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Does domestic investment contribute to economic growth in Uruguay? What did the empirical facts say?

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Abstract

The fundamental role of domestic investment to provide economic prosperity is very well recognized by the economic theory since the Mercantilist theory. Hence, we investigate the impact of domestic investment on economic growth for the case of the Uruguayan economy over the period 1960-2017. For this aim, we employ the Vector Error Correction Model (VECM). Our highlights reveal the absence of a significant impact of domestic investment on growth in the short- and long-run. Due to the marginal role of domestic investment played in the Uruguayan economy, the weak saving rate couldn't significantly help the economy and creating wealth. Therefore, a strong saving policy is required to encourage domestic investors and reevaluate their crucial role in the economic process of Uruguay.

Keywords: Domestic investment, Economic growth, VECM, Uruguay.

JEL Classification : E22, F14, O16, O47, O54.

1. Introduction

Without any doubt, domestic investment is one of the most important determinants of economic growth. Indeed, the classical, neoclassical, and Keynesian theses pointed out the importance of domestic investment in promoting the growth of the economy.

In this context, Romer (1986); Lucas (1988); Barro (1991); Fischer (1993), Adams (2009); Omri and Kahouli (2014); Tiba et al. (2015); Tiba and Frikha (2018 a,b); Bakari and Tiba (2019), Bakari et al. (2019), Tiba and Frikha (2019 a,b,c), and Tiba (2019 a,b) recorded a positive contribution of domestic investment to economic growth, in accordance with the classical, neoclassical, and Keynesian theories.

However, other study tried to explore better this link, and found that domestic investments don't have necessarily a favorable effect on economic growth like Firebaugh (1992); Khan (1996); Devarajan (1996); German-Soto and Bustillos (2014); Bakari et al (2018a); Bouchoucha and Bakari (2019).

Furthermore, these conflicting results are due to the use of different econometric methodologies, different variables, periods, and sample. This could be significantly altered the results and provided paradoxical and non-conclusive facts.

Since the 1960s, Uruguay has plunged into an economic crisis and found it very difficult to recover. This led to the resort to religiosity, where the external debt amounted to 12.75 billion dollars. However, the crisis was exacerbated by the collapse of Argentina's economy in 1999, because it's the main economic partner of Uruguay. In addition, in 1994, only 6 % of Uruguayan families lived below the national poverty line, and 94 %of Uruguay's population was middle class or wealthy. It has doubled or tripled since the late 1990s, reaching 30 % of poverty, while unemployment affects 12% of assets.

Between 1999 and 2002, the economic crisis threatens to bring about a collapse of the financial system, forcing the state to intervene to rescue banks and the poverty rate has risen to 40 %.

Since the rise of the broad front to power in 2005, social spending in total public spending has increased from 60.9% to 75.5% between 2005 and 2015. The unemployment rate has fallen from 17% in 2002 to 8% in 2016. However, the deficit and debt General still remain very high.

For all these reasons, it is brought to us that domestic investments are among the best needful settlements for saving and reducing most of these disasters of this country. For this purpose, we attempt to treat the contribution of domestic investment on economic growth for the case of the Uruguayan economy over the period 1960-2017 by applying the Vector Error Correction Model (VECM). To the best of our knowledge, none of the previous studies investigate the impact of domestic investment on growth in Uruguay.

We structure the rest of the paper as follows. In the next Section, we introduce a literature survey linking domestic investment to economic growth. In Section 3, we describe the data and present the empirical model. In Section 4, we present the empirical results. We furnish concluding remarks in Section 5.

2. Literature Survey

Domestic investment is well-respected as one of the most substantial macroeconomic variables for a country's growth. Numerous empirical and theoretical studies have sought to explain the relationship between domestic investment and economic growth. Some of them showed a positive and a negative relationship between the two variables. However, for others, the impact is not significant. The sequent Table (Table.1) exposes an ensemble of empirical investigations that are composed during our working on this quest to give rise to the implementation of our empirical validation.

Table 1 Studies related to the relationship between domestic investment and economic growth

No	Authors	Countries	Period	Methodology	Results
		Domestic Investment has a positive effect on economic growth			
1	Farhani et al (2014)	France	1970 - 2010	Cointegration Analysis Vector Error Correction Model Autoregressive Distributed Lag Model	DI <=> Y: LR DI <=> Y: SR
2	Bakari (2017a)	Malaysia	1960 - 2015	Cointegration Analysis Error Correction Model Wald Test	DI => Y: LR DI # Y: SR
3	Keho (2017)	Cote D'Ivoire	1965 - 2014	Cointegration Analysis Autoregressive Distributed Lag Model Generalized Method of Moments	DI <=> Y: LR DI <=> Y: SR
4	Mbulawa (2017)	Botswana	1985 - 2015	Ordinary Least Squares Vector Error Correction Model	DI => Y
5	Bakari et al (2019)	Brazil	1970 - 2017	Cointegration Analysis Vector Error Correction Model	DI <=> Y: LR DI <=> Y: SR
		Domestic Investment has a negative effect on economic growth			
1	Bakari (2017b)	Egypt	1965 - 2015	Cointegration Analysis Vector Error Correction Model Wald Test	DI => Y: LR (-)
2	Bakari (2017c)	Gabon	1980 - 2015	Cointegration Analysis Error Correction Model Wald Test	DI => Y: LR (-) DI => Y: SR

3	Bakari (2018)	Algeria	1969 - 2015	Cointegration Analysis Error Correction Model Wald Test	DI => Y: LR (-) DI => Y: SR
4	Bakari (2019)	France	1972 - 2016	Cointegration Analysis Vector Error Correction Model Wald Test	DI <=> Y: LR (-) DI => Y: SR
5	Bouchoucha and Bakari (2019)	Tunisia	1976 - 2017	Cointegration Analysis Autoregressive Distributed Lag Model Wald Test	DI => Y: LR (-) DI => Y: SR
		Domestic investment has not any effect on economic growth (insignificant effect)			
1	Bakari (2017d)	Sudan	1976 - 2015	Cointegration Analysis Error Correction Model Wald Test	DI # Y: LR DI <= Y: SR
2	Bakari et al (2018b)	Nigeria	1981 - 2015	Cointegration Analysis Vector Error Correction Model Wald Test	DI # Y: LR DI # Y: SR
3	Fakraoui and Bakari (2019)	India	1960 - 2017	Cointegration Analysis Vector Error Correction Model Wald Test	DI # Y: LR DI # Y: SR
4	Jibiry and Abdu (2017)	Nigeria	1970 - 2014	Cointegration Analysis Vector Error Correction Model	DI # Y: LR
5	Siddique et al (2017)	Pakistan	1975 - 2015	Cointegration Analysis Autoregressive Distributed Lag Model	DI # Y: LR

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

However, the contribution of domestic investment to economic growth remains a subject of debate. Theoretically, its effect on economic growth should be positive and rest always a major cause for growth and sustainable development. But the conclusions of empirical work are sometimes contradictory. This is one of the reasons that led us to verify the effect of domestic investment on economic growth in Uruguay in section 4. But before we reach this stage, we will begin by specifying in section 3 our empirical approach.

3. Empirical Strategy

To study the impact of domestic investment on economic growth in Uruguay, we will apply a detailed empirical analysis based on the model of Sims (1980).

In fact the Sims model has several advantages:

- ✓ It is able to study cointegration between variables;
- ✓ It is able to give an approximation more similar to reality than other models, especially when the model has a sample less than or equal to five variables;
- ✓ It is able to study the causality between short term and long term variables, if the variables are cointegrated;
- ✓ It is most effective in studies that involve time series analysis;

Our empirical scheme would be based first of all on the determination of the stationary of variables by utilizing the ADF stationary test. All variables must be stationary in first difference to proceed to the next stage of cointegration analysis by using the Johansen Test.

In the case of the absence of cointegration relationship between variables, we will employ VAR Model and the Granger Causality Test. However, in the case of the presence of cointegration relationship we will operate VECM Model and the Wald Test.

We will take on as a beginning step the modeling of the neoclassical model in order to establish the impact of domestic investment on economic growth. This model includes exports and imports as control variables, and it is jotting down as follows:

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

We can write the augmented production function as follows:

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

In equation (2) Y is GDP, K is Domestic Investment, X is Export, M is Import and A indicates the level of technology concerned in the country and which is supposed to be constant. The returns to scale are attached with domestic investment, exports and imports, which are exposed byα_1, α_2 and α_3 respectively.

In order to make linear the non linear form of Cobb-Douglas production, all variables are amended into logarithms. The Cobb-Douglas production function is presented in linear functional form as follows:

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

After holding technology constant, the linear model recovering the leverage of domestic investment on economic growth can be put down as follows:

$$\mathbf{Log\ (Y_t) = \alpha_0 + \alpha_1 Log(K_t) + \alpha_2 Log(X_t) + \varepsilon_t} \qquad \textbf{(4)}$$

To examine the effect of domestic investment on economic growth in Uruguay, we will imply a time series database that will hide the period 1960 - 2017. All variables are taken from the World Development Indicators. The short representation of our data is reported in Table 2.

Table 2: Description of variables

No	Variable	Description	Source
1	Y	Gross domestic product (Constant US$)	The World Bank
2	K	Domestic Investment (Constant US$)	The World Bank
3	X	Exports (Constant US$)	The World Bank
4	M	Imports (Constant US$)	The World Bank

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 Uruguay.

4. Empirical results

Table 3 reports on the ADF unit root test for all four variables in the model. A unit root test for stationary was effected on both levels and the first differences within three different models: (i) the model with intercept, (ii) the model with intercept and trend, and (iii) the model without intercept and trend.

Table 3: Unit Root Test

Variables	**ADF Test**		
	Intercept	***Intercept and Trend***	***Without Intercept and Trend***
Y	(0.305552)	(3.236922)*	(2.577735)
	[4.693326]***	[4.751622]***	[3.604063]***
DI	(2.365536)	(4.225452)	(0.433157)
	[4.447583]***	[4.398682]***	[4.458853]***
M	(0.450113)	(1.789726)	(1.789726)
	[6.279387]***	[6.232094]***	[5.892903]***
X	(0.439274)	(3.624207)**	(3.997367)
	[7.650683]***	[7.582233]***	[6.281962]***

*****; ** and * denote significances at 1%; 5% and 10% levels respectively**

( ) denotes stationarity in level

[ ] denotes stationarity in first difference

All variables reject the null hypothesis in the first difference, which means that all time series are integrated of order one, I (1). That implies that all the variables have attained stationary after the first difference.

After the results of table 3 confirmed that all variables had a unit root, then we passed in the next stage by applying the Johansen's cointegration technique to investigate whether there is a long-run relationship among the variables. After applying Johansen test and the estimation of Sims Model, it is necessary to specify the number of optimal lags suitable for our model using an explicit statistical criterion such as the HQ, FPE, AIC or SIC.

Table 4: Lag Order Selection Criteria

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	249.9524	NA	9.16e-10	-9.459709	-9.309614*	-9.402166
1	274.1117	43.67244*	6.71e-10*	-9.773526*	-9.023047	-9.485810*
2	280.3887	10.38117	9.86e-10	-9.399563	-8.048702	-8.881675
3	290.0637	14.51261	1.30e-09	-9.156297	-7.205053	-8.408236
4	301.7463	15.72660	1.62e-09	-8.990244	-6.438617	-8.012010
5	311.6998	11.86758	2.25e-09	-8.757684	-5.605675	-7.549278

*** 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

The results of Table 4 show us that the number of lags has been equal to 1 since the criteria AIC select that the number of lags is equal to 1.

Table 5: Johansen Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**
None *	0.497080	98.03973	47.85613	0.0000
At most 1 *	0.348199	60.23693	29.79707	0.0000
At most 2 *	0.293108	36.69603	15.49471	0.0000
At most 3 *	0.274085	17.61774	3.841466	0.0000

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

The results of the test of Johansen indicate the presence of 4 cointegrating equations between domestic investment, export, import and economic growth at a level 5 %. In this case Vector Error Correction Model will be upheld.

As we have noted that the main objective of Vector Error Correction Model is to determinate the long-run and the short-run relationships between the variables. The estimation results indicate that our Vector Error Correction Model will have the following form in 4 equations:

D(DLOG(Y)) = C(1)*(DLOG(Y(-1)) + 2.83229112083*DLOG(X(-1)) + 1.26436684415*DLOG(M(-1)) - 1.41594846751*DLOG(DI(-1)) - 0.170004919524) + C(2)*D(DLOG(Y(-1))) + C(3)*D(DLOG(X(-1))) + C(4)*D(DLOG(M(-1))) + C(5)*D(DLOG(DI(-1))) + C(6) (5)

D(DLOG(X)) = C(7)*(DLOG(Y(-1)) + 2.83229112083*DLOG(X(-1)) + 1.26436684415*DLOG(M(-1)) - 1.41594846751*DLOG(DI(-1)) - 0.170004919524) + C(8)*D(DLOG(Y(-1))) + C(9)*D(DLOG(X(-1))) + C(10)*D(DLOG(M(-1))) + C(11)*D(DLOG(DI(-1))) + C(12) (6)

D(DLOG(M)) = C(13)*(DLOG(Y(-1)) + 2.83229112083*DLOG(X(-1)) + 1.26436684415*DLOG(M(-1)) - 1.41594846751*DLOG(DI(-1)) - 0.170004919524) + C(14)*D(DLOG(Y(-1))) + C(15)*D(DLOG(X(-1))) + C(16)*D(DLOG(M(-1))) + C(17)*D(DLOG(DI(-1))) + C(18) (7)

D(DLOG(DI)) = C(19)*(DLOG(Y(-1)) + 2.83229112083*DLOG(X(-1)) + 1.26436684415*DLOG(M(-1)) - 1.41594846751*DLOG(DI(-1)) - 0.170004919524) + C(20)*D(DLOG(Y(-1))) + C(21)*D(DLOG(X(-1))) + C(22)*D(DLOG(M(-1))) + C(23)*D(DLOG(DI(-1))) + C(24) (8)

Table 6.Vector Error Correction Model (VECM) Estimation

	Y	**M**	**X**	**DI**
Y		0.0010	0.8837	0.0325**
M	0.9204		0.0001	0.6281
X	0.0493**	0.2054		0.8005
DI	0.8320	0.4860	0.0743*	
ECT	[-0.028883]	[-0.120374]	[-0.368313]***	[0.150018]

*****; ** and * indicate significance at 1%, 5% and 10%, respectively**

( ) denotes the value of the probability of the variables in the short term

[ ] denotes the significance of long-term co-integration equations

The results of the estimation of Vector Error Correction Model are reported in Table 6. If the coefficient of the error correction term (ECT) is negative and has a significant probability.

This means that equation of the long term is significant. In addition, if the probability of the Wald test has a significant probability, this means that there is a causal relationship in the short run. According to the results, domestic investment has not any effect on economic growth in the long run and in the short run.

To check the robustness of our model and to verify the solidity of our estimate after each empirical investigation, we will apply a set of diagnostic tests. Table 7 indicate all residual diagnostic tests are satisfactory and confirm that our model is acceptable and well treated

Table.7: Diagnostic tests

Log (Y)				**Log (DI)**			
Breusch-Godfrey Serial Correlation LM Test:				***Breusch-Godfrey Serial Correlation LM Test:***			
F-statistic	1.437545	Prob. F(2,47)	0.2478	F-statistic	0.142342	Prob. F(2,47)	0.8677
Obs*R-squared	3.170520	Prob. Chi-Square(2)	0.2049	Obs*R-squared	0.331135	Prob. Chi-Square(2)	0.8474
Heteroskedasticity Test: Breusch-Pagan-Godfrey				***Heteroskedasticity Test: Breusch-Pagan-Godfrey***			
F-statistic	1.380848	Prob. F(12,42)	0.2131	F-statistic	1.989090	Prob. F(12,42)	0.0502
Obs*R-squared	15.56013	Prob. Chi-Square(12)	0.2122	Obs*R-squared	19.93044	Prob. Chi-Square(12)	0.0684
Scaled explained SS	15.87475	Prob. Chi-Square(12)	0.1970	Scaled explained SS	15.23058	Prob. Chi-Square(12)	0.2291
Heteroskedasticity Test: Harvey				***Heteroskedasticity Test: Harvey***			
F-statistic	0.380489	Prob. F(12,42)	0.9633	F-statistic	1.577700	Prob. F(12,42)	0.1357
Obs*R-squared	5.392854	Prob. Chi-Square(12)	0.9436	Obs*R-squared	17.08914	Prob. Chi-Square(12)	0.1463
Scaled explained SS	4.252356	Prob. Chi-Square(12)	0.9784	Scaled explained SS	18.51708	Prob. Chi-Square(12)	0.1009
Heteroskedasticity Test: Glejser				***Heteroskedasticity Test: Glejser***			
F-statistic	0.939211	Prob. F(12,42)	0.5187	F-statistic	1.889123	Prob. F(12,42)	0.0642
Obs*R-squared	11.63644	Prob. Chi-Square(12)	0.4753	Obs*R-squared	19.27990	Prob. Chi-Square(12)	0.0820
Scaled explained SS	11.13198	Prob. Chi-Square(12)	0.5176	Scaled explained SS	17.62139	Prob. Chi-Square(12)	0.1277
Heteroskedasticity Test: ARCH				***Heteroskedasticity Test: ARCH***			
F-statistic	0.208861	Prob. F(1,52)	0.6496	F-statistic	0.222714	Prob. F(1,52)	0.6390
Obs*R-squared	0.216026	Prob. Chi-Square(1)	0.6421	Obs*R-squared	0.230294	Prob. Chi-Square(1)	0.6313
Log (X)				**Log (M)**			
Breusch-Godfrey Serial Correlation LM Test:				***Breusch-Godfrey Serial Correlation LM Test:***			
F-statistic	3.387095	Prob. F(2,47)	0.0422	F-statistic	1.180121	Prob. F(2,47)	0.3162
Obs*R-squared	6.928612	Prob. Chi-Square(2)	0.0313	Obs*R-squared	2.629915	Prob. Chi-Square(2)	0.2685
Heteroskedasticity Test: Breusch-Pagan-Godfrey				***Heteroskedasticity Test: Breusch-Pagan-Godfrey***			
F-statistic	0.994775	Prob. F(12,42)	0.4701	F-statistic	0.731244	Prob. F(12,42)	0.7132
Obs*R-squared	12.17249	Prob. Chi-Square(12)	0.4319	Obs*R-squared	9.505103	Prob. Chi-Square(12)	0.6593
Scaled explained SS	8.222700	Prob. Chi-Square(12)	0.7675	Scaled explained SS	8.950350	Prob. Chi-Square(12)	0.7072
Heteroskedasticity Test: Harvey				***Heteroskedasticity Test: Harvey***			
F-statistic	0.751758	Prob. F(12,42)	0.6940	F-statistic	0.689777	Prob. F(12,42)	0.7516
Obs*R-squared	9.724611	Prob. Chi-Square(12)	0.6401	Obs*R-squared	9.054830	Prob. Chi-Square(12)	0.6982
Scaled explained SS	8.757644	Prob. Chi-Square(12)	0.7235	Scaled explained SS	10.51162	Prob. Chi-Square(12)	0.5712
Heteroskedasticity Test: Glejser				***Heteroskedasticity Test: Glejser***			
F-statistic	0.865244	Prob. F(12,42)	0.5866	F-statistic	0.647089	Prob. F(12,42)	0.7898
Obs*R-squared	10.90167	Prob. Chi-Square(12)	0.5374	Obs*R-squared	8.581903	Prob. Chi-Square(12)	0.7382
Scaled explained SS	9.729470	Prob. Chi-Square(12)	0.6397	Scaled explained SS	7.999213	Prob. Chi-Square(12)	0.7852
Heteroskedasticity Test: ARCH				***Heteroskedasticity Test: ARCH***			
F-statistic	0.936973	Prob. F(1,52)	0.3375	F-statistic	0.416570	Prob. F(1,52)	0.5215
Obs*R-squared	0.955788	Prob. Chi-Square(1)	0.3283	Obs*R-squared	0.429154	Prob. Chi-Square(1)	0.5124

5. Conclusion

Due to the seminal contribution of domestic investment to the economy as recognized by the classical, neoclassical, and Keynesians theses, we are motivated to investigate the contribution of domestic investment on growth for the Uruguayan economy. For this purpose, we employ the Vector Error Correction Model (VECM) over the period 1960-2017.

Our empirical evidence pointed out the absence of a significant impact of domestic investment on growth in the short- and long-run. This result could be justified by the marginal role of domestic investment played in the Uruguayan economy. Also, the weak saving rate couldn't finance the economy and creating wealth in the case of Uruguay. From this outlook, the Uruguayan government should give more attention to the national saving through fiscal intensive to serve later the national investment and the economy.

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