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Investment, growth and employment: VECM for Uruguay

Gabriela Mordecki(*)
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Abstract

Investment is a key to analyze an economy's growth, as its increase the economy productive capacity, either expanding the capital stock as incorporating new technology that makes the production process more efficient. In Uruguay, investment has substantially increased in recent years, both overall and sectoral. This would have occurred as a result of strong growth in the period, as well as government policies on investment promotion. Growth and investment evolution, together with employment, has undergone a long history in economic theory. In that sense, there are empirical studies that support the theory that investment precedes growth, while there are others that provide evidence to the hypothesis that growth determines investment. Through a model with vector error correction (VECM) we found a long-term relationship between GDP without primary activity, investment and urban workers of Uruguay. In this model we observe a positive relationship between GDP and the other two variables, where GDP precedes both urban workers and investment.

Key words: Investment, growth, employment, cointegration

JEL: B23, E22, F43

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Inversión, crecimiento y empleo: VECM para Uruguay

Gabriela Mordecki
Lucía Ramírez

Resumen

La inversión resulta un elemento clave al analizar el crecimiento de una economía, ya que su incremento se traduce en un aumento de la capacidad productiva de la economía, ya sea ampliando el *stock* de capital como incorporando nueva tecnología que hace más eficiente el proceso productivo. En Uruguay, se ha incrementado en forma sustancial la inversión en los últimos años tanto a nivel global como sectorial. Ello se habría dado como consecuencia del fuerte crecimiento del período, así como de las políticas del gobierno en materia de promoción de inversiones. La evolución del crecimiento y de la inversión, conjuntamente con el empleo, han sido objeto de análisis de larga data en la teoría económica. En ese sentido, existen estudios empíricos que respaldan la teoría de que la inversión precede al crecimiento, mientras que hay otros que aportan evidencia hacia la hipótesis de que es el crecimiento quien determina la inversión. A través de un Modelo de vectores con corrección de error (VECM) se constata una relación de largo plazo entre el PIB sin actividad primaria, la inversión y los ocupados urbanos de Uruguay. A partir de este modelo se constata una relación positiva entre el PIB y las otras dos variables, donde el PIB precede tanto a la ocupación como a la inversión.

Palabras clave: Inversión, crecimiento, empelo, cointegración
Clasificación JEL: B23, E22, F43

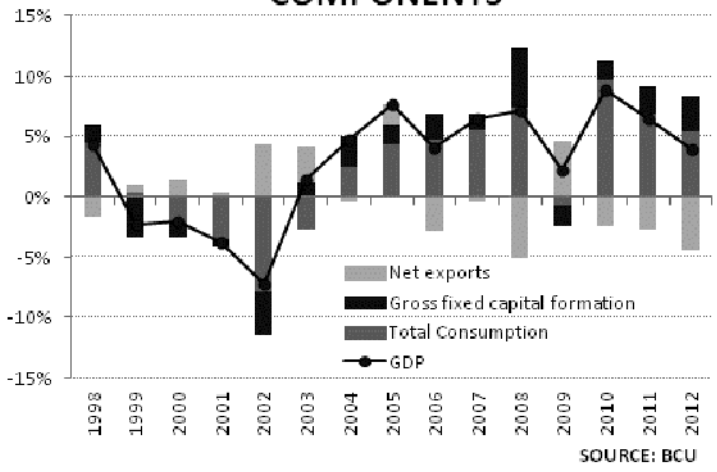
Introduction

Investment is an essential element to analyze growth, as it increases the economy's production capacity, either expanding the capital stock or incorporating new technology that makes more efficient the production process. In this sense, it is important to analyze the recent performance of investment in Uruguay, since it is a key aspect in strengthening the growth path of the Uruguayan economy. Also, according to the most recognized economic theories, there is a positive relationship between economic growth and job creation in an economy, and also between growth and investment.

The significant increase of investment in the Uruguayan economy in recent years coincides with exogenous factors, which had a substantial effect on its evolution. The repositioning and growth of emerging economies like China and India, where demand had a strong impact on the commodities market, together with the weakening dollar, led to a sharp increase in commodity prices, and became more profitable investments concerning the processing of raw materials. In this context of low interest rates and recession in developed countries, became more attractive investments in emerging economies.

Linking investment with growth can be seen in the graph below, where the rate of annual change in Gross Domestic Product (GDP) for the study period is shown. There it is observed that both GDP and Gross Fixed Capital Formation (GFCF) vary in the same direction.

FIGURE 1 - ANNUAL GDP GROWTH COMPONENTS



Meanwhile, in Figure 2 we show the number of employed evolution, the GDP without primary activity and investment through the Gross fixed capital formation (GFCF). The relevance of analyzing the relationship of these three variables can be seen in this chart, which notes that the variables evolve in the same direction, although employment shows less variability than GDP and this in turn less volatility than GFCF.

Investment relevance and its relationship to growth and employment has been the subject of long-standing analysis in economic theory. In that sense, there are empirical studies supporting the theory that investment precedes growth while there are others who provide evidence to the hypothesis that growth determines investment. This article therefore attempts to analyze the relationship between growth, employment and investment for the Uruguayan economy considering the period 1988-2011, in order to analyze the last two growth cycles of the Uruguayan economy. For that, we estimate an econometric model trying to find long-term relationships between the variables using the Johansen cointegration methodology.

1. Analysis framework and background

The central role of investment as one of the main engines of growth is identified in several economic theories. Among them, Reig (2013) mentions the classical political economy of the nineteenth century, the Keynesian view of growth (Harrod-Domar model), the neoclassical growth theory (Solow and Denison) and the endogenous growth theories. Although these approaches address the issue of investment with different emphasis, all agree that investment is important in explaining the growth pattern of the economy. Meanwhile, other authors have emphasized that causality is not from investment to growth, but to the contrary, because many times the investment levels depend on the preceding business context. Antelo and Valverde (1994) analyze private investment to the economy of Bolivia, claiming that according to Keynesian theory, investment affects positively economic growth and depends on the expected return rate of capital. Moreover, these authors claim that according to the neoclassical theory, investment depends on GDP growth and interest rate. However, in developing countries where financial markets are less developed, the interest rate is not significant in determining investment.

Anyway, beyond the existence of theories that by one side support growth led by investment and others, that on the contrary, support the hypothesis that investment is led by growth, in all of them the main fact is that both variables are interrelated and linked in the analysis of the economic performance of countries, and therefore, one should consider both variables as two paths that constantly interact.

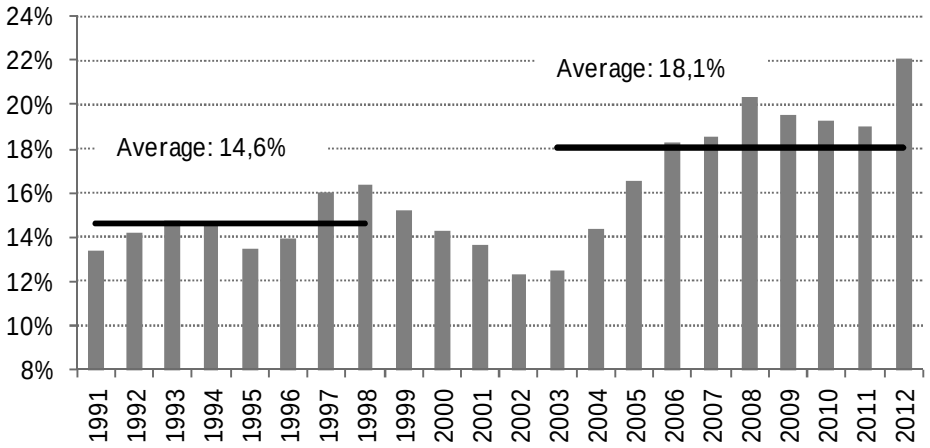
This theoretical relationship has been subject to empirical testing on numerous occasions. Such is the case in Bond et al. (2004) who find evidence for 94 countries that a major share of investment in GDP generates a higher level of output per worker, as well as a higher rate of growth in the long term. However, there is not much empirical evidence in favor of investment predicting growth. In this work, Bond et al. (2004) mention that a large number of recent studies find that investment does not Granger cause growth, such as Jones (1995) and Blomstrom et al. (1996). Meanwhile, Attanasio et al. (2001) found that investment Granger causes growth, but with a negative sign. Meanwhile, Cheung et al. (2012), found great heterogeneity in the relationship between investment and growth, in a study of 188 developed and developing countries. This fact may suggest a possible negative association between variables, especially for lower-income countries. According to the authors, this result, which has no basis in economic theory, can respond to capital flows in recent years to the United States with low or even negative investment returns. Another background that should be noted is Ibarra and Moreno - Brid (2004), who studied the relationship between GDP, investment and foreign direct investment (FDI) to Mexico, finding that FDI depends crucially on GDP and real wages. Meanwhile, Chudnovsky and López (2007) analyze the relationship between FDI and economic development in the case of the Mercosur countries, concluding that the macroeconomic effects were not significant in recent years, while microeconomic seem to have been stronger, though heterogeneous.

2. Recent trends in investment

In the last decade the Uruguayan economy has experienced significant growth, with high rates relative to the historical average of the country. While in the past 50 years the Uruguayan economy grew at an average annual cumulative rate of 2.4% in the last 10 years grew at a rate of 5.2%. This strong GDP growth was also followed by a significant dynamism in the labor market and a substantial expansion of investment.

Investment (measured by GFCF), grew at a cumulative annual average rate of 10.7% in last decade, rising from 12.4% of GDP in 2002 to 22.1% of GDP in 2012. This meant that investment in terms of the average GDP for the period 1991-1998 was 14.6%, while for the period 2003 to 2011 the average was 18.1%, as seen in the figure below.

FIGURE 3 - GFCF/GDP (%)



SOURCE: BCU

Despite the recent dynamism, investment as a percentage of GDP in Uruguay is located along its history below various countries of similar or greater degree of development (Bittencourt and Reig, 2009). Uruguay also registered investment rates below the average for Latin America, which in turn has been historically lower than that achieved by other emerging regions (ECLAC, 2012).

Since 2008 Uruguay received an average annual FDI of 2,000 million. According to Uruguay XXI (2012), considering the accumulated stock of FDI, Uruguay is one of the countries in the region with the highest proportion of FDI relative to GDP, ranking second after Chile. While changes occur regarding the nineties, Bittencourt et al. (2009) point out that given the dynamism of FDI in recent years, it is necessary to reflect on the type of FDI more favorable to the long run country's development because "recent FDI does not seem to have contributed significantly to the modification of the historical pattern of (low) growth, to the extent that does not change the production structure and the specialization of the country in commodities, to a greater intensity of knowledge and technology. "

3. Model

3.1. Series and methodology

To carry out this investigation, we estimated a vector autoregressive model with error correction mechanism (VECM). The variables used were: GDP excluding agricultural activities (*PIB_NO_A*), gross fixed capital formation (*FBKF*) and the number of urban employed (*OCUP*). For GDP and GFCF we used seasonally adjusted series, and all series were considered in logarithms. The series of GDP and GFCF are from the Uruguayan Central Bank (BCU) and urban employed are from household surveys and population projections from the National Institute of Statistics (INE). The series were taken quarterly and modeling was from the first quarter of 1988 to the fourth quarter of 2011 (Figure 2).

With respect to the trajectories, while all series show growth from the beginning of the period considered until 1998 and then fell until 2002 when the economy experienced a major crisis in its history, the decline is much more pronounced in investment, whereas employment shows less shrinkage. The subsequent recovery also occurs with greater intensity in the investment.

In order to analyze the integration degree of the series to be modeled, we applied the Augmented Dickey-Fuller (ADF) test, which results are shown in Table 2. All the cases were non-stationary series with a unit root, i.e., I (1). According to the theory, this is a result generally expected for economic series, opening the possibility to analyze whether there is a cointegration vector between the series, showing a long-term relationship between variables.

TABLE 1 – UNIT ROOT TEST

Augmented Dickey-Fuller

H_O = there is an unit root

	Statistic value of the series in levels	Rejection H0 up to 95%	Statistic value of the series in first differences	Rejection H0 up to 95%
PIB_NO_A	2.34085	No	-5.26651	Yes
	(no constant, 2 lags)		(constant, 1 lag)	
OCUP	2.433494	No	-11.98867	Yes
	(no constant, 1 lag)		(constant, 0 lags)	
FBKF	0.696656	No	-9.736054	Yes
	(no constant, 4 lags)		(no constant, 0 lags)	

Note: Lags were determined considering the Akaike test.

SOURCE: IECON

The existence of long term equilibrium relationships among the variables was run under Johansen (1988) methodology. From this verification, we estimated a vector error correction model VECM (Engle and Granger, 1987 and Johansen, 1992).

3.2. Johansen cointegration method

Following Enders (1994), cointegration analysis is based on a vector autoregressive model with Vector Error Correction Model specification for an endogenous variable vector.

$$\Delta X_{it} = A_1 \Delta X_{it-1} + \cdots + A_k \Delta X_{it-k+1} + \prod X_{it-k} + \mu + \boldsymbol{\Gamma} D_t + \xi_t \qquad t=1, \ldots, T$$

Where $\xi_t \sim N(0, \sigma^2)$

μ is a vector of constants and D_t contains a set of dummies (seasonal and interventions).

Information about long-term relationships is included in the $\prod = \alpha\beta'$ matrix. β is the coefficients vector for the existing equilibrium relationships, and α is the vector for short-term adjustment mechanism coefficients. The identification of the matrix $\prod$ range determines the total cointegration relationships existing among the variables.

Once examined the long-term relationship, we proceed to the short-term analysis, which shows different adjustment mechanisms of the variables to the long-run equilibrium.

The cointegration is analyzed with Johansen test, from the Trace and the Eigenvalue of matrix Π (Table 2). The existence of a cointegrating vector is not rejected, and the signs of the variables were as expected. Moreover, in the resulting pattern exclusion tests for β and weak exogeneity test for α all were significant. Furthermore, residuals were well behaved (see Annex). However, the GFCF (*FBKF*) coefficient was significant only at 10%, while the employment (*OCUP*) was significant at 1%.

Thus, the vector found is:

$$PIB\_no\_A_t = \underset{(2,174)}{0,128}\,\mathrm{FBKF}_t + \underset{(9,601)}{1,824}\mathrm{Ocup}_t - 21,571$$

As variables were considered in logarithms, the coefficients can be read as elasticities. Therefore, with the increase of one percentage point (pp) in investment considered through GFCF, GDP without primary activity grows 0.128%. On the other hand, with the increase of one pp in employment, GDP without primary activity increases 1.824%.

TABLE 2
COINTEGRACION TEST

Date: 10/15/13 Time: 20:24
Sample (adjusted): 1989Q3 2011Q4
Included observations: 90 after adjustments
Trend assumption: Linear deterministic trend
Series: PIB_NO_A FBKF OCUP
I0904 I0801 I9404 I1004 I9901
Warning: Critical values assume no exogenous series
Lags interval (in first differences): 1 to 2, 5 to 5
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.284632	41.64718	29.79707	0.0014
At most 1	0.090388	11.50091	15.49471	0.1825
At most 2	0.032511	2.974607	3.841466	0.0846

Trace 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

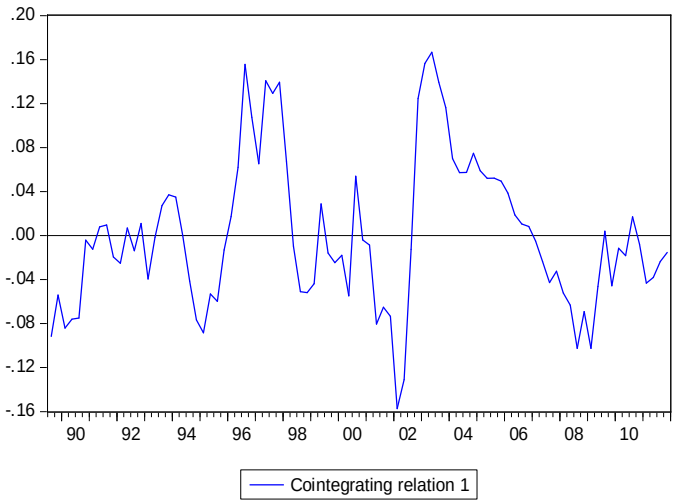
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.284632	30.14627	21.13162	0.0021
At most 1	0.090388	8.526307	14.26460	0.3277
At most 2	0.032511	2.974607	3.841466	0.0846

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: IECON

FIGURE 4
COINTEGRATION VECTOR

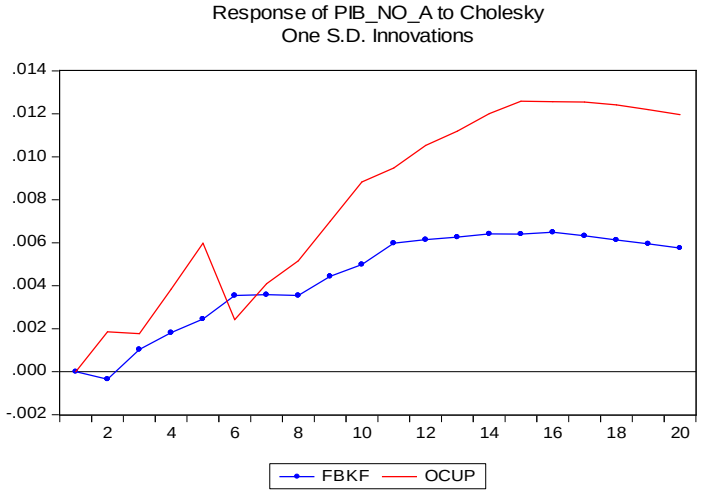


SOURCE: IECON

3.3. Impulse-response functions

The impulse response functions show the reaction of the different variables to shocks in the others. In this first case, a shock is simulated in investment and occupation and as a result we can see the impact on GDP without primary activity. Figure 5 shows the GDP without primary activity reaction, and after 14 quarters fits around 1.2% to a positive shock on employment, while after 10 quarters, the setting is around 0.6% to shock on investment.

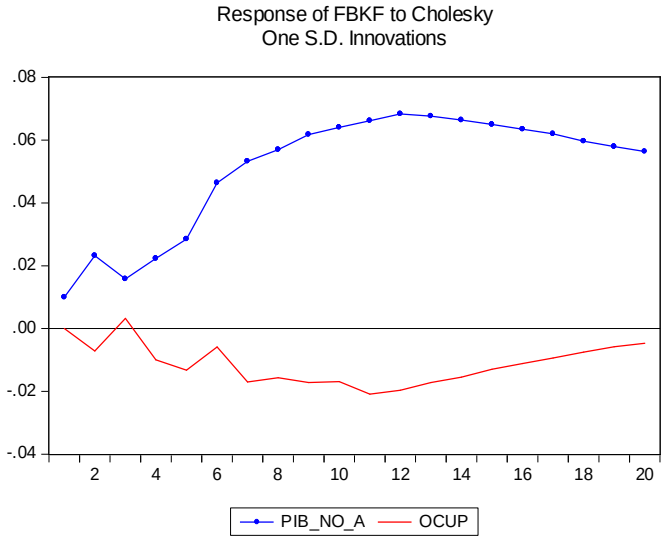
FIGURE 5
NON AGRICULTURAL GDP IMPULSE FUNCTION



SOURCE: IECON

Analyzing the impact of investment to a shock of the other two variables, non agricultural GDP and investment (Figure 6), the impulse-response function shows a positive impact of 6% from the first variable after 12 periods, and a negative impact after a shock from the second variable that disappears after 12 to 14 periods.

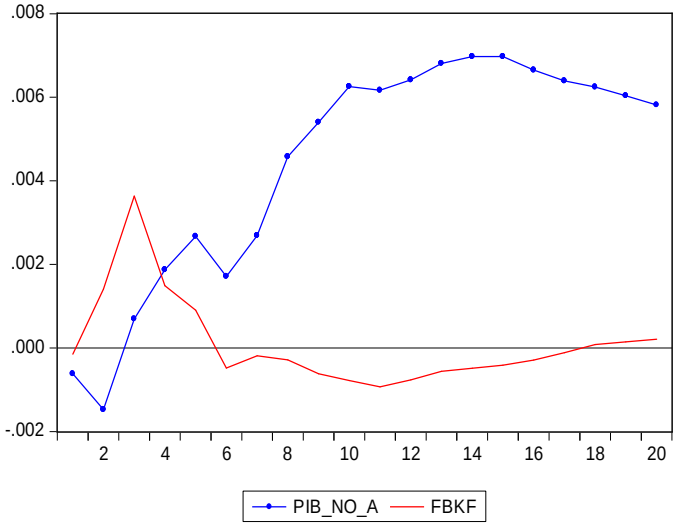
FIGURE 6
INVESTMENT IMPULSE FUNCTION



SOURCE: IECON

The impact on employment of a shock in GDP without primary activity is positive and around 0.6%, while there is no clear effect resulting from a shock in the investment, which appears positive in the first period, then becomes slightly negative to disappear at the end of the analysis (Figure 7).

FIGURE 7
EMPLOYMENT IMPULSE FUNCTION



SOURCE: IECON

Hence from this analysis it is evident the positive relationship between investment and GDP on the one hand and between the GDP and employment on the other. However, the relationship between employment and investment is not so clear and in some cases appears to be negative, which could be showing a phenomenon of saving labor investment, or that the investment was aimed at less intensive labor sectors.

Finally, and to complete the study (Table 3), causality between variables was analyzed through the Granger test. In the first relationship, according to this test is rejected GDP without primary activity does not cause the employment, the second is rejected that the investment does not cause the employment and the third is rejected GDP without primary activity does not cause investment. Therefore, the results of this test indicate that the GDP without primary activity precedes the investment and employment. Also, investment precedes the employment.

TABLE 3
GRANGER TEST

Pairwise Granger Causality Tests Date: 10/15/13 Time: 20:36 Sample: 1985Q1 2011Q4 Lags: 5			
Null Hypothesis:	Obs	F-Statistic	Prob.
PIB_NO_A does not Granger Cause OCUP	103	6,18238	6.E-05
OCUP does not Granger Cause PIB_NO_A		0,90733	0,4799
FBKF does not Granger Cause OCUP	91	2,63712	0,0294
OCUP does not Granger Cause FBKF		0,64843	0,6635
FBKF does not Granger Cause PIB_NO_A	91	1,01848	0,4124
PIB_NO_A does not Granger Cause FBKF		4,86731	0,0006

SOURCE: IECON

According to this modeling, there is a long-term relationship between the three variables considered: GDP, investment and employment. According to the estimated coefficients, the elasticities are consistent with the empirical analysis of the series trajectories; investment is the variable that reacts more intensely, while the employment presents the lowest variability.

The Granger test suggests that the non agricultural GDP precedes investment and employment, while investment precedes employment.

Finally, the significance of α coefficients indicates that all variables adjust in the short-term to the long-term relationship deviations. In this case also the variable that faster adjusts is investment, with less than three quarters to fully adjust, while both GDP and employment adjust much more slowly (Table 4).

TABLE 4
VECM ESTIMATION

Vector Error Correction Estimates			
Date: 04/08/14 Time: 17:23			
Sample (adjusted): 1989Q3 2011Q4			
Included observations: 90 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
Cointegrating Eq:	CointEq1		
PIB_NO_A(-1)	1.000000		
FBKF(-1)	-0.127828		
	(0.05879)		
	[-2.17448]		
OCUP(-1)	-1.823624		
	(0.18994)		
	[-9.60120]		
C	2.157074		
Error Correction:	D(PIB_NO_A)	D(FBKF)	D(OCUP)
CointEq1	-0.076874	0.382440	0.068105
	(0.02994)	(0.11301)	(0.02996)
	[-2.56757]	[3.38413]	[2.27351]

SOURCE: IECON

4. Concluding remarks

Investment is an essential element to analyze growth, as it increases the economy's production capacity, either expanding the capital stock or incorporating new technology that makes more efficient the production process. In addition, the significant and recent investment increase in Uruguay coincides with some exogenous factors related to the international economy, which had a substantial and positive effect on the domestic situation. This increase meant that investment in terms of average GDP went from 14.6% in 1991-1998 to 18.1% between 2003 and 2011.

The relevance of the investment and its relationship to growth and employment has been the subject of long-standing analysis in economic theory. In that sense, there are empirical studies that support the theory that investment precedes growth, while there are others that provide evidence to the hypothesis that growth determines investment.

Here we analyzed the possible relationship between investment, non agricultural GDP and urban employment through Vector Error Correction Model (VECM). The estimation implies the existence of a long-term relationship between these three variables. From this model we found a positive relationship between GDP and the other two variables, where GDP precedes both employment and investment. However, the relationship between employment and investment is not so clear and in some cases appears to be negative, which could be showing a phenomenon of saving labor investment, or investment in less labor intensive sectors.

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6. Annex

6.1. Residual tests

6.1.1. Normality

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 10/15/13 Time: 20:30
Sample: 1985Q1 2011Q4
Included observations: 90

Component	Skewness	Chi-sq	df	Prob.
1	0.139553	0.292124	1	0.5889
2	-0.188352	0.532147	1	0.4657
3	-0.058232	0.050865	1	0.8216
Joint		0.875136	3	0.8314

Component	Kurtosis	Chi-sq	df	Prob.
1	2.695477	0.347754	1	0.5554
2	3.787216	2.323911	1	0.1274
3	4.025510	3.943766	1	0.0470
Joint		6.615430	3	0.0852

Component	Jarque-Bera	df	Prob.
1	0.639878	2	0.7262
2	2.856058	2	0.2398
3	3.994631	2	0.1357
Joint	7.490566	6	0.2778

6.1.2. Autocorrelation

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 10/15/13 Time: 20:31
Sample: 1985Q1 2011Q4
Included observations: 90

Lags	LM-Stat	Prob
1	8.098819	0.5242
2	11.88897	0.2196
3	6.475779	0.6915
4	7.015354	0.6355
5	11.16943	0.2643
6	10.28913	0.3276

7	3.975519	0.9130
8	7.834846	0.5509
9	9.265423	0.4131
10	5.966549	0.7433
11	5.329029	0.8047
12	3.225148	0.9547
Probs from chi-square with 9 df.		

6.2. VECM estimation

Vector Error Correction Estimates
Date: 04/08/14 Time: 17:23
Sample (adjusted): 1989Q3 2011Q4
Included observations: 90 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
PIB_NO_A(-1)	1.000000
FBKF(-1)	-0.127828 (0.05879) [-2.17448]
OCUP(-1)	-1.823624 (0.18994) [-9.60120]
C	21.57074

Error Correction:	D(PIB_NO_A)	D(FBKF)	D(OCUP)
CointEq1	-0.076874 (0.02994) [-2.56757]	0.382440 (0.11301) [3.38413]	0.068105 (0.02996) [2.27351]
D(PIB_NO_A(-1))	0.321781 (0.09531) [3.37624]	0.654867 (0.35974) [1.82040]	-0.151549 (0.09536) [-1.58927]
D(PIB_NO_A(-2))	0.259406 (0.09246) [2.80555]	-0.801603 (0.34900) [-2.29687]	0.021495 (0.09251) [0.23235]
D(PIB_NO_A(-5))	0.174160 (0.09397) [1.85330]	0.949853 (0.35470) [2.67791]	-0.156567 (0.09402) [-1.66522]
D(FBKF(-1))	-0.015753	-0.212091	0.036089

	(0.02237)	(0.08443)	(0.02238)
	[-0.70426]	[-2.51214]	[1.61260]
D(FBKF(-2))	0.011479	-0.105751	0.060437
	(0.02214)	(0.08356)	(0.02215)
	[0.51853]	[-1.26563]	[2.72870]
D(FBKF(-5))	-0.000793	0.045532	-0.020886
	(0.02053)	(0.07748)	(0.02054)
	[-0.03864]	[0.58770]	[-1.01698]
D(OCUP(-1))	-0.016400	0.219831	-0.072714
	(0.10375)	(0.39159)	(0.10380)
	[-0.15808]	[0.56138]	[-0.70051]
D(OCUP(-2))	-0.154712	1.045114	0.008890
	(0.09430)	(0.35594)	(0.09435)
	[-1.64059]	[2.93617]	[0.09422]
D(OCUP(-5))	-0.365195	0.662032	0.069055
	(0.10275)	(0.38781)	(0.10280)
	[-3.55437]	[1.70709]	[0.67174]
C	0.005402	0.003158	0.007064
	(0.00213)	(0.00802)	(0.00213)
	[2.54164]	[0.39363]	[3.32177]
I9102	0.007554	0.273594	-0.012635
	(0.01552)	(0.05859)	(0.01553)
	[0.48661]	[4.66959]	[-0.81353]
I9403	-0.091791	-0.025131	-0.020231
	(0.01583)	(0.05975)	(0.01584)
	[-5.79813]	[-0.42057]	[-1.27725]
I0002	-0.039413	-0.107561	-0.057570
	(0.01631)	(0.06157)	(0.01632)
	[-2.41602]	[-1.74687]	[-3.52720]
I0103	-0.063253	-0.011779	-0.026197
	(0.01739)	(0.06562)	(0.01739)
	[-3.63826]	[-0.17950]	[-1.50601]
I0202	0.062322	-0.171451	-0.024960
	(0.01640)	(0.06190)	(0.01641)
	[3.80022]	[-2.76980]	[-1.52122]
I0802	0.017191	0.139537	0.011726

	(0.01577)	(0.05951)	(0.01577)
	[1.09041]	[2.34483]	[0.74333]
I0203	-0.027256	-0.267115	-0.044817
	(0.01700)	(0.06417)	(0.01701)
	[-1.60332]	[-4.16294]	[-2.63494]
I0904	-0.000678	-0.147889	0.005303
	(0.01577)	(0.05951)	(0.01577)
	[-0.04301]	[-2.48510]	[0.33615]
I0801	-0.042191	0.034464	-0.015582
	(0.01542)	(0.05819)	(0.01543)
	[-2.73656]	[0.59224]	[-1.01012]
I9404	0.067120	-0.070077	0.030444
	(0.01754)	(0.06622)	(0.01755)
	[3.82591]	[-1.05828]	[1.73445]
I1004	-0.031941	0.070641	0.001293
	(0.01559)	(0.05884)	(0.01560)
	[-2.04902]	[1.20061]	[0.08289]
I9901	0.019501	-0.103962	-0.035937
	(0.01579)	(0.05959)	(0.01579)
	[1.23531]	[-1.74471]	[-2.27525]
R-squared	0.639028	0.652947	0.553412
Adj. R-squared	0.520499	0.538989	0.406771
Sum sq. resids	0.015078	0.214819	0.015094
S.E. equation	0.015002	0.056624	0.015010
F-statistic	5.391351	5.729726	3.773926
Log likelihood	263.5394	143.9952	263.4919
Akaike AIC	-5.345319	-2.688782	-5.344265
Schwarz SC	-4.706479	-2.049942	-4.705424
Mean dependent	0.008257	0.009608	0.003336
S.D. dependent	0.021664	0.083396	0.019488

Determinant resid covariance (dof adj.)	1.57E-10
Determinant resid covariance	6.49E-11
Log likelihood	672.5241
Akaike information criterion	-13.34498
Schwarz criterion	-11.34513

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Serie Documentos de Trabajo

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Instituto de Economía

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