Foreign direct investment, net inflows, Exports, Imports, Money supply and Total Benefits from Natural Resources.	Correlations Analaysis, Bounds Test, ARDL Model and WALD Tests.	DI => Y (-) : LR DI # Y: SR
Umar-Gingo and Demireli (2018)	Ghana	1980 – 2015	Secondary School Enrollment, Foreign Direct Investment, Gross Domestic Savings and Trade Openness.	Cointegration Analysis and VECM	DI => Y (-) : LR DI # Y: SR
Bakari (2019)	France	1972 – 2016	Tax Revenue	Cointegration Analysis, VECM and Granger Causality Tests.	DI <=> Y (-) : LR DI => Y (+) : SR
Appiah	Ghana	1960 – 2016	Foreign Direct Investment, Labour Force, Energy Consumption and Carbon Dioxide Emissions.	Cointegration Analysis and ARDL Model	DI # Y: LR DI # Y: SR
Bakari (2018a)	Algeria	1969 – 2015	Exports and Imports	Cointegration Analysis, VECM and Granger Causality Tests.	DI => Y (-) : LR DI => Y (+) : SR

Authors	Country	Period	Control Variables	Methodology	Results
Fakraoui and Bakari (2019)	India	1960 – 2017	Exports	Cointegration Analysis, VECM and Granger Causality Tests.	DI <= Y (+): LR DI <= Y (+): SR
Mohamed et al (2019)	Malaysia	1970 - 2008	Foreign direct investment, net inflows, Exports and Human Capital Development	Cointegration Analysis, VECM and Granger Causality Tests.	DI <=> Y (+) : LR DI # Y: SR
Wang et al (2019)	Pakistan	1995 – 2017	Carbon Emissions, Health Expenditures and Trade	Bounds Test, ARDL Model, Johansen Test, VECM and Granger Causality Tests.	DI => Y (+): LR DI # Y : SR
Olanrele (2019)	Nigeria	1970 - 2016	Electrecity Generation and Labor Force	VAR Model and Granger Causality Tests	DI # Y
Akalpler and Hove (2019)	India	1971 – 2014	Energy Consumption, Exports, CO2 Emissions and Imports.	Cointegration Analysis, ARDL Model and Granger Causality Tests	DI => Y (+) : SR DI => Y (+) : LR
Makhoba (2019)	South Africa	1960 - 2017	Government Expenditure, Revenues and Public Debt.	Cointegration Analysis, VECM and Granger Causality Tests.	DI => Y (+) : SR DI => Y (+) : LR
Bakari (2020)	Tunisia	1965 – 2016	Exports, Imports and Population	Cointegration Analysis, VECM and Granger Causality Tests.	DI <=> Y (-) : LR DI => Y (+) : SR
Yakubu et al (2020)	Nigeria	1990 – 2017	Labor Force	Ordinary Least Squares, Cointegration Analysis, VECM and Granger Causality Tests.	DI => Y (+): LR DI # Y : SR
Sulub et al (2020)	Malaysia	1978 - 2017	Hydropower Energy Supply and Total Electricity Consumption .	Cointegration Analysis, Bounds Test, ARDL Model, VECM and Granger Causality Tests	DI => Y (+) : SR DI => Y (+) : LR

Note: DI means Domestic Investment, Y means Economic Growth, LR means Long Run, SR means Short Run, (+) means Positive Effect and (-) means Negative Effect.

4. Data and methodology

4.1.Data

The exam that was applied in this time series from 1970 to 2017 or 48 notes should be good enough to reconnect domestic investment, exports, imports and economic growth in Spain. Data set includes tracking of gross domestic product (in constant US dollars), exports of goods and services (in constant US dollars), imports of goods and services (in constant US dollars) and domestic investment (in constant US dollars). All data are collected from the World Development Indicators(WDI 2018). The short exemplification of our data is stated in Table 2.

Table 2: Description of variables

No	Variable	Description	Source
1	Y	Gross domestic product (Constant US$)	World Development Indicators (WDI) 2018
2	K	Domestic Investment (Gross Fixed Capital Formation Constant US$)	World Development Indicators (WDI) 2018
3	X	Exports (Constant US$)	World Development Indicators (WDI) 2018
4	M	Imports (Constant US$)	World Development Indicators (WDI) 2018

Table 3 introduces the descriptive statistics and correlation matrix of the variables applied in the study. According to the correlation matrix, domestic investment (K), exports (X), imports (M) are positively correlated with economic growth (Y). The variables exports (X) and imports (M) which are explanatory variables of our study are positively correlated with domestic investment (K).

Table 3: Descriptive statistics and Correlation Matrix of the Variables

	Y	K	X	M
Mean	9.80E+11	2.19E+11	2.09E+11	2.03E+11
Median	9.12E+11	2.05E+11	1.53E+11	1.52E+11
Maximum	1.50E+12	4.13E+11	5.10E+11	4.67E+11
Minimum	4.59E+11	1.03E+11	3.37E+10	2.93E+10
Std. Dev.	3.36E+11	9.00E+10	1.48E+11	1.51E+11
Skewness	0.157765	0.467480	0.444140	0.323034
Kurtosis	1.546807	2.070123	1.748072	1.481616
Jarque-Bera	4.422658	3.477643	4.712725	5.445785
Probability	0.109555	0.175727	0.094764	0.065684
Sum	4.70E+13	1.05E+13	1.00E+13	9.77E+12
Sum Sq. Dev.	5.31E+24	3.81E+23	1.02E+24	1.08E+24
Observations	48	48	48	48
Correlation	**Y**	**K**	**X**	**M**
Y	1			
K	0.9361933152523645	1		
X	0.9753793735990678	0.8693094770324294	1	
M	0.9884313462092562	0.9547554141243067	0.9748947785134926	1

The pictorial representation of the descriptive statistics has been shown by making a boxplot in Figure 2. It shows that the mean values are around the median values, which shows that the distribution is approximately normal. There are no extreme or distant values in the sample. Therefore, our data are suitable for the analysis of time series.

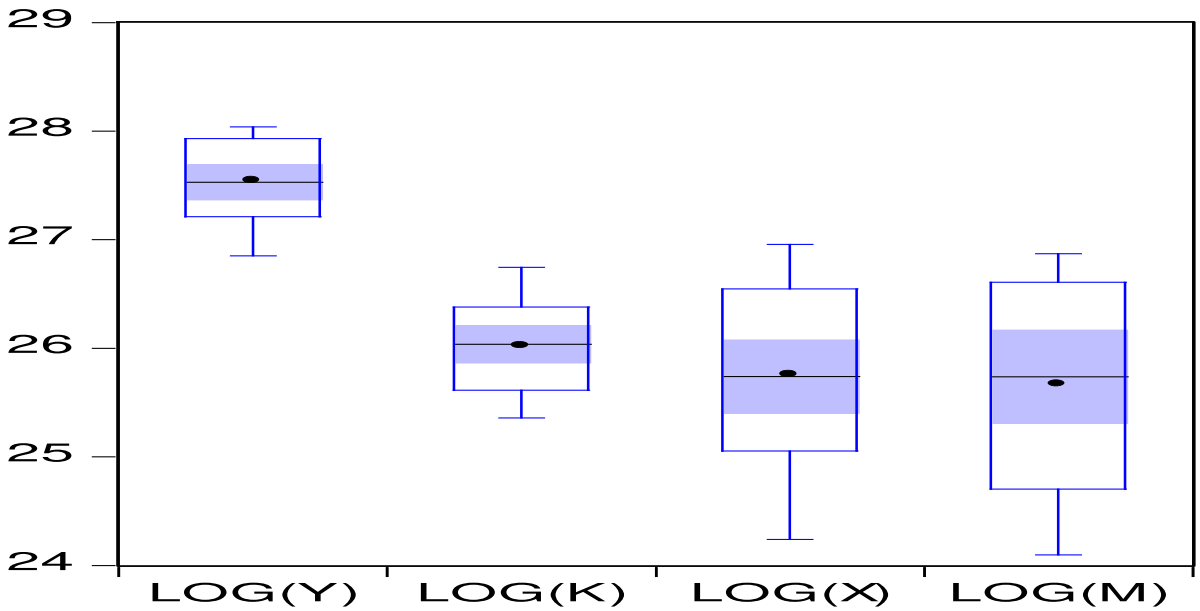


Figure 4. Boxplot of economic growth (Y), domestic investment (K), exports (X) and imports (M) at log level.

4.2.Model

First, we will take the modeling of the neoclassical model to determine the nexus between domestic investment and economic growth. This model includes imports and exports as control variables and is saved as follows:

$$\mathbf{Y = F\,[K, X, M]} \quad \mathbf{(1)}$$

This mode of production function is very dynamic and very transparent to demonstrate the relationship between domestic investment and economic growth. In addition, independent researchers in this field applied only the two variables, namely export and import, as control variables in the production function to extract the relationship between domestic investment and economic growth , such as Bakari (2017b) Bakari (2017c) Bakari (2017d) Bakari (2018a); Bakari (2018b); Bakari and Ahmadi (2018); Bakari et al (2018) Bakari et al (2019a,b); Bakari et al (2020). Then , we can set down the augmented production function as follows:

$$\mathbf{Y = A\,K^{\alpha_1} X^{\alpha_2} M^{\alpha_3}} \quad \mathbf{(2)}$$

In equation (2) **'Y'** is gross omestic product, **'K'** is domestic investment, **'X'** is export, **'M'** is import and **'A'** references the scale of technology involved in the country and which is persumed to be constant. The returns to scale are linked to domestic investment, exports and imports, which are shown by $\boldsymbol{\alpha_1, \alpha_2}$ and $\boldsymbol{\alpha_3}$ respectively.

The Cobb-Douglas production function is presented in linear functional form as follows by amended all variables into logarithms in order to differentiate it linear form:

$$\mathbf{Log\,(Y_t) = Log(A) + \alpha_1 Log(K_t) + \alpha_2 Log(X_t) + \alpha_3 Log(M_t) + \varepsilon_t} \quad \mathbf{(3)}$$

Once the technology is installed, a linear model can be established to restore the influence of domestic investment on economic growth as follows:

$$\mathbf{Log\,(Y_t) = \alpha_0 + \alpha_1 Log(K_t) + \alpha_2 Log(X_t) + \alpha_3 Log(M_t) + \varepsilon_t} \quad \mathbf{(4)}$$

4.3.**Empirical strategy**

We will use recent developments in time series econometrics to analyze the causal relationships between domestic investment and economic growth in Spain. For our results to be reliable and robust, and for our work to give an exact approximation, we will apply an empirical estimate based on the Sims's model (1980). The latter has several such advantages:

- Able to examine the common integration of variables (Cointegration analysis);
- Able to grant an approximation more identical to truth and reality than the other models, in particular when the model has a sample less than or equal to five variables;
- Able to explore the causality between variables in the long run and in the short run;
- More effective in studies involving time series analysis;

Our experimental scheme will firstly be based on the determination of the stationary of variables using the ADF and PP tests. All the variables must be must be stationary in first difference to go to the next step of the co-integration analysis using the Johansen test. In the absence of a cointegration relationship between the variables, we will use the VAR model and the Granger causality test. However, if there is acointegration relationship, we will run a VECM model and the Wald Test.

4.3.1. Tests for unit root

Unit root tests identify the presence of unit root in a series. A time series is stationary if it has no trend or seasonality. The Augmented Dickey-Fuller test {Dickey and Fuller (1979, 1981)} and the Phillips-Perron test {Phillips and Perron (1988)} will be used for this purpose.

The general form of the ADF test is estimated by the following regression:

$$\Delta\varphi_t = \delta + \gamma\varphi_{t-1} + \sum_{i=1}^{n} \gamma_1 \Delta\varphi_i + \varepsilon_t \qquad (5)$$

For the variables to be stationary, the following two conditions must be observed:

- ✓ ADF statistical test > Critical test at the 1%, 5% or 10% levels
- ✓ The probability value must be less than 5%

The general form of the PP test is estimated by the following regression:

$$\Delta\varphi_t = \delta + \gamma\Delta\varphi_{t-1} + \varepsilon_t \qquad (6)$$

This is also the case for the PP test, for the variables to be stationary the rule states that:

- ✓ PP statistical test > Critical test at the 1%, 5% or 10% levels
- ✓ The probability value must be less than 5%

With:

- Δ: is the first difference operator
- φ: is a time series
- t: is a linear time trend
- δ: is a constant
- n: is the optimal number of delays in the dependent variable
- ε: is the random error term.

4.3.2. Lag order selection criteria

The literature has shown how to select an adequate lag order of a covariance stationary VAR model and an adequate lag order of a VAR model subject to coin- tegration restrictions. Among the classical procedures are information criteria, such as Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) (Lutkepohl, 1993). In our case, we will use, like many empirical works, the information criterion AIC and the information criterion SC which are presented as follows.

$$\mathbf{AIC = 2k - 2 \ln (L)} \qquad \mathbf{(7)}$$

$$\boldsymbol{SIC = -2\,(L) + k.\ln (n)} \qquad \mathbf{(8)}$$

Knowing that :

- ✓ L: The maximum values of the likelihood function for the model.
- ✓ K: the number of parameters estimated in the model.
- ✓ n: the number of observations.

4.3.3. Johansen test

The study of cointegration makes it possible to test the existence of a stable long-term relationship between two non-stationary variables, by including delay variables and exogenous variables. There are several cointegration tests, the most general being that of Johansen. Whichever test is chosen, it only has meaning for long non-stationary series. Consequently, the analysis of co-integration makes it possible to clearly identify the true relationship between two variables, by looking for the existence of a vector of co-integration and by eliminating its effect if necessary. Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the

matrix Π. The trace test and maximum Eigenvalue test are shown in equations (9) and (10) respectively.

$$\zeta_{Trace} = -T \sum_{i=r+1}^{n} \ln (1 - \lambda_i) \quad (9)$$

$$\zeta_{Max} = -Tln(1 - \lambda_{r+1}) \quad (10)$$

Where λ_i denotes the estimated values of the characteristic roots obtained from the estimated Π, and T is the number of observations.

4.3.4. VAR/VECM

The last step (cointegration analysis) is very important because it helps to determine the nature of the model. In the absence of a cointegration relationship, reference is made to a Vector Autoregressive Model (VAR) and Granger causality tests. On the other hand, in the context of the presence of a cointegration relationship, reference is made to the Vector Error Correction Model (VECM).

4.3.5. Diagnostics tests

In this step, we will use stability tests to verify the robustness and the credibility of our model and of our empirical results by performing the CUSUM test . This test is founded by Brown et al (1975) and is based on the cumulative sum of the recursive residuals. This option colludes the cumulative sum together with the 5% critical lines. The test discovers parameter instability if the cumulative sum goes outside the area between the two critical lines.

4.3.6. Impulse response function analysis

Impulse response function analysis lines out the time path of the effects of 'shocks' of other variables contained in the Sims's (1980) model on a particular variable. This approach is designed to establish how each variable responds over time to an earlier 'shock' in that variable and to 'shocks' in other variables. This method is nominated innovation accounting and allow an intuitive insight into the dynamic relationships among the economic variables in a VAR/VECM.

After having the recognition of our data and our empirical strategy, the forthcoming section presents an empirical identification that examines the impact of domestic investment on economic growth in Spain.

5. Empirical Results

The results of unit root marks that Log (Y), Log (K), Log (X), and Log (M) variables are nonstationary in level. We must therefore mutate these variables into a first difference to make them stationary. From Table 4, it is evident that all variables are stationary in first difference. We deduce then that all variables are integrated of order 1 I (1).

The second step in Sims modeling is the fixing of the optimal VAR. The result are announced in Table 5. Based on the AIC Criteria, the outcome afford us an optimal VAR of order 2.

In the third step, we are concerned in examining the co-integration between variables by using the Johansen approach. This test is instituted on the trace statistic and the maximum eigenvalue statistics. The Johansen cointegration test, presented in Table 6, points that there is a long-run relationship between Log (Y), Log (K), Log (X), and Log (M). Subsequently, we can estimate a vector error correction model (VECM).

After inspecting the long-run relationship between Log (Y), Log (K), Log (X), and Log (M), a causality test is intended to expose the causal direction between variables. This test is builded from the restriction of Wald test coefficients , established on each equation of error correction model (ECM). The VECM can be formulationg with our variables as follows:

$$\Delta \mathbf{Log}\,(\mathbf{Y})_t = \alpha_1 + \sum_{i=1}^{k} \beta_{1i} \Delta \mathbf{Log}\,(\mathbf{Y})_{t-1} + \sum_{i=1}^{k} \gamma_{1i} \Delta \mathbf{Log}\,(\mathbf{K})_{t-1} + \sum_{i=1}^{k} \delta_{1i} \Delta \mathbf{Log}\,(\mathbf{X})_{t-1} + \sum_{i=1}^{k} \tau_{1i} \Delta \mathbf{Log}\,(\mathbf{M})_{t-1} + \rho_1 \mathbf{ECT}_{1t-1} + \varepsilon_{1t} \qquad (11)$$

$$\Delta \mathbf{Log}\,(\mathbf{K})_t = \alpha_2 + \sum_{i=1}^{k} \beta_{2i} \Delta \mathbf{Log}\,(\mathbf{Y})_{t-1} + \sum_{i=1}^{k} \gamma_{2i} \Delta \mathbf{Log}\,(\mathbf{K})_{t-1} + \sum_{i=1}^{k} \delta_{2i} \Delta \mathbf{Log}\,(\mathbf{X})_{t-1} + \sum_{i=1}^{k} \tau_{2i} \Delta \mathbf{Log}\,(\mathbf{M})_{t-1} + \rho_2 \mathbf{ECT}_{2t-1} + \varepsilon_{2t} \qquad (12)$$

$$\Delta \mathbf{Log}\,(\mathbf{X})_t = \alpha_3 + \sum_{i=1}^{k} \beta_{3i} \Delta \mathbf{Log}\,(\mathbf{Y})_{t-1} + \sum_{i=1}^{k} \gamma_{3i} \Delta \mathbf{Log}\,(\mathbf{K})_{t-1} + \sum_{i=1}^{k} \delta_{3i} \Delta \mathbf{Log}\,(\mathbf{X})_{t-1} + \sum_{i=1}^{k} \tau_{3i} \Delta \mathbf{Log}\,(\mathbf{M})_{t-1} + \rho_3 \mathbf{ECT}_{3t-1} + \varepsilon_{3t} \quad (13)$$

$$\Delta \mathbf{Log}\,(\mathbf{M})_t = \alpha_4 + \sum_{i=1}^{k} \beta_{4i} \Delta \mathbf{Log}\,(\mathbf{Y})_{t-1} + \sum_{i=1}^{k} \gamma_{4i} \Delta \mathbf{Log}\,(\mathbf{K})_{t-1} + \sum_{i=1}^{k} \delta_{4i} \Delta \mathbf{Log}\,(\mathbf{X})_{t-1} + \sum_{i=1}^{k} \tau_{4i} \Delta \mathbf{Log}\,(\mathbf{M})_{t-1} + \rho_4 \mathbf{ECT}_{4t-1} + \varepsilon_{4t} \quad (14)$$

Where $\beta_{ji}, \gamma_{ji}, \delta_{ji} and\ \tau_{ji}$ reflect the short-run relationships, ECTit-1 are the error correction term, i represents the speed of adjustment to disequilibrium, and ε_{it} are the error terms. Results of VECM Granger causality test {Results from Eqs. (11), (12), (13), and (14)} are reported in Table 6.

In the long run, Eqaution (11) reveals that there is a positive uniderctionnal causality from domestic investment to economic growth [a 1% increase in domestic investment log (K) leads to an increase of 0.513903 % of economic growth log(Y)]. Our results are in line with the findings of Bakari and Mabrouki (2017), Mbulawa (2017) and Iftikhar et al (2016). Also Equation (11) reveals that there is a positive unidirectionnal causality from exports to economic gowth [a 1% increase in exports log (X) leads to an increase of 0.136435% of economic growth log (Y)]. This upholds the results proved by Ahmed et al (2014), Chatterji et al (2014) and Hamdan (2016). However, the results of Equation (11) indicate that there is a negative unidirectionnal causality from imports to economic growth in the long run [a 1% increase in imports log (M) leads to a decrease of 0.186878 of economic growth log(y)]. This confirms the results indicated by Turan and Karamanaj (2014), Adeleye et al (2014) and Zaheer et al (2014). Finally, equation (11) indicate that only in the short run imports cause economic growth at 10 % level of significance [This confirms the results proved by Rahman and Shahbaz (2013), Alaoui (2015) and bakari (2017a)].

In the other hand, the results of VECM indicate from Equations (12), (13) and (14) that there is no relationship between variables in the long run. These means that (i) economic growth, exports and imports dont have any effect on domestic investment; (ii) economic growth, domestic investment and exports dont have any impact on imports; and (iii) economic growth,

domestic investment and imports dont have any influence on exports. Our findings here are in line with the findings of Bakari (2017c) and Bakari et al (2018). In the short run, Equation (12) denotes that economic growth cause exports at 10 % level of significance [This confirms the findings explored by Hussain (2014) and Olubiyi (2014)].

The CUSUM test (see Fig. 2), suggests that the parameters were stable over the sample period for all the equations because the "CUSUM" is coming within the range of critical lines at five percent significance level.

The estimation of VECM Model is a way to test the long run and the short run Granger causality relationship among the variables. However, estimation results do not look how variables in general respond to innovations in other variables. In order to check how a shock to one variable impacts another variable and how long the effect lasts in short run, we utilize generalized impulse response [Koop et al (1996)] which surmounts the orthogonality problem in traditional out of sample Granger causality test results based on Vector Error Correction Models. The generalized impulse response results are plotted out in Fig. 3. It is clear from Fig. 3, a shock in one of the four variables (log (Y), log (K), log (X) and log (M)] has positive and significant initial impacts on the other four, and the impacts die off over the horizons. The results appear to have more robust base according to the experiences with the status discussed above in Spain.

Table 3. Results of Unit Root Tests

Variables	**ADF Test**		**PP Test**	
	Constant	Constant and Trend	Constant	Constant and Trend
Log (Y)	(1.233680)	(2.915690)	(1.838698)	(1.934364)
	[2.981878]**	[3.038795]	[2.987916]**	[3.092214]
Log (K)	(1.663892)	(2.734007)	(1.261571)	(1.724028)
	[3.230824]**	[3.259899]*	[3.230824]**	[3.259899]**
Log (X)	(1.945180)	(1.450586)	(1.754103)	(1.397024)
	[3.180711]**	[3.145019]	[4.922313]***	[4.991145]***
Log (M)	(1.488757)	(1.413503)	(1.319730)	(1.153800)
	[4.398603]***	[4.570097]***	[4.470407]***	[4.664564]***
***; ** and * denote significances at 1%; 5% and 10% levels respectively*				
( ) denotes stationarity in level				
[ ] denotes stationarity in first difference				

Source: Calculations done by authors based on the Eviews 9 software

Table 4. Lag Order Selection Criteria

VAR Lag Order Selection Criteria						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	351.1087	NA	1.14e-12	-16.14459	-15.98076*	-16.08418
1	381.1342	53.06823	5.99e-13	-16.79694	-15.97778	-16.49486*
2	401.2364	31.78956*	5.05e-13*	-16.98774*	-15.51325	-16.44399
3	416.0543	20.67607	5.63e-13	-16.93276	-14.80293	-16.14734
4	429.1452	15.83092	7.15e-13	-16.79745	-14.01230	-15.77037
**** indicates lag order selected by the criterion***						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Source: Calculations done by authors based on the Eviews 9 software

Table 5. Johansen Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.481180	66.55176	47.85613	0.0004
At most 1 *	0.320131	37.67905	29.79707	0.0050
At most 2 *	0.252129	20.70142	15.49471	0.0075
At most 3 *	0.164699	7.918363	3.841466	0.0049
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.481180	28.87271	27.58434	0.0340
At most 1	0.320131	16.97763	21.13162	0.1731
At most 2	0.252129	12.78306	14.26460	0.0846
At most 3 *	0.164699	7.918363	3.841466	0.0049
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
**** denotes rejection of the hypothesis at the 0.05 level***				
*****MacKinnon-Haug-Michelis (1999) p-values***				

Source: Calculations done by authors based on the Eviews 9 software

Table 6. Granger causality test results based on Vector Error Correction Models

	Log (Y)	Log (K)	Log (X)	Log (M)
Log (Y)		(0.9146)	(0.0750)*	(0.3064)
		1.945893	7.329504	- 5.351076
Log (K)	(0.38570)		(0.9322)	(0.8489)
	0.513903		- 3.766653	2.749933
Log (X)	(0.1347)	(0.7418)		(0.3013)
	0.136435	- 0.265488		0.730073
Log (M)	(0.0945)*	(0.7418)	(0.1610)	
	- 0.186878	0.363645	1.369725	
Constant	0.01605	- 0.031232	- 0.117638	0.085885
ECT	[1.071467]***	[0.598672]	[0.100712]	[0.369052]
Values in brackets are estimated t-statistics for each cointegration equation.				
Values in parentheses are P-values of the Granger causality test / Wald test for short-term relationships				
The other values present the coefficients of the estimated variables included in the long-term relationships.				
**** ** ; ** and * denote significances at 1% , 5% and 10% levels respectively***				

Source: Calculations done by authors based on the Eviews 9 software

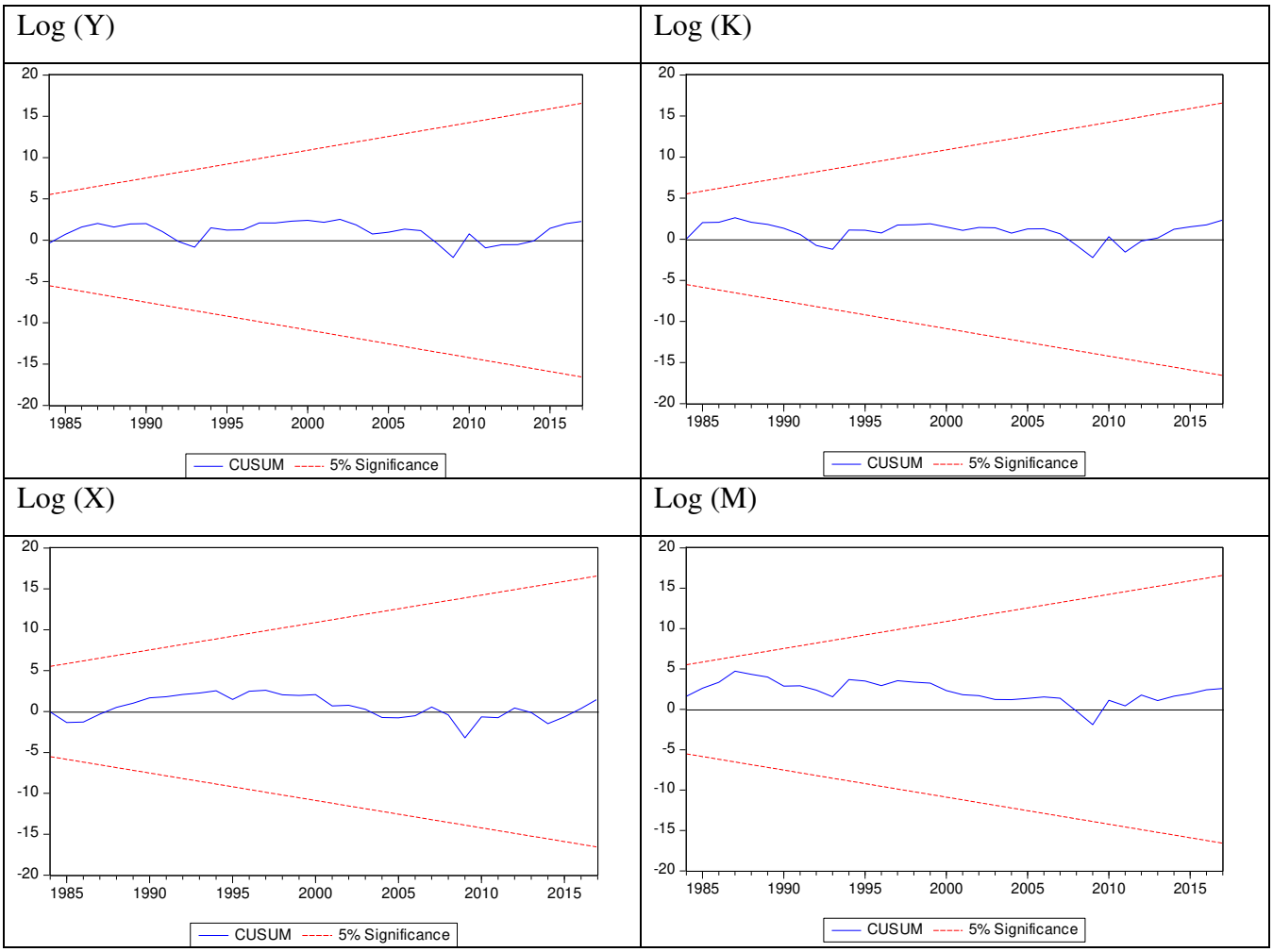


Fig 2. Cusum Test: VECM Model Stability

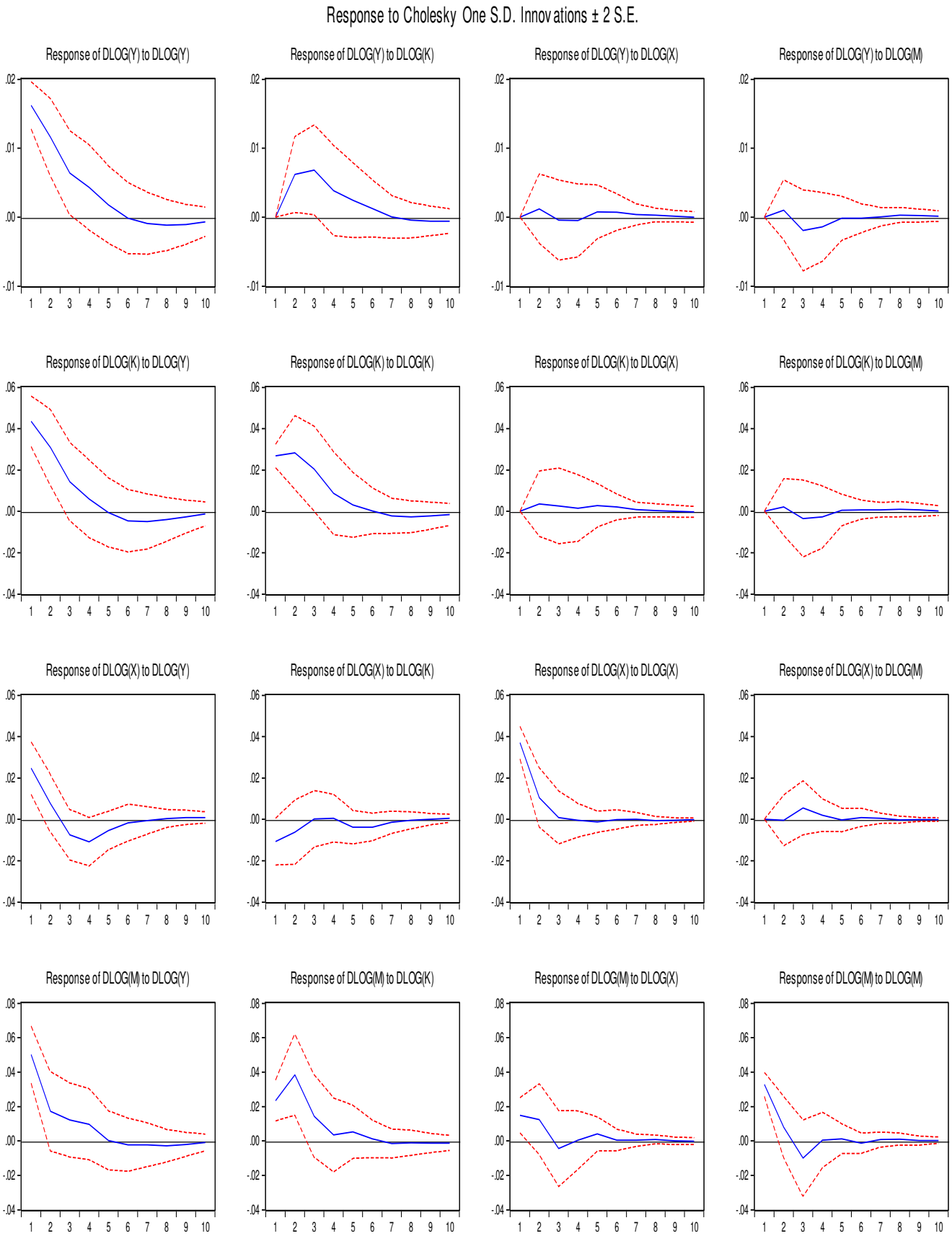


Fig 3. Generalized impulse responses of log (Y), log (K), log (X) and log (M) to other variables

6. Conclusion and recommendations

To study the effects of domestic investment on economic growth, we are in need of taking take into account its indirect and direct effects comprehensively, otherwise we may tend to despise or exaggerate its impacts as is the case in many literatures. This paper focuses on the impact of domestic investment in the contribution of economic growth on the spainish economic during the period 1970 – 2017. We applied cointegration analysis and Vector Error Correction Model (VECM) time series techniques to examin different hypotheses. Our cointegration test results suggest the presence of a long-run relationship among domestic investment, exports, imports and economic growth. Empirical analysis of VECM Model indicate that there is a positive uniderctionnal causality from domestic investment and exports to economic growth in the long run. Also, findings denote the existence of a negative uniderctional causality from imports to economic growth in the long run. In the short run, the results of WALD tests denote that there is no causal relationship between domestic investment and economic growth. In the other hand, we conclued that there is no any indirect effect between domestic investment, exports, imports and economic growth in the long run and in the short run.

The positive impact of domestic investments on long-term economic growth is explained thanks to a set of advantages that characterizes this country. Among these advantages, we can cite: the flexibility and adaptability of economic operators; a developed infrastructure network; a government pursuing a policy of reform; improved financial condition of businesses; an important tourism sector; and a diversified economy.

It should also be noted that the absence of a positive impact from economic growth to domestic investment and the absence of an indirect causal relationship between investment, economic growth and trade openness are a major problem. In fact, economic growth must also strengthen investments to give high productivity. this high productivity can increase the value of exports and therefore improve the trade balance. Similarly, the widening of investments through the inputs of economic growth can also reduce the percentage of the unemployment rate and improve other macroeconomic indicators such as consumption, innovation, inflation, etc. All this is explained by some weak points that characterizes the economy of Spain, among these points we quote: the important of the unemployment rate; the low productivity of domestic companies; Strong debt (public, private and external); the weaknesses of the education sector, the judicial system and the labor market; and the deficit in the trade balance.

Policy makers should pay attention to the relationship between domestic investment, exports, imports and growth. This also highlights the urgent need in formulating policies that enhance the role of exports in stimulating domestic investment and improving trade balance. These policies, in turn, will increase domestic investment and thus economic growth.We strongly suggest that the popularization of this study should be observed with caution.

The mains limitation of the study are:

- The absence of old and recent empirical studies relating to the contribution of domestic investment as a factor of economic economic growth, which makes it difficult to correctly interpret the link between the two variables in Spain economically.
- Our work corresponds to the country considered. That is, the study is confined to the spainesh context. Therefore, the results may not be relevant to the contexts of other countries.
- We wanted to add other control variables such as the active population, indicators of the level of democracy, indicators of economic freedom and the Level of political instability; but they make the data non-stationary.

Finally, according to our analyzes in this investigation, we can suggest some future directions for research. Among these last ones we suggest:

- Analyze the impact of the structure of domestic investments on economic growth to properly target investment strategies in Spain.
- Study the relationship between domestic investment and economic growth with the combination of the other control variables by applying other estimation techniques, especially the empirical models which allow us to examine the links between non-stationary variables.
- Examine the microeconomic and macroeconomic determinants of domestic investment with the aim of improving it to effectively strengthen economic growth.

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