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Business Expectations and Decisions: Macroeconomic implications for Uruguay

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Abstract

This article studies the macroeconomic implications of entrepreneurial expectations for business activity, investment, and employment. It tests the hypothesis of asymmetry in agents' reaction to expectations depending on whether the existing macroeconomic context is adverse or favorable. The empirical analysis is based on time series tools for quarterly data from 1997 to 2012, and the results show that investment adjustment to equilibrium relationships is non-linear. This is quicker in adverse macroeconomic contexts, showing agents' over-reaction in the face of negative economic news in accordance with the aversion to loss hypothesis.

Key words: expectations, investment and employment, co-integration analysis, non-linearity.
JEL **Classification**: C32, D84, E32.

Introduction

Examining expectations —that is, the predictions that agents make about the future behavior of different variables— and their influence on economic dynamics is a way of approximating the nexus between micro- and macroeconomic perspectives in economic analysis. This article attempts to bring together both perspectives through an empirical study of the existing relations between businesspersons' expectations and macroeconomic aggregates (level of activity, investment, and employment) in Uruguay.

The economic literature has analyzed the link between expectations and the economic cycle from different standpoints. The idea that changes in expectations about economic activity can be important driving forces for economic fluctuations has been of particular interest in interpreting boom and recession cycles the world over in recent decades (Leduc and Sill, 2010; Mertens, 2007).

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Understanding how expectations are formed is a key factor in the study of the dynamics of the economy and has been a controversial topic in recent theoretical discussion. Nevertheless, although the theoretical literature that developed the link between expectations and the cycle is extensive, empirical approaches have not been equally so.

Some prior research for Uruguay shows that expectations possess relevant information for anticipating the evolution of economic activity, and that they have a non-linear impact on it, depending on the phase of the cycle the economy is going through. In this article, I look more deeply into the channels through which this link takes place, investigating the relationship between entrepreneurs' expectations and the direct determinants of production, investment, and employment.

In addition, I test the asymmetry hypothesis in the response to expectations in more and less favorable contexts of global economic activity. This hypothesis is founded on previous research results that delve into the dissimilar behavior of individuals in the face of good and bad news (Bowman, Minehart, and Rabin, 2999; Soroka, 2006).

The study is supported by the aggregate analysis of time series of the variables in question. It takes into account information about business expectations from the Monthly Industrial Survey by the Cámara de Industrias de Uruguay (CIU) and estimates from the National Accounts by the Banco Central de Uruguay (BCU) and the Instituto Nacional de Estadística (INE), between the third quarter of 1997 and the last quarter of 2012 (1997:Q3-2012:Q4). The empirical inquiry is based on using econometric time series tools, crossed correlations, co-integration analysis, autoregressive vector models with a linear and non-linear adjustment error-correction mechanism, and causality analysis.

The article is organized as follows: the next section presents the conceptual references framing the study, introduces the basis for the non-linearity hypothesis in the link between expectations and activity, and references the national precedents for the topic. Then, I explain the empirical methodology used, and later I present the expectations indicator the study is based on, its characterization, and preliminary identification of the links with activity, and the empirical results. Finally, I present the main conclusions and final considerations. This article is accompanied by an econometric appendix.

Expectations and economic cycle

Economic literature has delved into the study of the link between expectations and the economic cycle from different points of view. Expectations were put forward as a category of analysis by Keynes (1936) associated with business decisions; he posited that companies' employment roster is associated with the current state of expectations and of pre-existing expectations in prior periods. Later, Muth (1961) exemplified the interaction between perceptions of the future and economic activity based on the well-known spider web model. In the 1970s, Lucas (1973) introduced the hypothesis of rational expectations, showing how it operates analytically. The basic idea is that economic agents form expectations about economic variables using the real model that truly determines them.

The rational expectations hypothesis is one of the most commonly utilized suppositions in macroeconomic research, and its application has had a very important impact on the analysis of economic policy (Taylor, 2000). While it represented a key methodological advance in the study of economic problems in which agents must predict variables, different authors have questioned its implications and manifested its limitations. The recent compilation of articles dealing with this issue by Frydman and Phelps (2013) covers the timeliness of the study of macroeconomic implications of expectations under different approaches from the traditional rational-expectations approach.

Approaches linked to disciplines like psychology have proposed explanations for the anomalies not justified by rational-expectations-based models. They are based on concepts of limited rationality and learning; a large part of them are framed in what is known as behavioral economics (Kahneman and Tversky, 1979; 1984; Tversky and Kahneman, 1981, among others). From this perspective, agents' limited cognitive capacity is emphasized, thus capturing the inherent limitations in internalization and information processing. These authors explore the systematic biases among people's beliefs and choices and the optimal choices and beliefs postulated by rational-agent models. It is in this framework that the notion of aversion to loss is put forward, interpreting agents' asymmetrical behavior in the face of contradictory news or events, a form of behavior that goes unexplained by the supposed economic rationality.

More recently, the idea that expectations are key driving forces for economic fluctuations has once again begun to be current for explaining the boom and recession cycles of recent decades (Leduc and Sill, 2010; Mertens, 2007; Kurz,

Jin, and Motolese, 2003). In this framework abundant evidence exists that the news or agents' perceptions of current and future economic bases about how production will play out, are capable of generating positive correlations among the main macroeconomic variables (recently, Beaudry and Portier, 2005; 2006; previously, Fama, 1990, and Schwert, 1990, among others). In a recent study for the eurozone, D'Agostino and Mendicino (2014) found that the shocks about expectations explain the ongoing unemployment in the region resulting from the last crisis.

Several studies have underlined the relevance of the role of expectations in developing the technological innovation that mobilizes resources on macro-, meso-, and micro-levels. Authors like Borup *et al* (2006) maintain the importance of expectations as a factor that mediates in the process of developing strategies, in addition to the firm's resources, capabilities, and culture. For these reasons, these authors point to the analysis of expectations as a key element for understanding scientific and technological changes.

On the other hand, the literature of financial behavior has also investigated the dynamic of expectations and its derivations, and has shown that investors' behavior is influenced not only by calculations of returns and risks, but also by perceptions and expectations about the behavior of other investors. Outstanding among the literature that studies the behavior of financial assets is a new approach proposed by Frydman and Goldberg (2008; 2013), which they call imperfect knowledge economics (IKE). These authors propose an approach that combines the explanations of the fundamentals of economics with those provided by other aspects of the context like sociological and psychological elements. IKE models rest on the basic premise that agents (and analysts) have imperfect knowledge of the relationship between the perspectives of the real value of financial assets and the fundamental economic factors that determine them. This is the premise that allows these models to incorporate psychological considerations, at the same time that, in contrast with the majority of behavioral models in finance, they assign the main role in the explanation of asset price and risk behavior to the fundamental factors.[1]

All this literature has given rise to many articles, papers, and books. Some explain that fluctuations are fostered by expectations using models that in-

[1] Frydman *et al.* (2012) show that the IKE model can explain the high degree of persistence observed in foreign exchange markets.

trinsically consider "the spirit of capitalism," or what some authors call the intrinsic desire for accumulation (Karnizova, 2010). Others explore the implications of shocks for future expectations about productivity in a framework of limited compliance of financial contracts (Lorenzoni and Walentin, 2007; Walentin and Riksbank, 2007). Eusepi and Preston (2008) developed a theory of fluctuations caused by expectations based on learning in a context in which agents possess incomplete information about how stock markets are determined. Floden (2007) demonstrates that unbridled optimism about future productivity can generate immediate economic expansions in the framework of a neoclassical model. Li and Mehkariz (2009) present a model incorporating the creation of endogenous output linked to news about the economy's future, which accounts for positive co-movements in output, investment, and employment.

Westerhoff (2006) puts forward a modification to Samuelson's multiplier-accelerator model to explore the influence of expectations on fluctuations in economic activity. He finds that economic activity depends endogenously on agents' mood. If they are optimistic (pessimistic), production is above (below) its equilibrium value in the long term.

De Bondt and Diron (2008) analyze more specifically the effects of expectations about business profitability on aggregate investment. They find that, just like external financial costs (like the availability of internal sources of financing), these expectations play an important role in determining macroeconomic investments. Many examples of this kind can be found in the empirical literature, whose object of study are the statistics on expectations and their usefulness for predicting and detecting changes in cyclical fluctuations. Pesaran, Pierse, and Lee (1993), Rahiala and Teräsvirta (1993), Smith and McAleer (1995), Kauppi, Lassila, and Teräsvirta (1996), Öller (1990), Hanssens and Vanden Abeele (1987), Kangasniemi, Kangassalo, and Takala (2010), and Kangasniemi and Takala (2012) focus on output growth; Batchelor (1982) focuses on employment.

The relationship of consumers' expectations to the economic cycle has also been studied. Brown and Taylor (2006) delve into the determinants of individuals' financial expectations based on the United Kingdom's household survey and find that individuals' predictions are influenced both by the cycle of life and the economic cycle. They find that past optimism has a positive effect on forming expectations, as opposed to pessimism; that financial opti-

mism is inversely associated with savings, and that expectations are useful for predicting future consumption.

The asymmetrical influence of good and bad news

Political science and psychology have presented abundant empirical evidence testifying to individuals' responses to positive and negative economic information being asymmetrical, where negative information would have a much greater impact on individuals' attitudes than positive information. In economics, the concept of aversion to loss, based on persons making decisions using the subjective value of losses and profits and not the final result, suggests a similar dynamic (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981).

For example, research shows that negative information plays a more important role in electoral behavior than positive news (among others, see Aragonés, 1997; Campbell *et al.*, 1960; Kernell, 1977).[2] The individual process behind the asymmetry of the responses has been explored by psychology in the literature about the formation of impressions, documenting that in various situations, negative information has a broader impact on impressions than favorable information (Ronis and Lipinski, 1985; Singh and Teoh, 2000; Van der Pligt and Eiser, 1980; Vonk, 1993; 1996).[3] Various explanations for this behavior have been offered. Most of the work suggests that impressions are formed based on expectations and that people generally have relatively optimistic expectations, which means that the point of reference tends to be slightly positive on average. Another series of explanations suggest that the asymmetry is explained by weighted knowledge. More attention is paid to information seen as unique or new, which generally tends to be more extreme. In any case, both theories suggest that it is the average expectation about an economy (relatively favorable) that makes individuals see relatively unfavorable information, particularly when it is revealing and informative, as very negative. And therefore, they react accordingly.

Other currents emphasize the asymmetry of information in the mass media, and that the news —both economic and social (Harrington, 1989)— in the mass media tends to be more negative than positive. The predominance of

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[2] Quoted in Soroka (2006).

[3] *Ibidem*.

negative news in the media could be explained by the same theories mentioned above on the level of the individual; that is, it would be the product of the asymmetrical reaction to the information on an individual level. An alternative explanation for this imbalance between positive and negative news in the media involves the media's role in democratic institutionality, focused on identifying and monitoring problems.

Soroka (2006) explores these asymmetries in the mass media's responses to positive and negative economic changes and the public's response both to their own economy and to the coverage of economic news. In Soroka's opinion, this dynamic can be explained by the way in which public communication takes place and how policy is formulated, as well as, in general, by the public's response capabilities in representative democracies. Given the public's predisposition to overestimating the importance of negative information, the mass media anticipate and prioritize these news items. Individuals in turn respond asymmetrically to the information received, which already has a negative bias. Thus, the bias is emphasized.

In economics, prospect theory and the loss aversion concepts suggest a similar dynamic.[4] Prospect theory states that people show greater concern or shock about a loss of well-being or benefit than about gains of similar magnitude; this has been called loss aversion (Kahneman and Tversky, 1979).

Microeconomic research deals with this kind of behavior on an entrepreneurial level (Wen, 2010; Sullivan, 1997). But this individual loss-aversion behavior seems to also show up in the macroeconomic dynamic; for example, Bowman, Minehart, and Rabin (1999) show that consumption tends to fall more when the economy contracts to rise when it expands.

Holmes *et al.* (2011) extensively review the empirical literature developed within this conceptual framework, centering concretely on the studies about strategic management and organizational behavior. They review both applied research on a microeconomic level (research linked to managing human resources: motivation, remuneration) and on a macroeconomic level (mainly the analyses about organizational risk and return) and put forward a series of recommendations. Among the latter is the idea of being particularly careful in

[4] The theory says that people make decisions based on the potential value of losses and profits and not on the final result, and that agents use interesting heuristics to evaluate losses and gains.

empirical analysis when it is done on an aggregate level and in the framework of prospect theory.

Some background on Uruguay

Few research projects have dealt with the study of expectations in Uruguay, regardless of their approach, and most have focused on the analysis of expectations about inflation (Zunino, Lanzilotta, and Fernández, 2010; Lanzilotta, Fernández, and Zunino, 2008; Borraz and Gianelli, 2010). The first uses different statistical tests to explore the rationality of the predictions by the Banco Central de Uruguay's (BCU) Selective Inflation Expectations Survey among analysts. The authors find that inflationary expectations for one year ahead are non-biased, but inefficient; this implies that the analysts do not use all the information available when they construct their predictions. And this, then, supposes that the analysts' expectations do not behave according to a pattern of purely rational expectations, but that they follow a behavior pattern called "weakly rational," more compatible with the most recent models of limited rationality or learning. Lanzilotta, Fernández and Zunino (2008) got results that agree Zunino, Lanzilotta, and Fernández (2010), pointing out that in general there is a learning process from the mistakes in crafting the predictions.

For their part, Borraz and Gianelli (2010) analyze the micro-data from the inflation expectations survey of the Banco Central de Uruguay, testing agents' rationality. They conclude that there is partial use of available information and, in some cases, a systematic bias.

Based on the construction of leading indicators for Uruguayan economic activity, previous studies have dealt with the issue of the relationship between economic cycles and expectations in the country (Lanzilotta, 2006) from the macroeconomic point of view. This research showed that the expectations have an auto-regressive structure, though they also take and process information from the economic context to form them. Expectations behave pro-cyclically; that is, they move in the same direction as the macroeconomic cycle of reference. When the economic cycle is close to the peaks and valleys of activity, the positive influence (in the same direction as the cycle) of these agents' expectations is even greater. In other words, they act in a non-linear way on the level of economic activity, depending on how distant the economic cycle is from its long-term trajectory.

This article brings the focus of attention back to the relationship between business expectations and economic activity and delves into the direct impact of expectations on the dynamics of investment and employment. It tests the non-linearity hypothesis, differentiating more or less favorable macroeconomic contexts in the framework of which changes in the way the variables of employment and investment respond to expectations are tested.

Empirical methodology

The empirical strategy was based on examining crossed correlations, co-integration analysis, estimates of auto-regressive vector models with mechanisms for error correction, allowing for a non-linear or asymmetrical adjustment in them, and causality analysis. What follows is a brief explanation of these methodologies.

Correlation methodology

Correlation methodology rests upon the description of the regularities and crossed correlations as an indicator of the type of co-movement (see Badagián and Cresta, 2006). Contemporary correlation indicates if the variable in question (expectations) is pro-cyclical (if the coefficient is positive), counter-cyclical (if it is negative), or a-cyclical (if it is not significantly different from zero) with regard to another variable of interest (the economic cycle). For its part, the maximum correlation indicates the change of phase with regard to the cycle of reference: it is said that the cycle of a variable leads, synchronizes, or lags behind the cycle of reference if the coefficient reaches a maximum value for $j < 0$, $j = 0$, or $j > 0$, respectively, where j represents the order of the correlation.

Co-integration analysis, Johansen methodology, and VECM models

The co-integration analysis used here is based on the procedure proposed by Johansen (1995) and Johansen and Juselius (1989), which enables us to empirically detect the existence of co-integration relationships among n variables of interest (integrated of order 1). It makes it possible to determine the existence of r relations of co-integration, or, what is the equivalent, the existence of $n - r$ common tendencies among the n series. This analysis starts off from the specification of an auto-regressive vector error-correction model (VECM) for a vector of endogenous variables (see Harris, 1995).

$$\Delta \mathbf{X}_t = \mathbf{A}_1 \Delta \mathbf{X}_{t-1} + \ldots + \mathbf{A}_k \Delta \mathbf{X}_{t-k+1} + \Pi \mathbf{X}_{t-k} + \mu + \Gamma \mathbf{D}_t + \varepsilon_t, \; t = 1, \ldots, T \quad [1]$$

where $\varepsilon_t \sim N(0,\sigma^2)$, μ is a vector of constants, and $\mathbf{D}_t$ contains a set of dummies (seasonal and interventions).

The information about the long-term relationships is contained in the matrix $\Pi = \alpha\beta'$, where β is the vector of coefficients of the existing equilibrium relationships and α is the vector of coefficients of the mechanisms for adjusting to the long-term equilibrium. The number of co-integration relationships that exist among the variables is determined as a function of identifying the range of the matrix Π. From here is deduced, therefore, the number of common trends among these variables. If r co-integration relationships exist among the n variables considered, then, there will be $n - r$ common trends.

The co-integration analysis implies carrying out exclusion contrasts (tests for the meaning of β) in order to evaluate which variables are part of the possible equilibrium relationships and exogeneity tests to determine which variables are exogenous to those relationships. To do the latter, we carry out contrasts both for weak exogeneity (in order to determine which of the variables do not react to deviations from long-term relations) and for strong exogeneity (analyzing, in addition, causality in the Granger sense).

The contrast for weak exogeneity in the complete system implies analyzing the meaning of the α coefficients; this is done based on the likelihood ratio statistic between the restricted and non-restricted models:

$$H_j: \alpha_{ij} = 0, \; j = 1, \ldots, r$$

In cases in which there are multiple co-integration relationships, it is possible that one variable is exogenous with regard to the parameters of one cointegration relationship but not with regard to those of others. This is the case because the conditions of weak exogeneity are defined in relation to a specific co-integration vector and not in relation to the complete system.

In some cases, it is necessary to analyze the pertinence of specific restrictions on the parameters for the different co-integration relationships, such as, for example:

$$\beta_{1j} = \beta_{2j}, \text{ a homogeneity restriction}$$

The short-term dynamic that shows the mechanisms for adjusting the different variables toward long-term equilibrium is expressed through the $\mathbf{A_i}$ matrices of equation [1].

Indicators of business expectations

The use of indicators that include economic agents' opinions and attempt to shed light on their behavior is widespread internationally. They are usually used in leading indices of countries with a developed statistical base and a good number of forward-looking indicators: indices for business expectations for different sectors of activities, consumer confidence indices, investment expectations, etc. This is the case, for example, of the United Kingdom and the United States.

Business expectations are usually considered an advanced indicator of economic activity for different reasons. Businesspeople have a great deal of information about the economic conditions most directly associated with their firms, and, therefore, they can predict that economic prospects are improving or worsening before output levels rise or fall. It should be taken into account that businesspeople have information about order requests and that this supplies them with advance information about sales trends. On the other hand, their own optimism or pessimism can influence variables like investments to be made and decisions about stocks and future production and other variables relevant in determining the country's output level. Analogous reasons explain the use of consumer confidence indices as an advanced indicator of future demand.

At a local level, not many examples of studies or indicators exist that reflect the expectations of agents, consumers, businesspersons, or analysts. One of the surveys that has provided this type of information for the longest is the one carried out by the Cámara de Industrias de Uruguay (CIU), the Monthly Industrial Survey, first done in 1997.[5] In addition to showing sales and personnel employed by industrial firms, it asks about their expectations for the following six months. It looks into the evolution of the company's activity, of the branch of industry, of the foreign and domestic market, and of the economy as a whole. The expectations indicators studied in this article refer to the last group.

[5] This survey's methodology can be consulted at: <http://www.ciu.com.uy>.

Specifically, the question asked in the CIU monthly survey is, "Future Expectations. Considering the current situation, how do you think the national economy will evolve in the next six months? Your sector? And your firm?" It asks if the respondent thinks the (economic) situation will improve, worsen, or remain the same. Based on the individual answers, the CIU develops a aggregate expectations indicator (used for this article), weighting the positive answers with a +1, the negative answers with a –1, and the rest with 0. It should be pointed out that the size of the firm or the branch of industrial production is not weighted in the responses. Therefore, the industrial businesspersons' expectations indicator was built using the following calculation:

$$EI_t = \frac{\left(Num\_posit\_resp_t * (+1) + Num\_neg\_resp_t * (-1) + 0 * Num\_resp\_same_t\right)}{Number\ of\ responses\ in\ the\ month\ t}$$

Because of its construction, the economic expectations indicator takes on values between –1 and 1. Lastly, it should also be noted that the contrasts of unit roots show that the expectations indicator is a variable integrated of order 1 (it has a regular unit root). The appendix includes the results of the Augmented Dickey-Fuller contrast results.

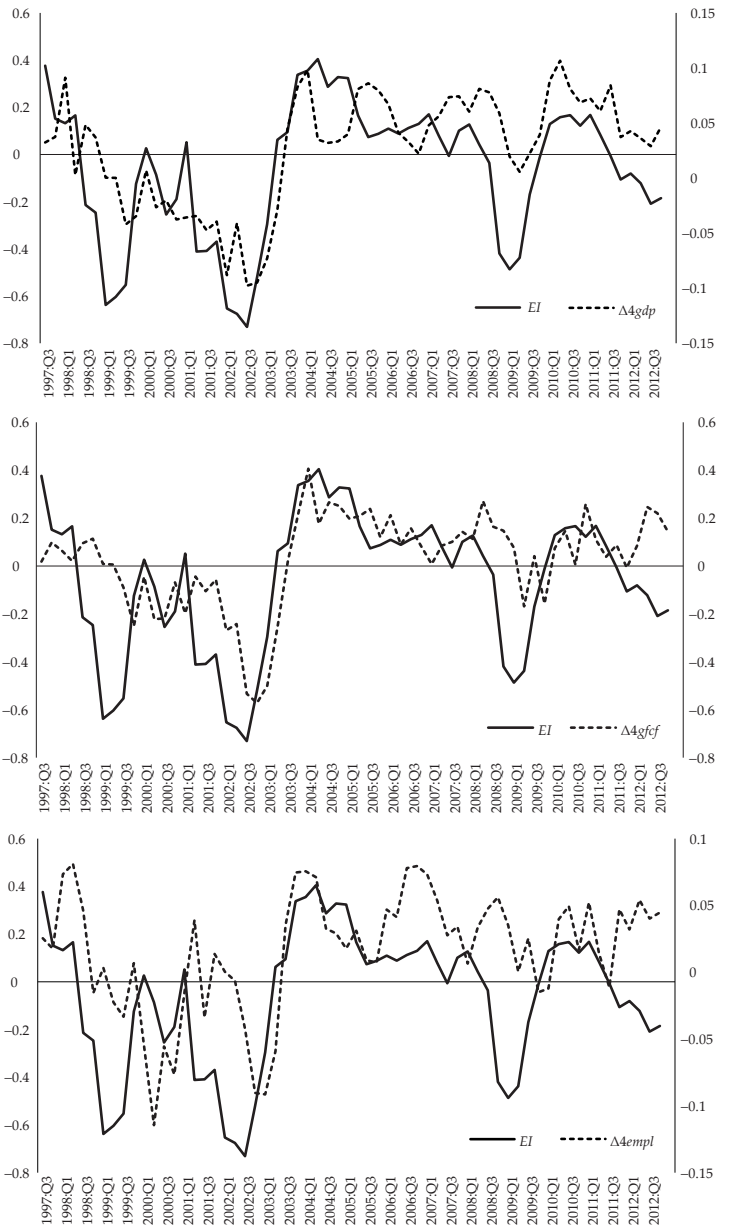
Results

The following graphs show the evolution of the aggregate expectations indicator (*EI*) between the first quarter of 1998 and the last quarter of 2012, accompanied by the inter-annual variation of the gross domestic product (GDP) (in logarithms, $\Delta_4 gdp$), of gross fixed capital formation (in logarithms, $\Delta_4 gfcf$), and of the employment rate ($\Delta_4 EMPR$). On simple observation, it is clear that the trajectory of the aggregate economic expectations indicator is strongly associated to those for inter-annual GDP growth, investment, and the employment rate.[6] We can also see that the expectations indicator in many cases forecasts the turning points that the other variables show.

[6] Also included in the appendix are the ADF contrasts about the GDP, fixed investment (GFCF), and employment rate (EMPR) series. All these show a strong seasonal pattern (clearly evidenced in the autocorrelation and partial autocorrelation functions), which is why they are included in the first seasonal difference. At the same time, both the GDP and the GFCF are taken in their logarithmic transformation.

Graph 1

Indicator of business expectations about the economy, inter-annual GDP variation, investment, and employment rate, 1997:Q3 to 2012:Q4



Source: developed by the author using data from CIU, BCU and INE.

Upon examination, cross-correlations corroborate this graphic intuition (see Table 1). According to this analysis, the expectations show a significant correlation and are ahead by at least one or two quarters of all the activity variables considered in their inter-annual growth. The highest correlations can be observed in annual investment growth, which it anticipates by two quarters. Thus, we can affirm that, as expected, the expectations indicator performs in a pro-cyclical way with regard to the growth of output, investment, and employment, forecasting their performance.

Table **1**
Cross correlations of expectations and inter-annual variations of GDP, investment, and employment rate, 1997:Q3 to 2012Q4

Variables in $t = 0$	***EI*(–*t*)**		
	Maximum correlation	*t*	*t = 0*
$\Delta_4 gdp$	0.7339	1	0.67
$\Delta_4 gfcf$	0.7579	2	0.59
$\Delta_4 empl$	0.5879	2	0.46

Note: *gdp* = log(*GDP*); *gfcf* = log(*GFCF*).
Source: estimations by the author.

Analysis of co-integration and VECM models

This first perception about the relationship between expectations and macro variables was confirmed with the co-integration analysis (in accordance with the procedure proposed by Johansen 1989 and 1995). Three vectors are specified: [$\Delta_4 gdp$, *EI*], [$\Delta_4 gfcf$, *EI*], [$\Delta_4 EMPL$, *EI*], to each of which the contrast was applied. The results showed that in all cases a co-integration relationship existed among the variables involved. The results of the contrasts are shown in the appendix. The estimated equations are shown in Table 2.

Equation [2] shows the positive association between expectations and inter-annual GDP growth. The coefficient can be interpreted as the elasticity of GDP response (its inter-annual variation) in the face of changes in entrepreneurial expectations. In this case, the adjustment mechanisms are significant for both variables. This means that both are endogenous to the relationship; that is, both can be determined by the dynamic that the equation posits. Given that the adjustment in GDP growth in the face of deviations from the long-run trend is relatively show (the coefficient α is 0.131), the adjustment in expectations is relatively swift (64% per quarter).

Table 2
Long-run equations, error-correction mechanisms (ECM), weak exogeneity contrasts, and exclusion of variables contrasts, 1997:Q3 to 2012:Q4

Equation	ECM (Weak exogeneity)		Exclusion contrasts	
	Variable 1	*Variable 2*	H_0	*Probability*
	$\Delta_4 gdp = 0.35EI + cst_{gfcf}$ (0.04149)			
[2]	$\alpha(gdp) = 0.55$	$\alpha(csme) = 0$	$\beta(gdp) = 0$	0.002***
	endogenous	exogenous	$\beta(EI) = 0$	0.000***
	$\Delta_4 gfcf = 0.734EI + cst_{gfcf}$ (0.10864)			
[3]	$\alpha(\Delta_4 gfcf) = 0.439$	$\alpha(EI) = 0$ (prob = 0.372)	$\beta(\Delta_4 gfcf) = 0$	0.001***
	endogenous	weakly endogenous	$\beta(EI) = 0$	0.000***
	$\Delta_4 empl = 0.124EI + cst_{gfcf}$ (0.03107)			
[4]	$\alpha(\Delta_4 empl) = 0.441$	$\alpha(EI) = 0$ (prob = 0.792)	$\beta(\Delta_4 empl) = 0$	0.001***
	endogenous	weakly exogenous	$\beta(EI) = 0$	0.002***

Nota: H_0: null hypothesis; *cst*: constant; *csme* = capital stock in machinery and equipment; α: error-correction coefficient (ECM); β: coefficients in co-integration equations; *gdp* = *log*(*GDP*); *gfcf* = *log*(*GFCF*). (**) and (***) rejection of H_0 at 5 and 1 percent, respectively.

The relationship of the entrepreneurial expectations with direct determinants of economic activity can be observed in equations [3] and [4]. We find that the elasticity in the response of the fixed capital investment growth rate given the changes in business expectations is higher than that of the GDP (0.73), and it cannot be ruled out (to 19%) that it is equal to one (equation [3]). In this case, the only variable determined inside this relationship is investment itself, since the error-correction mechanism of the expectations equation is null. The investment adjustment in the face of deviations from the long-run trajectory is swift (50%) in each quarter. Similar behavior is seen in the employment rate (equation [4]). The expectations act exogenously and, just as in the case of investment, the adjustment of the rate of variation in employment is relatively rapid.

The Granger causality testing was also done. This causality is not taken in the philosophical sense, but attempts to deduce which variable can forecast another. Table 3 shows the results of the causality contrasts of the expectations indicator and the variables of investment and employment variations (considered in first differences).

Table 3
Granger causality contrasts

Null Hypothesis (H_0):	*Observations*	*Statistic F*	*Probability*
EI does not cause $\Delta_4 gfcf$ in the Granger sense	58	4.7601	0.0025
$\Delta_4 gfcf$ does not cause *EI* in the Granger sense		0.6169	0.6526
EI does not cause $\Delta_4 empl$ in the Granger sense	58	3.4141	0.0154
$\Delta_4 empl$ does not cause *EI* in the Granger sense		0.4971	0.7379
Period: 1997:Q1 to 2012:Q4		4 lags	

Source: author's estimates.

The contrasts allow us to rule out the idea that expectations do not cause activity variables, at the same time that it was possible to prove that in none of these cases is there feedback. That is, it is fully accepted that neither investment nor employment growth cause the expectations.

No linearities in the short-run dynamic

The equations found show the existence of a linear relationship between activity variables and agents' expectations. It is not possible to rule out the presence of feedback between inter-annual growth of activity levels and expectations because both variables are endogenous. To the contrary, in the cases of inter-annual investment and employment variations, it was found that the determination is unidirectional, with the expectations weakly exogenous. This made it possible in some cases to go from a multi-equational to a single-equational specification to model the short-run dynamic without great loss of information. Thus, the two following equations were specified:

$$\Delta\Delta_4 gfcf_{tt} = \alpha_{gfcf}\left(\Delta_4 gfcf - 0.734\, EI_t - cst\right) + \sum_{j=1}^{4}\rho_j \Delta\Delta_4 gfcf_{t-j} + \sum_{j=1}^{4}\varphi_j \Delta EI_{j-1} + \sum_{i=1}^{4}\delta_i D_{it} \quad [5]$$

$$\Delta\Delta_4 empl_t = \alpha_{empl}\left(\Delta_4 empl_t - 0.124 EI_t - cst\right) + \sum_{j=1}^{4}\tau_j \Delta\Delta_4 empl_{t-j} + \sum_{j=1}^{4}\theta_j \Delta EI_{j-1} + \sum_{i=1}^{4}\delta_i D_{it} \quad [6]$$

where D_i are the intervention variables due to the presence of outliers in each equation.

The single-equational specifications have the advantage of facilitating the formulation of models by thresholds and carrying out the non-linearity contrasts on the error-correction coefficients, thus, proving or ruling out the hypothesis of asymmetries in the short-run adjustment of the variables in more or less favorable economic contexts.

On the basis of the results for the case of the Uruguayan economy, reviewed in Lanzilotta (2006), the macroeconomic context was represented by the cyclical phase the economic activity is going through. Two state variables are specified as a function of which the asymmetries were proven. The first, the GDP cycle (defined as a percent of the long-run trend);[7] the second, the quarterly variation of the cycle. In both cases, the threshold was established with a value of 0. In accordance with the first of the state variables, two regimes were defined. The first, when the cycle assumes positive values, corresponds to contexts in which economic activity develops above the long-term trend. The complementary state corresponds to negative or null values of the cycle and, therefore, refers to contexts in which the economy grows the same as or less than the long-run trend (this includes contractions). In accordance with the second of the state variables, the asymmetries were put forward as a function of whether the cycle was in ascending (recoveries or accelerations) or descending mode (decelerations or contractions). The states were considered as lags to rule out the endogeneity of the cycle (in $t-1$ and $t-2$).

Equations [5] and [6] were reformulated as follows:

$$\Delta\Delta_4 gfcf_t = \alpha^1_{gfcf}\left(sv^{m=1,2}(h)>0\right)cointeg\left(eq[7]\right)_t + \alpha^2_{gfcf}\left(sv^{m=1,2}(h)\le 0\right)cointeg\left(eq[7]\right)_t + \sum_{j=1}^{4}\rho_j'\Delta\Delta_4 gfcf_{t-j} + \sum_{j=1}^{4}\varphi_j'\Delta EI_{j-1} + \sum\delta_i' D_{it} \qquad [5']$$

$$\Delta\Delta_4 empl_t = \alpha^1_{empl}\left(sv^{m=1,2}(h)>0\right)cointeg\left(eq[8]\right)_t + \alpha^2_{empl}\left(sv^{m=1,2}(h)\le 0\right)cointeg\left(eq[8]\right)_t + \sum_{j=1}^{4}\tau_j'\Delta\Delta_4 empl_{t-j} + \sum_{j=1}^{4}\theta_j'\Delta EI_{j-1} + \sum\delta_i' D_{it} \qquad [6']$$

[7] The cyclical component of the GDP was estimated on the basis of structural time-series models (Harvey, 1989).

with $sv^1(h) = cy_{gdp}(h)$ and $sv^2(h) = cy_{gdp}(h) - cy_{gdp}(h-1)$, being $h = t-1$ and $t-2$, and D_i' the intervention variables for outliers in each equation and the Easter effect:[8]

$$cointeg(eq[7])_t = \Delta_4 gfcf_t - 0.734EI_t - cst_{gfcf}$$

$$cointeg(eq[8])_t = \Delta_4 empl_t - 0.124EI_t - cst_{empl}$$[9]

The results of the estimates are summarized in Table 4. In each of the equations (and states), I used the Wald test to check that the difference between the adjustment coefficients $(\alpha_1 - \alpha_2)$ was significantly different; that is, that both coefficients were significantly different from each other.[10]

Table 4
Asymmetrical behavior with regard to expectations
Wald contrasts on estimated coefficients in equations [5′] and [6′]
(considering sv_1 and sv_2, $h = t$, $t-1$ and $t-2$)

Equation, state variable (sv) and standard error of the equation (se)	***m* = *t* – 1**		**H₀: $\alpha^1 = \alpha^2$**	***m* = *t* – 2**		**H₀: $\alpha^1 = \alpha^2$**
	α^1	α^2	*(Ji-squared, probability)*	α^1	α^2	*(Ji-squared, probability)*
Equation [5′]						
sv_1: *cy_gdp*(*m*)	–0.3560	–0.4225	0.6010	–0.3700	–0.4019	0.8021
se	0.0820			0.0822		
sv_2: *cy_gdp*(*m*) – *cy_gdp*(*m* – 1)	–0.3764	–0.3837	0.9586	–0.1076	–0.4276	0.0107
se	0.0822			0.0720		
Equation [6′]						
sv_1: *cy_gdp*(*m*)	–0.4701	–0.3826	0.5783	–0.4636	–0.3901	0.6444
se	0.0244			0.0244		
sv_2: *cy_gdp*(*m*) – *cy_gdp*(*m* – 1)	–0.6173	–0.3740	0.150	–0.4828	–0.4025	0.6046
se	0.0240			0.0244		

Source: author's estimates.

With regard to the first state variable (value of the cyclical component of GDP, differentiating positive and negative phases), the hypothesis of asymmetry was

[8] In all the specifications of equation [5], outliers were included in the form of level jumps (in quarters 2000:Q3, 2002:Q3, 2002:Q4, 2003:Q4, and 2004:Q1) and the Easter effect; in equation [6], only two outliers were included (2000:Q1 and 2000:Q2).

[9] The significant lagged coefficients were ρ_1' and ρ_4' and φ_1' in equation [5]. In equation [6] only τ_4' was significant. Equal delays were considered in the specifications of both equations.

[10] Rigorously speaking, the Wald test posits equal coefficients.

rejected for both variables. That is, with regard to the cyclical position, adjustment behavior in the face of imbalances cannot be ruled out as linear, that is, symmetrical both when the cycle is above the long-run trend and when it is below it.

For the second of the state variables (the cyclical GDP variation), the existence of asymmetries in the adjustment of the investment growth rate was proved (when it is evaluated two periods behind) in the face of deviations of the long-run relationship. The adjustment was quicker when the cycle is descending, that is, in the phases of decelerating economic activity and during recessions. In these cases, the fixed capital investment growth rate adjusts very rapidly toward the trend (the investment trajectory that adjusts to expectations), in a little over two quarters. When the economic context is more favorable, the adjustment is significantly slower.

The adjustment of the investment growth rate in these cases seems to fit with what the theoreticians of behavioral economics call aversion to loss. In effect, the agents over-react in adverse macroeconomic circumstances, quickly correcting their investment decisions. In contrast, in the face of favorable circumstances, their reaction is gradual. In other words, bad macroeconomic news, misalignments in the long-run relationship between expectations and the investment dynamic, prompt rapid corrections, significantly more rapid than what happens when the cycle has an upturn, whether recoveries or cyclical speed-ups.

The short-run equation for the employment growth rate did not present asymmetries in the mechanisms for adjusting to equilibrium (which brings it in line with expectations). In contrast with investment, employment, or more precisely, its rate of variation, would not react more swiftly in the face of adverse macroeconomic circumstances, distancing itself from the hypothesis of aversion to loss.

It is to be expected that agents' investment decisions allow for relatively rapid adjustments. When faced with bad news, businesspeople adjust their expectations, and in a relatively short time, their investment decisions, in accordance with the new context, stopping or postponing planned investments. To the contrary, in a regulated labor market, downward adjustments in the face of bad news are not rapidly resolved, and even more so taking into account that the Uruguayan labor market is characterized by its relative rigidity (Forteza and Rama, 2000).

Conclusions

Prior studies for Uruguay show that the evolution of expectations provide important information for forecasting the evolution of economic activity and that they have a non-linear impact on it, depending on the cyclical phase the economy is going through. In this article, I investigate the channels through which this link takes place, studying the way in which business expectations impact growth, investment dynamics, and employment. Presented here is a brief summary of the results and some policy considerations and future lines of inquiry.

The analysis shows the importance of expectations in the growth of the factors that determine output, investment, and employment. Similar results were found by other authors such as Batchelor (1982) for the case of employment, and Bondt and Diron (2008) for the case of investment, among others. Based on estimating threshold models for the dynamic of adjustment for both relationships of equilibrium, I tested the hypothesis of the existence of asymmetrical behaviors in responses, according to the existing macroeconomic conditions. Evidence was found that the dynamic of the short-run adjustment of the equilibrium relationship between expectations and investment growth presents non-linearities. The adjustment, which is significantly more rapid in periods of deceleration or economic recession, is indicative of acceleration in agents' reactions in the face of bad economic news.

This behavior can be framed within the notion of aversion to loss formulated by Kahneman and Tsversky (1979) and documented in different empirical studies of behavioral economics. It also jibes with the results found in other disciplines (Soroka, 2006; Harrington, 1989) in studies seeking to interpret the public's reactions to good and bad news. It should be noted that a research project based on experimental games to analyze factors impacting individuals' and share capital's confidence also seem to indicate non-rational behaviors (of aversion to risk or to loss) in Uruguay (Chiara *et al.*, 2008). According to the results of this research, this individual behavior would also be visible in Uruguay's macroeconomic dynamic through investment. Bowman, Minehart, and Rabin (1999) found similar results for the Canadian, French, German, Japanese, and British economies with regard to consumption. For their part, the evidence contributed by Delis, Kouretas, and Tsoumas (2014) about the reaction of banks tightening credit at times they dub "anxious periods" could contribute to explaining businesspersons' behavior with regard to investment

during times of deceleration in economic activity.[11] Along this same line of argumentation, Liu and Wang (2014) suggest that the credit restrictions themselves not only amplify the fundamental shocks, but that they could give way to self-generated economic cycles.

The link between expectations and employment variations, by contrast, does not follow the same pattern, probably due to rigidities in the labor market that slow down the adjustment in the face of adverse conditions (see Forteza and Rama, 2000).

In summary, the results shed light on the way in which businesspeople's mood and perception of the economy's future affect or determine economic growth. They show that aggregate investment behavior seems to bring on board behaviors influenced by entrepreneurs' fear of loss, given that their evolution adjusts more rapidly to expectations when the macroeconomic climate worsens or is more adverse. The focus on the economy of imperfect knowledge (Frydman and Goldberg, 2008; 2013) contributes new elements that allow us to interpret the behavior observed.

Thus, economic cycles could include a strong endogenous component. This observation is important for policy-makers, since, if they manage to create an optimistic climate, recessions could be shortened. In this sense, economic policy's capability has a key impact on businesspersons' expectations in situations of recession or economic deceleration, on affecting their investment decisions, on avoiding unnecessary over-adjustments, and on cushioning excessive fluctuations. The government's degree of credibility and reputation will make this goal more or less feasible.

Identifying the heterogeneities in the link between expectations and production and investment depending on the sector that businesspersons belong to is one of the lines of investigation that most clearly emerge from this study.

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[11] They call moments when agents' expectations worsen although the economy is not in recession "anxious periods."

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Appendix

Table A1
Unit root contrast
Augmented Dickey-Fuller

Period: 1997:Q3-2012:Q4	*Statistical value by levels*	*Statistical value by 1st difference*
Expectations	–2.799362	–6.82859***
(*EI*)	(1 lag, with constant)	(0 lags, without a constant)
Gross domestic product (logarithms)	–2.38295	–2.646123*
(*gdp*)	(8 lags, with trend and constant)	(7 lags, with constant)
Capital stock in machinery and equipment (logarithms)	–2.365288	–0.875467
(*csme*)	(9 lags, with trend and constant)	(8 lags, with constant)
Employed (logarithms)	–1.93799	–12.18934***
(*empl*)	(0 lags, with trend and constant)	(4 lags, with constant)
Gross fixed capital formation	–2.952046	–6.586227***
($\Delta_4 gfcf = d\log(GFCF,0,4)$)	(4 lags, with constant)	(4 lags, without constant)
Employed (annual variation)	–1.346411	–7.46577***
($\Delta_4 empl = d(empl,0,4)$)	(8 lags, without constant)	(4 lags, without constant)

Note: the number of lags was determined according to the Akaike Information Criterion (AIC). (*), (**), and (***) rejection of existence of unit root at 10, 5, and 1 percent respectively.

TABLE **A2**
Co-integration contrast
Johansen procedure

Specification: variables, lags			**Trace**		**Maximum eigenvalue**	
	No. of error corrections	*Eigenvalue*	*Statistic*	*Probability*	*Statistic*	*Probability*
[$\Delta_4 gdp$, *EI*]	None	0.47493	36.899	0.0001***	35.4318	0.0001***
Lags 1-2 and 4	At least 1	0.02633	1.468	0.8792	1.4676	0.8792
Sample (adjusted): 1998:Q4-2012:Q4						
Exogenous (in differences): seasonal dummies, Easter, outliers, 1999:Q1, 1999:Q4, 2001:Q1, 2002:Q1, 2003:Q2, 2008:Q4						
[$\Delta_4 gfcf$, *EI*]	None	0.31686	31.3115	0.001**	22.86334	0.0034**
Lag 1	At least 1	0.13134	8.4481	0.0683	8.448146	0.0683
Sample (adjusted): 1998:Q4-2012:Q4						
Exogenous (in differences): Easter, 2000:Q3						
[$\Delta_4 empl$, *EI*]	None	0.2789	26.1905	0.0067**	19.9420	0.0109**
Lag 1	At least 1	0.0974	6.2484	0.1724	6.2484	0.1724
Sample (adjusted): 1998:Q4-2012:Q4						
Exogenous (in differences): 1998:Q3, 1999:Q1, 1999:Q4, 2001:Q2, 2002:Q1, 2008:Q4						

Note: (*) and (**) significance to 5 and 1 percent, respectively.