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## **SHORT AND LONG RUN DETERMINANTS OF PRIVATE INVESTMENT IN ARGENTINA**

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This study provides an empirical analysis of the macroeconomic factors that can potentially affect investment decisions in Argentina in a short, medium and long run perspective. Both the theory and the empirical literature are reviewed in order to identify a private investment function for the last three decades (1970-2000). The results suggest that investment decisions seem to be determined, in the short run, by shocks in returns (exchange rate, trade liberalization) and in aggregate demand. Besides, there is evidence of a “crowding-out” effect of public investment. In the long run, the capital accumulation path seems to be closely dependent on both well-developed financial and credit markets and on perspectives of fiscal sustainability.

*JEL classification codes:* E22, H54, O16, O23

*Key words:* investment, macroeconomic instability, crowding-out, Argentina

### **I. Introduction**

As most developing countries, during the last century, particularly the last decades, the Argentinean economy has been characterized by changes in economic regimes that have severely conditioned capital accumulation. In order to contribute

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to the discussion of what determines the desired capital stock of the firms operating in the economy, the main goal of this work is to try to elucidate the main determinants of private investment decisions in Argentina.

The empirical literature on the determinants of investment behavior is broad and roughly divided in two groups: time series analyses for one or several countries, and microeconomic studies using firm level data. Among the former, Loungani and Rush (1995), Blomstrom et al. (1996), Everhart and Sumlinski (2001), Campos and Nugent (2003), and Krishna et al. (2003) are the main recent references, while firm level analyses include among others Chirinko and Schaller (1995), Bloom et al. (2001), and Butzen et al. (2002). Although the current tendency is toward microeconomic studies with panel data at the firm level, this paper deals with the first group methodology due to the absence of reliable microdata.

For the particular case of Argentina, FIEL (2002), and Kydland and Zarazaga (2002) address the characteristics exhibited by the economic growth during the last decades, and at the same time they broadly discuss the role that capital accumulation played in the growth process in the country. But concerning private investment decisions, the only previous references for the Argentinean case are Bebczuk (1994) and Grandes (1999). Compared to the first one, this paper extends the results to the post-reform period (nineties). It also complements that study and Grandes (1999), which only deals with investment behavior in machinery and equipment during the nineties, by incorporating other macroeconomic variables a priori relevant, such as the external debt, financial credit to the private sector, the relative price of capital goods with respect to consumption goods, and the degree of trade liberalization of the economy.

The rest of the paper is organized as follows. Section II reviews the theory of the determinants of the investment decision. Section III presents the evolution and composition of the investment process in Argentina during the whole twentieth century, using data recently provided by the Secretary of Economic Policy of the Ministry of Economy and Production. This section analyzes the time series behavior of investment, and shows evidence in favor of the hypothesis of a structural change by the end of the seventies. The main contribution of the paper is Section IV, where a private investment function is estimated, not only for the short run, but also for the medium and long run. The paper concludes in Section V, with brief final comments and policy recommendations.

## **II. The theory of the determinants of private investment**

The literature has proposed several hypotheses concerning the key

macroeconomic variables that play a decisive role in explaining investment behavior in a country.

A first candidate is activity level. Samuelson stressed the reciprocal relationship between investment and production, and proposed the “accelerator” hypothesis. Similarly, in Jorgenson (1963), the value of the desired capital stock for a typical firm depends positively on the demand level. The output of the country (GDP) would be a reasonable proxy to aggregate demand as a determinant of private investment in a country (see Long and Summers 1991 and Blomstrom et al. 1996).

Another possible determinant is the rate of return on investment. The literature usually approaches this through a real interest rate as representative of the cost of capital. However, as suggested by Jorgenson, real interest rates would have a negative impact on the desired capital stock but not on investment flows, as early empirical approaches seemed to suggest (i.e., the Tinbergen approach). Hence, it is not clear that real interest rates should be included in an investment function. Instead, another approach for controlling for the opportunity cost of investment is by looking at the relative price of capital goods with respect to consumption goods. It is natural to expect that in periods characterized by relative lower cost of equipments agents should be investing relatively more.

The theory of investment irreversibility suggests that the cost of investing in machinery and equipment is usually not recovered by a future resale. This “sector-specific” characteristic of investment would imply that the higher degree of “uncertainty” that usually prevails in emerging countries is relevant in investment decisions in these nations, since any abrupt fall in aggregate demand would generate an unsustainable excess in installed capacity (see Caballero 1991, Caballero and Pindyck 1996, and Bloom et al. 2001). In several papers, the inflation rate is used as a reasonable proxy for the uncertainty level in the economy (Beaudry et al. 2001), since stable prices improve the informative content of the price system, allowing a favorable allocation of resources (the best opportunities are easily identifiable).<sup>1</sup>

The restrictions on investment financing are a problem broadly documented in the literature on the determinants of investment. Just as suggested in Loungani and Rush (1995), the basic idea is that some agents, typically small and medium enterprises (SMEs), are unable to get financing directly through open market debt.

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<sup>1</sup> Other variables related to the uncertainty level in the economy were used in previous studies. For example in Campos and Nugent (2003), a socio-political index of instability is used as a proxy variable for uncertainty, which includes political murders and revolutions.

Hence, these agents are strongly dependent on bank credit, a market that is usually characterized by imperfections due to asymmetric information between lenders and borrowers. In developing countries like Argentina, this problem of access to credit is critical, due to the absence of futures markets and poor access to long term financing. The evolution of the credit amounts destined for the private sector would be a good indicator of the restrictions operating in the domestic financing of investment.

On the other hand, the external debt level (as a share of GDP), is a variable that can represent the evolution of external credit in investment financing. A higher external debt level could be an indicator of over-indebtedness, signaling the lack of viability and sustainability of current macroeconomic policies in the long term, and most likely negatively impacting investors' expectations due to the increase in the degree of uncertainty on future policies. However, a country can have a large debt for a good reason, as a good credit rating, hence signaling a higher level of credit availability. A similar problem crops up at the firm level (see Petersen and Rajan 1994). For both reasons, external debt is included in the analysis, just as in Chirinko and Schaller (1995), although its impact on investment decisions may be a priori unpredictable.

The real exchange rate can also affect the evolution of private investment. On one hand, just as suggested in Froot and Stein (1991), not only would devaluation reactivate the exportable sector of the economy, but it would also be favorable to the acquisition of local assets by foreign companies at a much lower price. Other authors like McCulloch (1989) reject this link between investment and exchange rate, suggesting that it is not the price of a domestic asset, but the rate of return that determines investment. When a country's currency is depreciated in real terms, not only the asset price falls, but also the nominal gain of the investment. This effect becomes particularly relevant in sectors producing non-exportable goods.

Another variable that is usually included is the degree of trade liberalization of an economy. Here, a priori, an ambiguous effect can be expected. On one hand, an economy highly integrated to the world is expected to attract investments in tradable sectors in order to increase productivity and competitiveness (Balasubramanyam et al. 1996). However, an abrupt increase in exposure to external competition in certain sectors can make these sectors less attractive as a destination for new capital flows (Serven 2002). The ratio of exports plus imports to GDP (trade liberalization coefficient) is used in this study.

Finally, it is also interesting to distinguish between public and private

investment. Changes in the economic environment usually affect in a different way the investment decisions of both companies and workers that operate in markets with different types of regulation, or of government groups whose decisions are made in normative environments outside of market mechanisms. Here, public investment can also have differential impacts, and one of the following effects is expected to arise: the “crowding out” effect, in which the state displaces the private sector when the public investment increases in a country and competes for the appropriation of scarce (physical and financial) resources; and the “crowding in” effect that emphasizes the positive externalities (such as investments in infrastructure, anticyclical policies, public goods provision) and the complementarity that public investment has by inducing higher levels of private investment (see Everhart and Sumlinski 2001).

### **III. The evolution of fixed gross investment in Argentina**

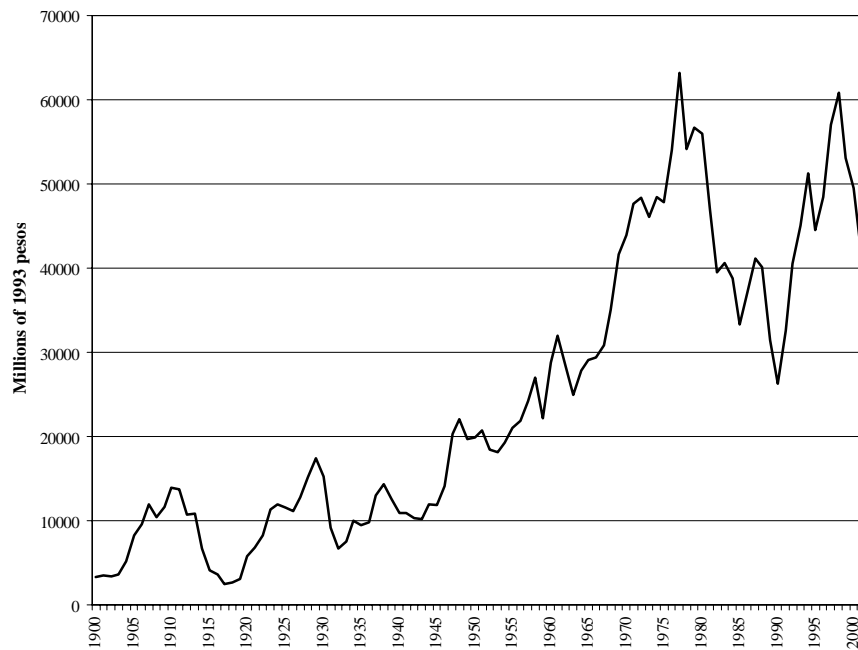
Figure 1 shows the evolution of Fixed Gross Investment (FGI) in Argentina since 1900.<sup>2</sup> From the beginnings of the twentieth century, with the reinstatement of the gold standard régime in 1903, the investment process began an upward trend that was extended to 1910, except for a brief interruption in 1908. Investment fell just before the First World War crisis, and then registered a strong recovery, with a peak in 1929. Then it descended abruptly for three years during the international “Great Depression” and, after recovering in 1934, it randomly evolved due to the effects of the Second World War. In 1948, a new peak was reached during Perón’s government.

Starting in the postwar period, a long phase of worldwide growth began. Argentina also showed growth in investment between 1953 and 1977, an import substitution period, when the country reached its peak in real terms in the century. Then, while most of the developed world continued growing, the dynamics of investment in Argentina began to be much more volatile, never attaining the levels reached in the peak of the previous phase.

During the second half of the twentieth century four different periods can be clearly distinguished: two with growing investment rates and two with falling

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<sup>2</sup> See Maia and Nicholson (2001), pages 9-11 for the methodology for calculating the investment series. The series is available at the website of the Secretary of Economic Policy of the Ministry of Economy and Production ([www.mecon.gov.ar/peconomica/default\\_ing.htm](http://www.mecon.gov.ar/peconomica/default_ing.htm)).

**Figure 1. Fixed gross investment in Argentina**

Source: Ministry of Economy and Production, Argentina.

rates. The periods of growing rates of investment include 1953 to 1977 and 1991 to 1998.<sup>3</sup> Those of falling rates include the period 1978-1990 and the last years of the nineties. Precisely in 1977 the government liberated the interest rates and the capital account. This shock could have induced a structural break in the investment function.

In this paper, due to data availability, only the determinants of investment behavior for the last three decades are studied. However, in order to sustain the hypothesis of structural change in 1977, and to justify the period of analysis of the study, it is necessary to show evidence that supports the idea that there was a change in the investment function starting in the seventies.

The strategy for testing the structural change is the following. First, the trend is analyzed. As the 1900-2001 investment series (Fixed Gross Investment) and its different components (Machinery and Equipment, Transport, and Housing) reject

<sup>3</sup> This is the period studied by Grandes (1999).

the unit root hypothesis at a 5% level using Augmented Dickey-Fuller (ADF) tests, it is possible to make a univariate regression to characterize the series including a trend term. Table 1 presents a univariate regression with trend. The Lagrange Multiplier (LM) tests of Breusch and Godfrey were performed on the residuals, and they reject the null hypothesis of autocorrelation. As can be seen, the trend is highly significant only for the period 1900-1977, and the hypothesis of unit root is rejected at a 10% significance level.

**Table 1. Regressions for fixed gross investment**

Variables	Sample			
	1900-2001	1900-1977	1978-2001	1978-2001
Constant	1.507 (4.01)	1.587 (3.67)	3.054 (2.24)	3.288 (2.56)
FGI <sub>t-1</sub>	1.299 (14.33)	1.317 (12.87)	1.028 (5.11)	1.046 (5.32)
FGI <sub>t-2</sub>	-0.473 (-5.24)	-0.504 (-4.94)	-0.334 (-1.67)	-0.354 (-1.83)
Trend	0.004 (3.26)	0.006 (3.23)	0.002 (0.60)	- -
R2	0.963	0.953	0.695	0.689
P-Value BG	0.122	0.122	0.327	0.404

Notes: FGI expressed in logarithms. The t-statistics are between parenthesis. The Breusch and Godfrey test was performed with 2 lags. P-Value BG is the significance level for rejecting the null hypothesis of no serial correlation in the disturbances up to second order.

On the other hand, using ADF tests the series don't reject the unit root hypothesis for the period 1950-2001. Consequently, the Perron (1989) test can be applied assuming a break in 1977. The following equation was estimated:

$$y_t = \alpha_0 + \mu_1 D_L + \mu_2 D_P + \alpha_2 t + \alpha_1 y_{t-1} + \sum_{i=1}^k \beta_i \Delta y_{t-1} + \varepsilon_t, \quad (1)$$

where  $y_t$  is the logarithm of investment,  $D_L$  is a dummy variable that takes the value zero up to 1977 and one starting from 1978,  $D_P$  is another dummy that takes the value zero in every year except 1978, and  $t$  is the trend term. The null hypothesis

describes a behavior of a difference-stationary process ( $H_0: \alpha_1 = 1; \alpha_2 = 0; \mu_1 = 0$ ), while the alternative suggests an autoregressive trend-stationary process ( $H_1: \alpha_1 < 1; \mu_2 = 0$ ). Under the null hypothesis, the shock is permanent, but under the alternative, the behavior is that of a structural change with change in the mean.

The results of the Perron test for structural change are shown in Table 2. FGI rejects the unit root hypothesis, supporting the idea of a structural change with a permanent fall in the intercept. If each component is analyzed separately, this would also be the case for investment in machinery and equipment (M&E). On the other hand, the other components of private investment do not present evidence of structural change (at 5% significance level), hence rejecting the presence of a “negative shock”. This supports the idea that the causes behind the various forms of investment are quite different during these periods.<sup>4</sup>

**Table 2. Perron test for structural change. Sample 1950-2001**

Dependent Variable: $y(t)$	FGI	M&E	Transport	Housing
Constant	1.498 (2.17)	1.336 (2.12)	0.697 (1.74)	1.653 (2.40)
$D_L$	-0.153 (-2.12)	-0.180 (-2.22)	-0.285 (-1.42)	-0.111 (-1.67)
$D_P$	-0.022 (-0.16)	-0.206 (-1.41)	-0.022 (-0.07)	0.100 (0.82)
$t$	0.007 (2.21)	0.007 (2.09)	0.013 (1.47)	0.005 (1.91)
$y_{t-1}$	0.816 (10.37)	0.806 (9.39)	0.813 (10.20)	0.793 (9.80)
$\Delta y_{t-1}$	0.165 (1.17)	0.116 (0.94)	0.137 (1.04)	0.179 (1.25)
D-W	1.83	1.72	2.01	1.96

Note: The t-statistics are between parenthesis.

<sup>4</sup> Perron's (1989) conclusion for the USA is that “most macroeconomics time series are not characterized by the presence of a unit root” and that “fluctuations are indeed transitory... Only two events (shocks) have had a permanent effect on the various macroeconomic variables: the Great Crash of 1929 and the oil price shock of 1973”.



#### IV. Estimations and results for private investment

This section presents evidence on the investment determinants for Argentina in the last three decades. The usual methodology in the estimation of the investment function calls for separating private from public investment, as they usually respond to different behaviors. This paper deals only with the determinants of private investment in Argentina. Annual data of public and private investment (machinery and equipment, transport equipment, and housing) are estimated in Everhart and Sumlinski (2001) for the period 1970-2000. Private investment is calculated by the authors as the difference between total gross domestic investment and consolidated public investment (where public investment includes investment by state-owned enterprises). These series are used in the present study at constant prices.<sup>5</sup>

The other series used were GDP at constant prices, external debt as percentage of GDP, the trade liberalization coefficient (sum of exports and imports as a share of GDP, all series at constant prices), the real exchange rate (nominal exchange rate multiplied by the ratio of the producer price index of the US and the consumer price index of Argentina), the relative price of capital goods with respect to consumption goods (using investment and consumption deflators) and the inflation rate (change in CPI).<sup>6</sup> The source of all annual data on national accounts and prices is the IMF (International Financial Statistics), total credits to the private sector and the external debt come from the World Bank (World Bank Development Indicators).

Before starting with the estimation of the investment functions, it was necessary to analyze the behavior of all macroeconomic variables in order to determine their stationarity condition (to avoid spurious OLS estimates in presence of unit root series). For this purpose, ADF tests for unit root were applied to each variable used in the analysis (Table 3).<sup>7</sup> To determine the possible inclusion of a trend, and

<sup>5</sup> Everhart and Sumlinski (2001) report the public and private investment series both as a share of GDP, and as a ratio of series at current prices. To transform the data into series in level at constant prices, both variables were multiplied by the GDP at current prices and then divided by the Total Investment deflator.

<sup>6</sup> Just as in Bebczuk (1994), in this study the real interest rate is not used because throughout the twentieth century in Argentina (and especially in the last decades) successive regulatory and inflationary episodes meant that during several periods the real interest rate of the economy was negative.

<sup>7</sup> These tests are based on regressions of the following form:  $\Delta u_t = a + bt + cu_{t-1} + \sum_{i=1}^p d_i \Delta u_{t-i} + v_t$ , where  $u_t$  is the variable of interest,  $t$  is the trend, and  $p$  is the number of lags. The estimation strategy consists of a t-test for the OLS estimate of  $c$ , where the null hypothesis is that the series are I(1).

**Table 3. ADF tests. Sample: 1970-2000**

Variable	Description	ADF	Crit. Val. 5%	Lags - Trend
<i>invpr</i>	Private investment (constant \$)	-2.677	-3.584	1 - Trend
<i>gdp</i>	GDP (constant \$)	-2.005	-3.584	1 - Trend
<i>invpu</i>	Public investment (constant \$)	-2.655	-3.584	1 - Trend
<i>trade</i>	Exports + imports (% GDP)	-1.890	-2.989	1
<i>rer</i>	Real exchange rate (index)	-3.278	-2.989	1
<i>debt</i>	External debt (% GDP)	-1.386	-2.989	1
<i>credit</i>	Credit to private sector (%GDP)	-2.768	-2.989	1
<i>infl</i>	Inflation using CPI (%)	-3.822 *	-2.989	1
<i>price</i>	Relative price investment/ consumption (index)	-4.644 *	-3.596	1 - Trend

Notes: All variables in logarithms except inflation. For each variable, in the election of lags/trend the Schwarz criterion was minimized. \* Reject Unit Root at 5% level.

the optimal number of lags, the Schwarz Information Criterion (SIC) as a selection method was used.<sup>8</sup>

All the series present unit roots (at 5 % significance level), except the relative price of investment and the inflation rate. In the second stage, the order of integration of the non-stationary variables was performed, proceeding in the same way by means of ADF tests applied to series in difference based on models that minimize the SIC. All present I(1) behavior at 5% significance level, i.e., the first differences are stationary.

The next step is to estimate the long term investment function by applying the Cointegration technique of Engle and Granger (1987) to the I(1) variables.<sup>9</sup> The hypothesis of long term relationship for the variables is the following, which also includes a dummy variable that takes the value of 1 in the period of reforms (after 1991):

$$\ln invpr_t = \alpha_0 + \alpha_1 \ln gdp_t + \alpha_2 \ln invpu_t + \alpha_3 \ln trade_t + \alpha_4 \ln rer_t + \alpha_5 \ln debt_t + \alpha_6 \ln credit_t + d91_t + \varepsilon_t \quad (2)$$

<sup>8</sup> The Schwarz information criterion (SIC) minimizes  $SIC = T \log \left| \hat{\Sigma} \right| + f \log(T)$ , where  $f$  is the total number of parameters in the model,  $T$  is the number of observations, and  $\Sigma$  is the variance-covariance disturbances matrix.

<sup>9</sup> A valid alternative not explored here is to use Johansen's (1991) cointegration technique.

The results for equation (2) are shown in Table 4. Using the methodology “from general to particular”, it is concluded that private investment flows seem to be positively cointegrated with output (a long term elasticity of 2.1%) and the domestic financing opportunities (0.3%), while it is negatively cointegrated with the external debt level and the degree of trade liberalization of the economy. The cointegration model is valid since the residuals are stationary, applying ADF to the preferred specification according to the SIC approach (without trend and with one lag).

**Table 4. Private investment, Argentina 1970-2000 – Cointegration**

Variables	Final Model
$\ln gdp_t$	2.114 ** (0.16)
$\ln trade_t$	-0.254 ** (0.12)
$\ln debt_t$	-0.236 ** (0.06)
$\ln credit_t$	0.329 ** (0.10)
Constant	-15.007 ** (1.78)
Observations	31
R2	0.894
F	54.56
DFA error (1 lag)	-4.537
Crit.Val. 5%	-2.989

Notes: Standard errors between parenthesis. The general specification includes all non-stationary I(1) variables (Equation 2), results available upon request to the authors. \* Significant at 10%. \*\* Significant at 5%.

These estimates confirm most of the empirical results found in the literature: the perspectives of growth (output), profitability (trade liberalization), and viability (domestic financing, external debt level) of the economic system are the main variables that guide the investment decision in the long run. The profitability of investment that is not approached in this study by means of an interest rate seems

to be captured indirectly through the negative impact of a deep trade liberalization (sectors producing non-exportable goods).

Once the long term relationship is obtained, it is interesting to estimate a partial adjustment model (or a short term relationship) between private investment and its main determinants. The Distributed Lags (DL) specification proposes combining variables with lags of these variables, including the dependent variable. The general form of these models is the following:

$$\Delta y_t = \beta_0 + A(L)\Delta y_{t-1} + B(L)\Delta q_t + \eta_t, \quad (3)$$

where  $y_t$  represents private investment,  $q_t$  the vector of independent variables, and  $\eta_t$  the error term. In particular, the considered hypothesis of short term behavior is the following one:

$$\begin{aligned} \Delta \ln invpr_t = & \alpha_0 + \sum_{i=1}^2 \alpha_{1i} \Delta \ln invpr_{t-i} + \sum_{i=0}^1 (\alpha_{2i} \Delta \ln gdp_{t-i} \\ & + \alpha_{3i} \Delta \ln invpu_{t-i} + \alpha_{4i} \Delta \ln trade_{t-i} + \alpha_{5i} \Delta \ln rer_{t-i}) \\ & + \sum_{i=0}^1 (\alpha_{6i} \Delta \ln debt_{t-i} + \alpha_{7i} \Delta \ln credit_{t-i}) + \sum_{i=0}^2 (\alpha_{8i} \Delta \ln infl_{t-i} \\ & + \alpha_{9i} \Delta \ln price_{t-i}) + d91_t + \eta_t \end{aligned} \quad (4)$$

Using the methodology “from general to particular”, the results for the complete equation (4) and the preferred model are shown in Table 5, first column. The tests concerning the behavior of the errors  $\eta_t$  are also included. The hypothesis of serial correlation in the error term, that would lead to biased estimates due to the presence of lags of the dependent variable in the right hand side of the equation, is rejected (Breusch-Godfrey Test). Similarly, both the heteroskedasticity (Breusch-Pagan Test) and non-normality (Jarque-Bera Test) hypotheses are rejected, so the estimates are both consistent and efficient.

The preferred specification shows that there is evidence of partial adjustment in private investment in Argentina (only the first lag of the difference is significant at the 5% level). On the other hand, other variables influence the short term behavior of private investment. Output, for example, impacts with an elasticity of 2.3%, showing evidence that agrees with the accelerator hypothesis (Samuelson).

There is also evidence that supports the theory of a “crowding-out” effect of

**Table 5: First difference private investment, Argentina 1970-2000 - Distributed lags and error correction models**

Variables	Final Models	
	Distributed Lags	Error Correction
$\Delta \ln invpr_{t-1}$	-0.276 <sup>*</sup> (0.16)	
$\Delta \ln gdp_t$	2.301 <sup>**</sup> (0.41)	2.949 <sup>**</sup> (0.32)
$\Delta \ln gdp_{t-1}$	1.618 <sup>**</sup> (0.70)	
$\Delta \ln invpu_t$	-0.107 <sup>**</sup> (0.05)	-0.090 <sup>*</sup> (0.05)
$\Delta \ln trade_t$	-0.256 <sup>**</sup> (0.10)	
$\Delta \ln rer_{t-1}$	-0.151 <sup>**</sup> (0.06)	-0.126 <sup>**</sup> (0.04)
$\Delta \ln debt_{t-1}$	0.250 <sup>**</sup> (0.09)	0.167 <sup>**</sup> (0.08)
$\Delta \ln credit_t$	0.282 <sup>**</sup> (0.11)	0.133 <sup>*</sup> (0.07)
$infl_t$	0.010 <sup>**</sup> (0.00)	
$\Delta infl_t$	-0.012 <sup>**</sup> (0.01)	
$\Delta infl_{t-1}$	-0.013 <sup>**</sup> (0.00)	-0.007 <sup>**</sup> (0.00)
$\Delta \ln price_{t-1}$	0.656 <sup>**</sup> (0.19)	
$ltd_{t-1}$		-0.676 <sup>**</sup> (0.17)
Constant	-0.089 <sup>**</sup> (0.03)	-0.048 <sup>**</sup> (0.02)
Observations	29	29
R2	0.932	0.913

**Table 5: (Continued) First difference private investment, Argentina 1970-2000 - Distributed lags and error correction models**

Variables	Final Models	
	Distributed Lags	Error Correction
F	18.32	31.53
Jarque-Bera (Crit.Val. 5.99)	0.53	-
Breusch-Pagan (Crit.Val. 19.68)	5.72	-
Breusch-Godfrey (Crit.Val. 3.84)	2.08	-

Notes: Standard errors between parenthesis. The general specification for the distributed lag model includes all variables up to second lag (equation 4), results available upon request to the authors. The general specification for the error correction model includes all variables included in the final specifications of the short and long run models (equation 5), results available upon request to the authors. \* Significant at 10% level. \*\* Significant at 5% level.

the public investment (an increase of 1% reduces the private investment by 0.11%). As the cointegration model shows, in the long term this effect vanishes and there is no longer a relationship between public and private investment. This suggests that there is a sort of competition for resources between the public and the private sectors, at least in the short run.

The expected rates of return are also important determinants of private investment in the short run. The real exchange rate is significant: a devaluation (lagged one period) seems to decrease investment substantially (0.15%), as suggested by McCulloch (1989). Also inflation and its lags matter: while the immediate impact seems to stimulate investment, with time the effect seems to vanish and become negative. While the increase in trade liberalization (prominently in the nineties) seemed to have had an adverse effect on short term investment, affecting mainly the sectors most exposed to foreign competition (non-exportables), evidence that goes against the presence of an adjustment in the production process in these industries during this period. And the relative price of capital goods with respect to consumption goods is also significant (although surprisingly in the opposite direction as predicted). Besides that, in contrast to the long run evidence, in the short run a high external debt level would be signaling a good credit rating. Finally, as presumed, credit availability allows higher levels of private investment.

It is important to stress that both the short and long term results are close to those found in the study of Ribeiro and Teixeira (2001) for the Brazilian case. In that

paper, the evolution of the private investment process is analyzed for the period 1956-1996, showing a short term output elasticity of 1.42%, of 0.75% for the long run. Long term private investment is also cointegrated with credit to the private sector (0.17%). Moreover, the authors also found that the first differences of the real exchange rate (0.43%) are significant in the short run, just as is the case in the present study, and they stressed the significant impact of inflation (negatively) and credit availability (positive). These similarities suggest similar behavior in the Mercosur area.<sup>10</sup>

Finally, it is interesting to compile in a single model both the determinants of short and long term private investment. For that, an Error Correction specification can be used, taking into account the speed of adjustment to the long run trend of the series. This type of model helps to correct the potential biases in the estimation of the coefficients in models with differences that do not take into account cointegration relationships; when these long term restrictions between the variables are ignored, there could be an omitted variables bias.

The proposed specification that includes both the preferred short and long term models (only including the variables significant in both previous specifications) is the following:

$$\begin{aligned} \Delta \ln invpr_t = & \alpha_0 + \gamma ltd_{t-1} + \alpha_1 \Delta \ln invpr_{t-1} + \sum_{i=0}^1 \alpha_{2i} \Delta \ln gdp_{t-i} \cdot \\ & + \alpha_3 \Delta \ln invpu_t + \alpha_4 \Delta \ln trade_t + \alpha_5 \Delta \ln rer_{t-1} \\ & + \alpha_6 \Delta \ln debt_{t-1} + \alpha_7 \Delta \ln credit_t + \alpha_{10} infl_t \\ & + \sum_{i=0}^1 \alpha_{8i} \Delta infl_{t-i} + \alpha_9 \Delta \ln price_{t-1} + \mu_t \end{aligned} \quad (5)$$

The results of the Error Correction model (5) are presented in the second column of Table 5. The variable  $ltd_{t-1}$  is the deviation (or gap) from the long term trend in the previous period ( $ltd_{t-1} = \ln invpr_{t-1} + 15.007 - 2.114 \ln gdp_{t-1} + 0.254 \ln trade_{t-1} + 0.236 \ln debt_{t-1} - 0.329 \ln credit_{t-1}$ ) and  $\gamma$  represents the long term speed of adjustment coefficient. As can be observed, due to an increase in private investment above

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<sup>10</sup> It is important to notice that in contrast to the present study, Ribeiro and Teixeira (2001) do not find evidence of “crowding-in” or “crowding-out” effects of public investment.

the long term trend, the preferred model predicts that more than two thirds of the gap (67.6%) is closed in one year.

All the short term results remain. This “medium term” model predicts no partial adjustment of investment to the previous period, since now the model is corrected by incorporating the deviation from the long term trend. Besides, output elasticity is much bigger now (2.95% vs. 2.30%), and the same variables with the exception of trade liberalization and the relative price of investment goods are equally significant. In all the cases except output the effects are attenuated with respect to the short term coefficients. As an example, in this model it is also perceived that the “crowding-out” effect prevails over the “crowding-in”, although by a smaller amount (-0.09% vs. -0.11%) than at the short term.

## V. Final comments

This paper tries to elucidate the main characteristics of the capital accumulation process in Argentina. The results suggest a structural change in the investment trend for the last decades, starting during the last military régime (1976-1983). In spite of the turnover of the first half of the last decade, the country has not yet been able to recover the capital incorporation flows of the import substitution era (1950-1977).

Moreover, an exploration of the determinants of private investment for the last three decades reflects that the rhythm of capital accumulation from the private sector seems to have been determined mainly, in the short term, by transitory factors, both by yield (exchange rate, inflation, trade liberalization), as well as by shocks in the aggregate demand level. Controlling for other variables, the analysis shows evidence of a displacement effect (“crowding out”) coming from government investment decisions, by competing for resources that could have been utilized by the private sector.

Besides, among the factors that seem to have determined the long term growth path of the economy, the external debt level and restrictions that usually operate in the domestic credit market are found to be relevant. The poor operation of the financial credit system seems to have been an important obstacle to economic growth. On the other hand, the study presents evidence that capital incorporation from part of the private sector is intimately bound to the country’s perspectives of long-term sustainability: the debt position with the rest of the world is a variable that impacts the expectations of investors, since this usually determines the sustainability through time of the economic policies that a government undertakes.



These results are subject to traditional measurement errors, so they should be complemented by microeconomic studies of the determinants of investment at the firm level.

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