Instituto de Economía
Facultad de Ciencias Económicas y de Administración
Universidad de la República - Uruguay

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Bibiana Lanzilotta
Gabriela Mordecki
Viviana Umpiérrez

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Political economic uncertainty in a small & open economy: the case of Uruguay

Bibiana Lanzilotta[1]
Gabriela Mordecki[2]
Viviana Umpiérrez[3]

Abstract

It has been well documented by the macroeconomic literature the negative effects of economic policy instability on economic uncertainty and investment decisions. In changing environments, agents prefer to delay investment decisions in fixed capital, ultimately leading to the depression of economic activity.

Uruguay, as a small and open economy of South America, has historically faced strong external shocks. Therefore, not only local instability of economic policy affects, also international and regional ones affect macroeconomic volatility and growth.

With the objective of quantifying and analyzing uncertainty and volatility in the Uruguayan economy, we built an uncertainty composite index adapting the methodology proposed by Baker, Bloom & Davis (2015). In order to address how local and global economic policy uncertainty affects the volatility of the Uruguayan economy we include in the composite index, local and external uncertainty indicators. We represent local uncertainty by agent's divergence on expectations about the future of the exchange rate. In order to account for both, regional and global shocks, we include uncertainty indicators of the relevant economic-world for Uruguay. Empirical strategy is based on a combination of statistical methods of principal components analysis and time series techniques. We test two alternative indexes, both of them starting in January 2004.

Our results show that although both uncertainty indexes seem to be good predictors of the volatility for the whole period, they losses predictability power in the last years.

Keywords: Political economic uncertainty, volatility, principal components analysis

JEL Classification: E32, E70, C54

[1] Researcher at Instituto de Economía – FCEA – UDELAR, bibiana.lanzilotta@gmail.com
[2] Researcher at Instituto de Economía – FCEA – UDELAR, gabriela@iecon.ccee.edu.uy
[3] Researcher at Instituto de Economía – FCEA – UDELAR, vumpierrez@iecon.ccee.edu.uy

Incertidumbre de política económica en una economía pequeña y abierta: el caso de Uruguay

Bibiana Lanzilotta
Gabriela Mordecki
Viviana Umpiérrez

Resumen

La literatura macroeconómica ha documentado ampliamente los efectos negativos de la inestabilidad política tanto en la incertidumbre económica como en las decisiones de inversión. En entornos cambiantes, los agentes prefieren postergar decisiones de inversión en capital fijo conduciendo en última instancia a la reducción de la actividad económica.

Uruguay como economía pequeña y abierta de América Latina históricamente ha enfrentado fuertes shocks externos. Por lo tanto, la volatilidad macroeconómica y el crecimiento son afectados no sólo por la inestabilidad de la política económica local, sino también por la internacional y regional.

Con el objetivo de cuantificar y analizar la incertidumbre y la volatilidad de la economía uruguaya, construimos un índice compuesto de incertidumbre adaptando la metodología propuesta por Baker, Bloom & Davis (2015). Para abordar cómo la incertidumbre de la política económica local y global impacta en la volatilidad de la economía uruguaya, incluimos en el índice compuesto indicadores de incertidumbre locales y externos. Representamos la incertidumbre local por medio de la discrepancia de los agentes en relación a las expectativas del tipo de cambio futuro. Asimismo, como forma de incorporar los shocks regionales y globales, incluimos indicadores de incertidumbre del mundo económico relevante para la economía de Uruguay. La estrategia empírica se basa en una combinación de métodos estadísticos de análisis de componentes principales y de series temporales. Elaboramos dos índices alternativos, ambos a partir de enero de 2004.

Los resultados nos indican que si bien ambos índices de incertidumbre parecen ser buenos predictores de la volatilidad para todo el período, pierden capacidad de predicción en los últimos años.

Palabras clave: Incertidumbre de política económica, volatilidad, análisis de componentes principales

Código JEL: E32, E70, C54

1. Introduction

The literature on economic growth is broad and extensive about the factors that influence it and covers the issue from multiple perspectives. In this sense, much research has been done about the effect of certain policies in the economy. However, relatively little is written regarding the impact of political uncertainty on it.

Political uncertainty is associated with frequent changes in government decisions without clear direction as well as the rotation of political regimes. As a result, political, institutional and economic uncertainty can generate a situation of instability which could impact in volatility and economic growth.

For example, by the number of revolutions, coups and political assassinations per year as indicators of political instability, Barro (1991) finds a negative association between political instability with the growth of domestic product (GDP) and investment share of GDP. He states that property rights are the channel through which those variables are affected.

Alesina et al. (1996) investigated for a sample of 113 countries for the period 1950-1982 whether political stability improves economic growth or if, on the contrary, low economic growth leads to political instability. After controlling for other growth correlations, they found empirical evidence that political instability reduces growth. Indeed, in the countries with the greatest political instability, the growth rate was lower compared to those that did not. However, they did not have any conclusive evidence of causality between per capita GDP growth and political instability.

Policy uncertainty is important because it plays a role in macroeconomic fluctuations through different channels. As the environment becomes more uncertain, the agents (enterprises or individuals) will be more cautious and skeptical about making productive economic decisions such as investment and saving.

In fact, the literature points out that stability of economic policy plays a fundamental role in investment decisions. Uncertainty regarding future prices, wages and interest rates, exchange rates, trade regimes, taxes and regulatory policies are considered when evaluating investment decisions.

For example, Gulen & Ion (2016) find evidence of a negative relationship between policy uncertainty and firm-level capital investment, “being significantly stronger for firms with a higher degree of investment irreversibility and for firms that are more dependent on government spending” (Gulen & Ion, 2016). This support the view that in a changing environment, companies would prefer to wait for changes to settle before making important investment decisions in fixed capital, ultimately leading to the depression of economic activity.

To a similar conclusion arrive Guiso & Pariggi (2016) when analyzing the effects of uncertainty on the investment decisions of a sample of 549 Italian manufacturing firms. While there may be ambiguity in the impact of uncertainty on investment decisions (depending on assumptions regarding production technology, competition in product markets, the shape of adjustment costs and management's attitudes to risk, among others) the evidence suggests that “it is stronger for companies that cannot easily reverse investment decisions and for those with substantial market power” (Guiso & Pariggi, 2016).

The fact that capital is specific to the company or industry and that does not allow it to be reconverted for another company or a different industry, makes the decision to invest even more expensive due to the cost of "undoing" the investment.

In this regard, Pindyck (1991) argues that the Net Present Value criterion for investment decision making is incorrect "when investments are irreversible and the decision to invest can be postponed". As consequence, investors in an uncertain environment where predominates the lack of confidence and skepticism about the stability of economic policies prefer to wait before deciding, negatively affecting economic activity.

Taking into account the above and in order to anticipate future instability of the economy, it is important to have an indicator that measures uncertainty. One stylized fact that arises from various works linked to the subject is that in periods of greater uncertainty there are more discrepancies among professional forecasters. Moreover, in periods of economic downturn, the diversity of forecasts is even greater (Bloom, 2014; Ferderer, 1993). About this, Bloom states that recessions are rare events where politicians are tempted to experiment raising economic policy uncertainty and, therefore, forecasting is harder because people are unfamiliar with them. The underlying assumption is that the lack of predictability and large divergence among forecasters are signs of increased economic uncertainty.

Uruguay is a small and open economy, located between two large neighbors: Brazil and Argentina. Historically they strongly influenced Uruguayan economy, and the GDP of the three countries was closely related (see Lanzilotta et al., 2003 or Voelker, 2004), and regional shocks had a great influence on Uruguayan economy. Nevertheless, more recent works (Sosa, 2010) show that Uruguay is less vulnerable to regional volatility. Recently, The Economist (2018) highlighted in an article the positive economic performance of Uruguay in recent years, despite the fact that its two neighbors registered a drop in their economies.

This paper addresses the question of how international and local economic policy uncertainty impact on the volatility of the Uruguayan economy. In other words, to what extent can we anticipate the volatility of an economy like Uruguay's based on a composed index of external and local factors of economic policy uncertainty.

2. Background

There is a broad economic literature that studies the impact of political uncertainty on the economy, and vice versa. There is also extensive literature that pursues the objective of constructing an uncertainty indicator that allows anticipating the volatility of the economy. Indeed, this literature arises from the international crisis that began in the last years of the last decade. For example, in the website "Economic Policy Uncertainty"[4], we can find some Economic Policy Uncertainty (EPU) indexes for several countries, and studies as Arbatli et al. (2017) for Japan economy, or Baker, Bloom & Davies (2012), where they study if economic policy uncertainty obstructed economic recovery after the 2007-2008 financial crisis. They found that policy uncertainty was remarkably high after 2008, but they could not conclude that this fact caused the slowing of recovery, due to the diffoiculty of establishing what caused what.

There is no single universal measure of uncertainty, but proxies including volatility related to stock market returns, forecaster disagreement, or discrepancy among expectations of corporate earnings over time collected in surveys.

However, in recent years a new empirical line has emerged to measure the uncertainty calculated based on the frequency of mentions of the word "uncertainty" in the written press.

Specifically, the work of Baker, Bloom & Davis (2015) constructs an index of Economic Policy Uncertainty (EPU) for the United States, and this indicator has been replicated for 20 countries applying the same methodology.[5] Also, this calculation methodology is being taken as a starting point for works related to the subject.

The idea behind the EPU index is to capture the issues that prevail daily in the press and that, as a result, reach the readers leading to a general feeling about the most relevant issues and that concern people.

By automated searching of the digital archives of the main newspapers, the EPU index reflects the monthly relative frequency of own-country newspaper articles that contain a trio of terms pertaining to the economy (E), policy (P) and uncertainty (U). In order to control for the changing volume of news throughout time, they scale the raw count by the total number of articles in the same newspaper and month. Then, for each newspaper, they normalize the monthly series of scaled counts to unit standard deviation over time. Finally, standardized series are averaged, scaled counts across the newspapers by month with the objective to calculate the monthly EPU index.[6] The methodology for the EPU indexes used in this work is summarized in Figure A.1 - EPU Index Methodology in the Annex.

Additionally, with the national index computed a Global Index of Economic Policy Uncertainty (GEPU) is constructed by the GDP-weighted average of national EPU indexes for 19 countries that represent two-thirds of global output.[7]

"Fundação Getulio Vargas" (FGV) of Brazil made a similar index named "Indicador de Incerteza da Economia Brasil" (2016) which is a composite index that includes three indicators: a media-related component based on the frequency of news reports mentioning "uncertainty"; a

[4] http://www.policyuncertainty.com/ visited in May, 2018.

[5] Currently the countries which this index has been replicated are: Australia, Canada, China, France, Hong Kong, Ireland, Japan, Mexico, Russia, Spain, UK, Brazil, Chile Germany, India, Italy, Korea, Netherlands, Singapore, Sweden.

[6] For more information about the methodology see Davis (2016).

[7] Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States.

component related to firms expectations linked to exchange rate and inflation rate and a final factor based on financial market volatility. They compound those three measures in one indicator with the aim of minimizing the impact that each factor can have on an individual basis.

Furthermore, the KOF Swiss Economic Institute as part of a project promoted by the Swiss National Science Foundation currently is developing a measure of uncertainty indicator for Switzerland based on EPU methodology named "News Economic Policy Uncertainty" which nowadays is in a test phase.[8]

In a similar way, Bontempi et al. (2016) estimate another uncertainty indicator (GT) based on internet searches. The authors replace press word count with the idea of how internet users explicitly manifest their uncertainty by searching particular words with a certain frequency.

They assume the greater the uncertainty, the greater the concrete need to look for the specific event or issue of interest that is perceived as relevant by individuals. The information was obtained through Search Volume Index provided by Google, which is an index of Google queries since 2004. The comparative analysis between the GT and the written press uncertainty measures carried out by the authors' shows a trend of GT to either lead or lag the news-based uncertainty. This indicates that there may be room for internet search activity as a useful complement to other uncertainty indicators.

Ferderer (1993) seeks to measure the impact of economic uncertainty on investment. For this, as an indicator of uncertainty, he takes the difference in the forecasts made by the experts participating in the monthly survey led by Blue Chip Economic Indicators. He focused on the forecast discord of five different variables: the industrial production growth rate, the unemployment rate, short-term interest rate, long-term interest rate and inflation rate. His main conclusion is time-varying uncertainty plays an important role in the investment process.

At micro fundament level, Bachmann et al. (2016) construct a measure of time-varying uncertainty from business surveys using monthly data sets from Germany and United States that cover manufacturing sector managers expectations and business conditions. The idea behind the use of this type of survey is that through these surveys it is possible to capture the uncertainty from decisions makers. They estimate the uncertainty of the business environment through the transversal dispersion of forecast errors.

Bloom et al. (2017) make an estimation of uncertainty using data from the Census Bureau's 2015 Management and Organizational Practices Survey which surveys 35.000 manufacturing plants in issues related to future outcomes and probabilities of shipments, employment, capital and material expenditures. They compute a measure of subjective uncertainty, which found significantly correlated with commonly used business uncertainty indicators like stock market volatility and divergence in forecasts.

[8] The index is based on articles from 5 Swiss newspaper: https://www.kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-uncertainty-indicator.html

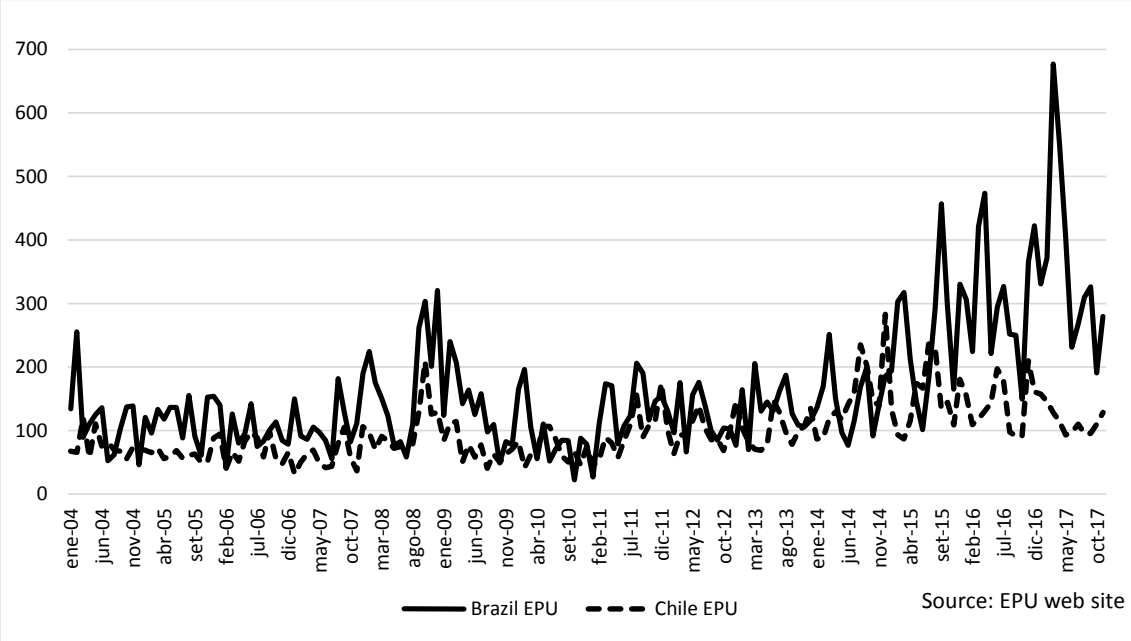
3. The Data

With the objective of analyzing volatility in the Uruguayan economy through international economic policy uncertainty, we will construct a composite index based on the Economic Policy Uncertainty (EPU) Index developed by Baker, Bloom & Davis (2015) previously mentioned.

As a first approach, to test the sensibility of the index, taking advantage of the geographical position of Uruguay, in this paper we work with the EPU indexes for Brazil, Chile and Global EPU (GEPU: current-price GDP measures) which may reflect the impact of regional as well as global shocks that the Uruguayan economy receives.[9] The choice of these two countries was based on the following reasons. On one hand, Brazil is one of the main destinations of Uruguayan exports[10] and is the biggest economy of the MERCOSUR.[11] In the other hand, Chile is a small economy open to international trade, exporting mainly commodities. All of these conditions - very similar to those of Uruguay- make this country sensitive to the impacts of external shocks analogous to those that may affect Uruguay[12].

Figure 1 presents the evolution of these two indexes.

Figure 1. Brazil and Chile EPU Indexes



For the case of Uruguay, which is a small and open economy, mainly exporting commodities, price taker of the international markets and with a flexible exchange rate system since 2002, a

[9] We are nowadays working in developing the EPU-Uruguay by applying machine-learning techniques.
[10] Brazil was the main Uruguayan exports destination until 2015, and from that year it went to second place, displaced by China.
[11] MERCOSUR is the widest integration process of Latin America, and it is integrated with Argentina, Brazil, Paraguay, and Uruguay.
[12] Although those indexes were the selected EPUs in the developing of the research, we work with a broad number of them.

good approximation of internal economic uncertainty is to consider the deviations of the forecast about the future of the exchange rate.

Regarding expert forecasts, the Central Bank of Uruguay has been carrying out a monthly survey of economic expectations since 2004 (for the exchange rate data is collected since 2005). The objective of this survey is to oversee the evolution of market expectations in relation to the main macroeconomic variables, as a way of complementing the information available for the design of monetary policy. Estimates are compiled from several reference institutions and independent professionals in the country.

In order to measure the divergences between forecasters, we use the standard deviation of the expected exchange rate for the next 12 months (12 mm) of the analyst forecast who participate in the aforementioned survey. According to the mentioned above, it is foreseeing that in periods of greater economic uncertainty, the standard deviation of exchange rate expectations will be larger (see Figure 2).

Figure 2. Standard Deviation of 12 mm Exchange Rate Forecasts

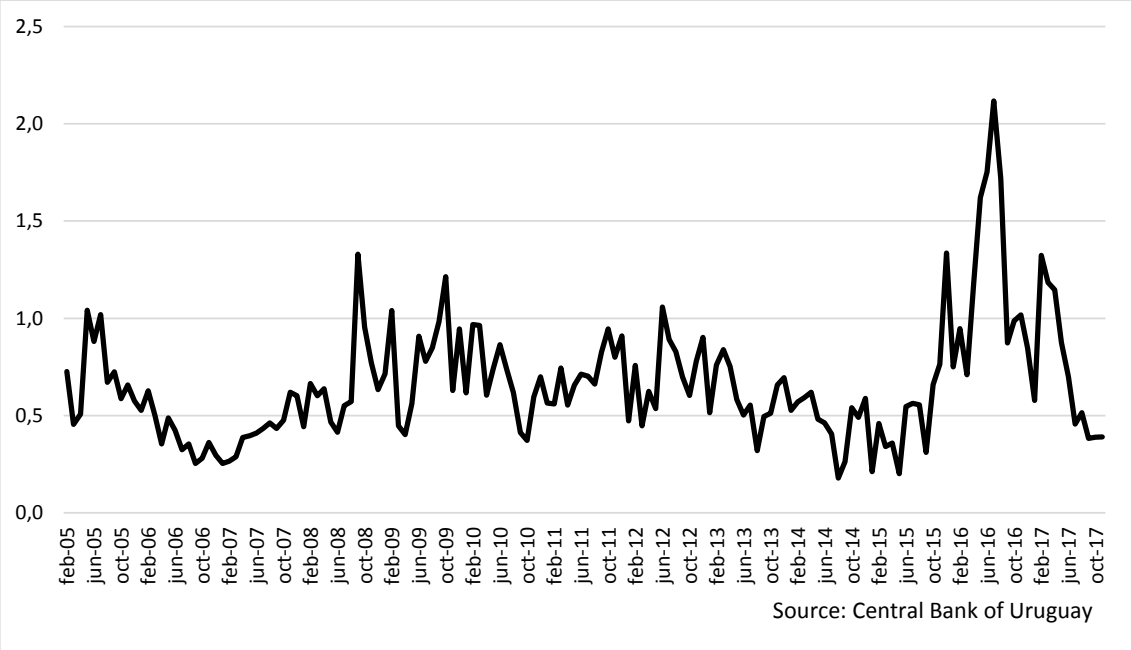
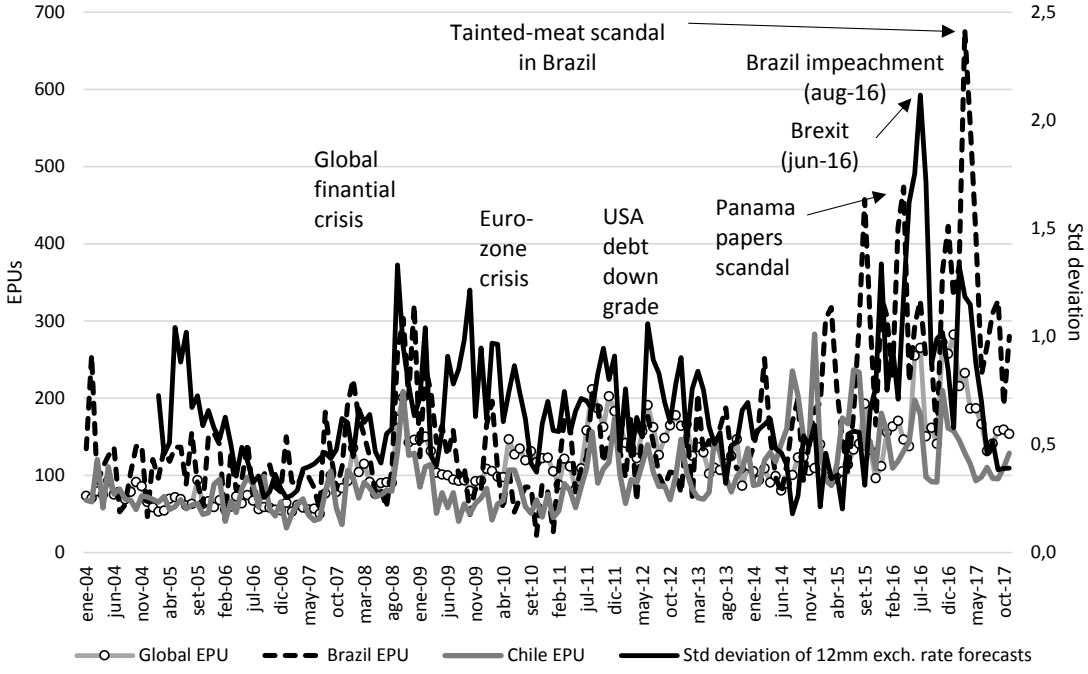


Figure 3 represents the evolution of Brazil, Chile, and Global EPUs, with the path of the standard deviation of exchange rate forecasts in Central Bank of Uruguay expert survey. As it can be appreciated, there´s a similar fluctuation between the EPUs of Brazil and Chile and the standard deviation of the forecasts of the exchange rate 12 mm collected by the Central Bank of Uruguay. The graph indicates that all the series move closely together, with only some exceptions. It stands out is the relative co-movement with the events that took place in the United States where we highlight the bankruptcy of Lehman Brothers, the financial bubble crisis, the U.S. debt downgrade, among the most important.

Figure 3. Brazil, Chile and Global EPUs, and Standard Deviation of 12 mm Exchange Rate Forecasts in Central Bank of Uruguay survey



Source: EPU web site and Central Bank of Uruguay

There were also other episodes that had an impact on the uncertainty of global economic policy, and consequently, on the diversity of forecasts about the exchange rate evolution. Related to them we highlight the global financial crisis, the Panama papers, and the Brexit.

It is important to note that at the regional level, the Dilma Rousseff impeachment stands out, which maximized the uncertainty of the future evolution of the exchange rate measured through the standard deviation. An "overshooting" is observed between the exchange rate forecast and the EPUs series.

Indeed, as was foregoing, there are two events that decouple this evolution, which are related to specific events in Uruguay. The first one is on April-June 2005 with the beginning of the first left-wing Government in the country's history. In those first months of the new Government, the uncertainty linked to economic policy and the first steps of the national government was high. The second event also has to do with electoral issues and goes back to the Presidential Election of November 2009, where the two candidates presented diametrically opposed visions of the policies to be implemented in Uruguay. This was boosted because one of the candidates was seen as representing the continuity of neo-liberal policies that took place in the 90s, while the other was a former guerrilla fighter who was not entirely clear if he would apply a center-left policy or totally left, increasing local policy uncertainty in either scenario which was reflected in the deviation of forecasts of the exchange rate.

Additionally, we analyzed the correlation between the standard deviation of 12 mm expected exchange rate and each EPU index, including Brazil, Chile and Global EPUs (Table 1). We found that there is a significant correlation value between the standard deviation of the expected exchange rate, the Global EPU and the EPUs from Brazil and Chile, suggesting that in relation to the economic cycle they are all pro-cyclical. In other terms, this implies that the greater the economic policy uncertainty (measured through the EPUs) the greater the deviation of the

expected exchange rate, indicating more discrepancies among the forecasts of the Uruguayan economy, showing increasing local uncertainty (see Table 2).

Table 1. Cross Correlation between Std. Deviation of 12 mm Expected Exchange Rate and EPUs

X Variable	Cross Correlation between Std. Deviation of Expected Exchange Rate 12 mm and X Variable in:												
	(t-12)	(t-11)	(t-10)	(t-9)	(t-8)	(t-7)	(t-6)	(t-5)	(t-4)	(t-3)	(t-2)	(t-1)	(t)
EPU Global	0,11	0,14	0,22	0,23	**0,30**	**0,50**	**0,50**	**0,47**	**0,44**	**0,43**	**0,44**	**0,51**	**0,50**
EPU USA	0,11	0,15	0,12	0,18	0,19	**0,31**	**0,35**	**0,31**	0,28	0,26	0,24	**0,34**	**0,37**
EPU China	0,12	0,20	0,25	**0,33**	**0,40**	**0,52**	**0,49**	**0,48**	**0,43**	**0,43**	**0,43**	**0,47**	**0,44**
EPU Brazil	0,09	0,15	0,23	**0,31**	**0,30**	0,28	0,25	0,29	0,28	0,27	0,26	**0,38**	**0,36**
EPU Chile	-0,07	-0,11	-0,09	-0,05	0,03	0,09	0,13	0,10	0,04	0,02	0,03	0,17	0,20
EPUC Chile	-0,08	-0,13	-0,12	-0,09	-0,06	0,00	0,04	0,06	0,01	0,01	0,04	0,16	0,19
Bovespa	-0,18	-0,20	-0,19	-0,18	-0,19	-0,20	-0,21	-0,22	-0,22	-0,23	-0,24	-0,25	-0,23
Risk Country	-0,08	-0,07	-0,06	-0,04	-0,01	0,02	0,03	0,04	0,07	0,13	0,17	0,18	0,17
X Variable	**Cross Correlation between Std. Deviation of Expected Exchange Rate 12 mm and X Variable in:**												
	(t)	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)	(t+9)	(t+10)	(t+11)	(t+12)
EPU Global	**0,50**	**0,51**	**0,42**	**0,40**	**0,34**	**0,30**	0,22	0,22	0,27	0,29	0,30	0,28	0,24
EPU USA	**0,37**	**0,35**	0,27	0,26	0,26	0,22	0,16	0,13	0,21	0,24	0,25	0,25	0,23
EPU China	**0,44**	**0,47**	**0,42**	**0,40**	**0,32**	**0,31**	0,22	0,22	0,22	0,25	0,26	0,25	0,17
EPU Brazil	**0,36**	**0,35**	**0,34**	**0,37**	**0,31**	0,21	0,18	0,25	**0,31**	**0,33**	**0,37**	**0,31**	0,23
EPU Chile	0,20	0,14	0,15	0,15	0,16	0,13	0,16	0,19	0,19	0,21	**0,31**	**0,39**	**0,45**
EPUC Chile	0,19	0,09	0,13	0,13	0,16	0,12	0,18	0,20	0,19	0,19	**0,30**	**0,35**	**0,43**
Bovespa	-0,23	-0,22	-0,20	-0,19	-0,16	-0,16	-0,18	-0,18	-0,18	-0,17	-0,16	-0,15	-0,11
Risk Country	0,17	0,16	0,17	0,17	0,15	0,14	0,17	0,17	0,17	0,17	0,16	0,11	0,05

Source: Authors' calculations

Table 2. Patterns of Correlations Std. Deviation of 12 mm Expected Exchange Rate

X Variable	Patterns of Correlations Expected Exchange Rate 12 mm				
	Comovement	Phase Change	Correlation Value		
			Contemporary t=0	Maximun value	t
EPU Global	Pro-cyclical	Lag	0,50	0,51	-1
EPU USA	Pro-cyclical	Lead	0,37	0,37	0
EPU China	Pro-cyclical	Lag	0,44	0,52	-7
EPU Brazil	Pro-cyclical	Lag	0,36	0,38	-1
EPU Chile	Pro-cyclical	Lead	0,20	0,43	12
EPUC Chile	Pro-cyclical	Lead	0,19	0,42	12
Bovespa	Counter-cyclical	Lag	-0,23	-0,25	-1
Risk Country	Pro-cyclical	Lead	0,17	0,17	8

Source: Authors' calculations

4. Main Results

To build the uncertainty index for Uruguay (from Jan-04 to Dec-17), we apply two alternatives. For the first one, we weighted each factor with the estimated explained variance that arises from a Principal Component Analysis (PCA). The PCA allows us to optimally represent in a space of small dimension, observations of a general n-dimensional space, while transforming the original variables, in general correlated, into new unrelated variables (Peña, 2002). To apply this technique, the variables must be standardized, since they are expressed in different units. The full estimates of PCA are included in the Annex.

The second alternative applied to calculate a second synthetic index was to assign an equal weight to each variable, that is, 1/4 for each one. The underlying idea is to compare both methodologies to ensure that the results obtained by independent methods do not vary significantly.

The uncertainty index obtained when applying PCA method (CPU index) results in the following equation:

$$CPUt = 0.207 * DS.E(\Delta ER)t + 0.291 * GEPUt + 0.266 * EPU_{BRAZIL}t + 0.237 * EPU_{CHILE}t \quad (1)$$

where DS.E(ΔER) represents the standard deviation of the expected exchange rate, GEPU represents the Global EPU, and EPU_{BRAZIL} and EPU_{CHILE}, represents the uncertainty index of each country.

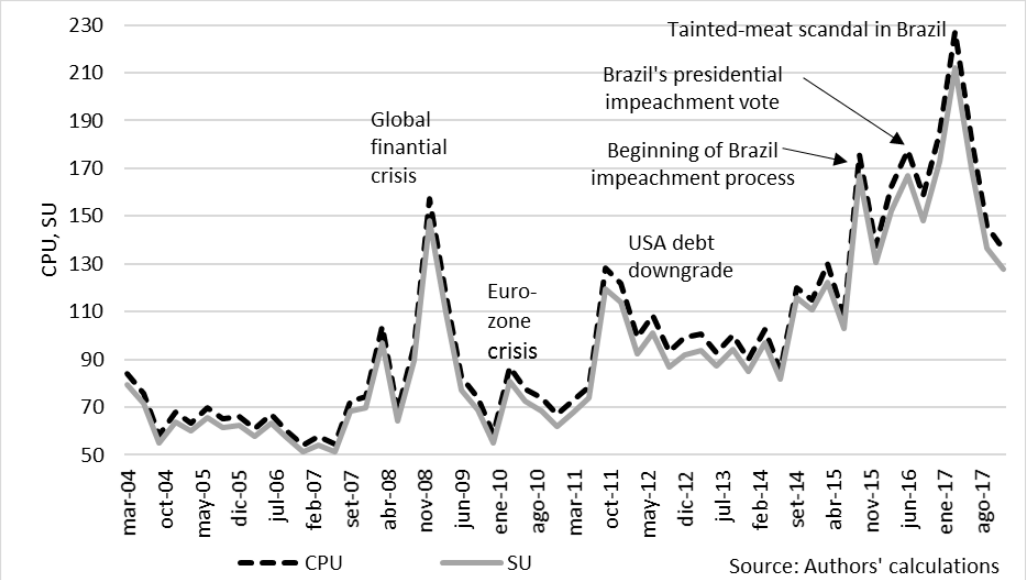
As we explained above, we also compute a second synthetic index (SU) assigning a simple weight to each variable (1/4 for each one). The uncertainty index obtained by applying this simple method results in equation (2):

$$SUt = 0.25 * DS.E(\Delta ER)t + 0.25 * GEPUt + 0.25 * EPU_{BRAZIL}t + 0.25 * EPU_{CHILE}t \quad (2)$$

As can be noted, the second index (SU index) assigns more weight to the internal variable, the standard deviation of the expected exchange rate, in comparison with CPU index. Figure 4 shows both indexes, which have a really similar evolution.

The main events shown in these indexes are similar to the ones in the EPUs, as the global financial crisis, in September 2008, with minor importance the Euro-zone crisis in March 2010, the United States downgrade of their debt rating in August 2001. From 2014 onwards, there is an increase in the value of the uncertainty indexes, dominated by Brazil's events. The most important are the beginning of the presidential impeachment process in December 2015, the impeachment vote in the Senate, in May 2016, and finally, in March 2017 the tainted-meat scandal.

Figure 4. Uruguayan Composite Indexes (CPU and SU)



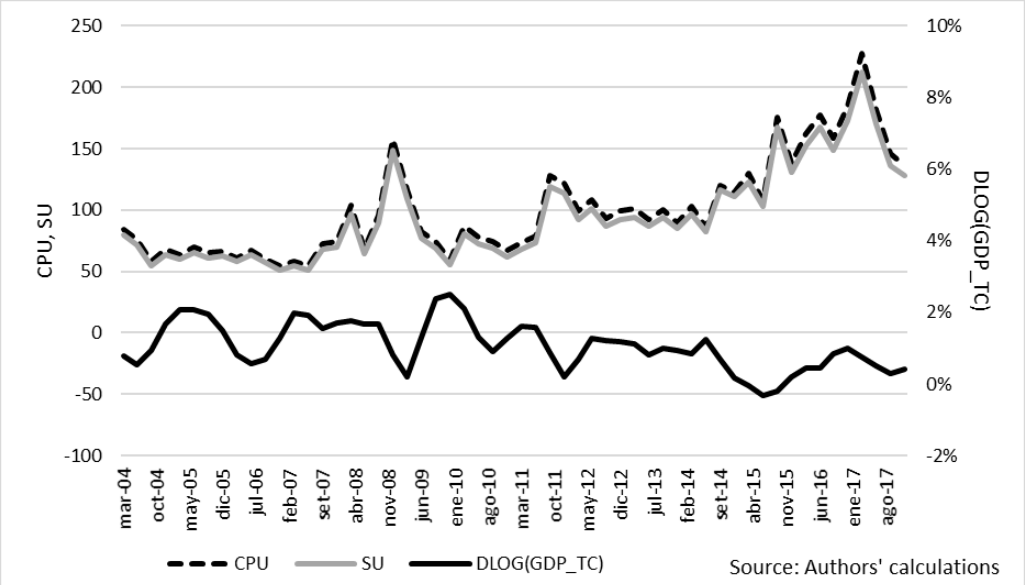
In what extent these indexes can anticipate Uruguayan macroeconomic fluctuations? To asses this issue we first compute macroeconomic fluctuations by the first difference of GDP trend-cycle (Δ_{gdp_tc}) as is shown in equation (3).[13]

$$\Delta_{gdp\_tc_t} = \log(GDP\_TC_t) - \log(GDP\_TC_{t-1}) \qquad (3)$$

As can be noticed in Figure 5, that the indexes and the variation of GDP Trend-cycle (Δ_{gdp_tc}) have almost an opposite behavior in the period.

[13] The Trend-Cycle component was estimated with Tramo-Seats procedure (Gomez & Maravall, 1996).

Figure 5. Uruguayan Composite Indexes (CPU and SU) compared with GDP changes



The bivariate cross-correlation between uncertainty indexes and GDP trend cycle quarterly change show that the most relevant correlation takes place when is evaluated in period t for each index and in t+1 for (Δ_{gdp_tc}) (correlation values are -0.60 for CPU and -0.61 for SU). This evidence suggests that both indexes anticipate in 1 quarter the evolution of GDP trend-cycle. Additionally, contemporaneous cross-correlation is also significant in both cases (the values are 0.58 for CPU and 0.59 for SU) (see Annex).

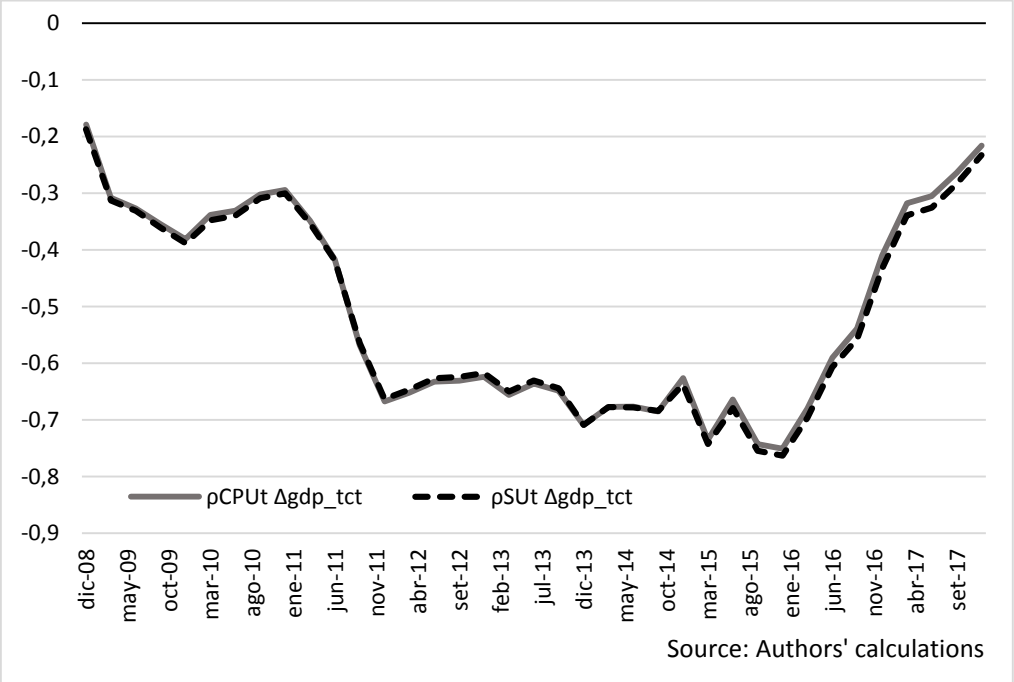
It can be noticed that the opposite pattern shown by uncertainty indexes and GDP does not seem to remain throughout the whole period (Figure 6). In order to statistically test if the pattern of co-movements varies, we run rolling cross-correlation considering moving windows of 20 quarters starting in 2004.01-2008.04 and moving on a period ahead up to 2013.01-2017.04. Equations 4 and 5 define the procedure.

$$\rho_{ij}^{CPU\ \Delta gdp\_trd} = \rho^{CPU\ \Delta gdp_{trd}+j}, \text{evaluated for period i-20 to i and for j=0,1} \quad (4)$$

$$\rho_{ij}^{SU\ \Delta gdp\_trd} = \rho^{SU\ \Delta gdp_{trd}+j}, \text{ evaluated for period i-20 to i and for j=0,1} \quad (5)$$

The results show that the correlation values vary throughout the period analyzed. Figure 6 shows the results of the contemporary correlation (j=0). Results for j=1 are quite similar.

Figure 6. Cross Correlations between GDP change with CPU and SU



Note that during the whole period, correlation values are negative. However, at the beginning and at the end of the period, the values appear to become non-significant (less than 0.3 in absolute terms).

Nevertheless, the fact that the correlation is weak in part of the period, can point out that the composite indexes are not sufficiently stable. It is, even more, worrying the trend shown in the last years.

5. Conclusions

The aim of this paper is to provide a starting point for the analysis of uncertainty in Uruguay, and its impact on the Uruguayan economy, mainly on the GDP. Much work remains to be done on this issue.

With this objective we built an uncertainty composite index adapting the methodology proposed by Baker, Bloom & Davis (2015), including as its components, local and external uncertainty indicators. We represent local uncertainty by agent's divergence on expectations about the future of the exchange rate, measured by the standard deviation of the 12 months expectations of exchange rate value, in Central Bank of Uruguay survey. In order to account for regional and global shocks, we consider uncertainty indicators of Latin-American countries (Brazil and Chile) and the Global EPU.

Based on a combination of statistical methods of principal components analysis and time series techniques, we selected the components of the indexes and built two alternatives. Both indexes begin in January 2004 and include Brazil, Chile and Global EPUs, and the 12 months standard deviation of exchange rate divergence in Central Bank of Uruguay survey. The difference between them is the weights considered building the index. The CPU index is weighted using the result of the PCA method. The second one, SU, results in giving an equal weight to each component.

Trough cross-correlations between GDP change with CPU and SU indexes, considering moving windows of 20 quarters, we found that both indexes prove to be good predictors of the local GDP fluctuations and performance when the whole period is analyzed. However, both of them losses predictability power in the last years. This suggests that the Uruguayan economy seems to have changed in the last years, and the sources of uncertainty that affected the economy in the past appear to have lost significance.

One possible explanation for this change is the decoupling of the Uruguayan economy from the main transmission channels of its main Mercosur partners. On a trade basis, in recent years Uruguay has diversified its export market exporting to around 150 countries, increasing the weight of China (from 5% in 2001 to 28% in 2017). Meanwhile, the linkages with Brazil and Argentina have decreased their share to 19% in 2017 from 37% in 2001 (Uruguay XXI, 2017). This would also explain the significant cross-correlation between the standard deviation of the expected exchange rate and the EPU for China.

However, in spite of this evolution the country remains dependent from Argentina mainly due to tourism and FDI. As mentioned at S&P Ratings (2018), Argentinian tourists represent over 60% of total tourist expenditures in Uruguay, while Foreign Direct Investment (FDI) flows from Argentina represent over 29% of total FDI. According to IMF one percentage point growth reduction in Argentina could still reduce Uruguay's growth by almost 0.4 percentage point (IMF, Country Report No. 16/63, 2016).

Besides, in relation to the financial system, in 2001 47% of deposits in the Uruguayan banking system belonged to non-residents (mainly from Argentina) which fell to 20% at the end of 2002 as a result of the financial crisis. In 2017 non-residents deposits account for 14% of total deposits, the lowest participation recorded since 1998 (web

data available). This change is due to the regulations of bank system post 2002 crisis and in the last year it is also related to information exchange between tax agencies that began in early 2018 but it was announced in 2017.
Finally but not least, legal and institutional stability in Uruguay together with the maintenance of the investment grade it favors the business climate, attracting foreign capital inflows outside the region through FDI.

New research efforts must be done in order to build an EPU index for Uruguay that adequately captures the new external and internal sources of volatility and uncertainty of the Uruguayan economy.

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7. Annex

EPU Index				
Country	**Period**	**Newspaper Covered**	**Index Construction**	**Methodology**
Global	January 1997 - Present	n/a	Is a GDP-weighted average of national EPU indices for 19 countries: Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. Each national EPU index reflects the relative frequency of own-country newspaper articles that contain a set of terms pertaining to the economy (E), policy (P) and uncertainty (U). In summary, each monthly national EPU index value is proportional to the share of own-country newspaper articles that discuss economic policy uncertainty in that month	The Global Economic Policy Uncertainty Index (GEPU) is constructed by normalizing each national EPU index to a mean of 100 from 1997 (or first year) to 2015. Second, they impute missing values for Australia, India, the Netherlands and Spain using a regression-based method. This step yields a balanced panel of monthly EPU index values for 18 countries from January 1997 onwards. Third, they compute the GEPU Index value for each month as the GDP-weighted average of the 18 national EPU index values, using GDP data from the IMF's World Economic Outlook Database.
USA	January 1985 - Present	10 large newspapers: USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the Houston Chronicle, and the Wall Street Journal.	EPU Index includes articules containing at least one of the terms 'uncertainty' or 'uncertain', at least one ot the terms 'economic' or 'economy' and one or more of the following terms: 'congress', 'legislation', 'white house', 'regulation', 'federal reserve', or 'deficit'. In other words, to meet the criteria for inclusion the article must have terms in all three categories pertaining to uncertainty, the economy and policy.	An automated search of each paper for terms related to economic and policy uncertainty and counting the number of articles containing terms related to uncertainty. To deal with changes over time in the volume of articles for a given paper, they divide the raw count of policy uncertainty articles by the total number of articles in the same paper and month, normalizing the resulting series for each paper to have a unit standard deviation from January 1985 through December 2009. Next, they sum the normalized values over papers in each month to obtain a multi-paper index. Finally, they re-normalize the multi-paper index to an average value of 100 from January 1985 through December 2009.
China	January 1995 - Present	South China Morning Post (SCMP), Hong Kong's leading English-language newspaper.	EPU Index counts through and automated search articles about economic uncertainty pertaining to China by flagging all articles that contain at least one term from each of the China EU term sets: {China, Chinese} and {economy, economic} and {uncertain, uncertainty}. Second, they identify the subset of the China EU articles that also discuss policy matters. For this purpose, they require an article to satisfy the following text filter: {{policy OR spending OR budget OR political OR "interest rates" OR reform} AND {government OR Beijing OR authorities}} OR tax OR regulation OR regulatory OR "central bank" OR "People's Bank of China" OR PBOC OR deficit OR WTO.	The automated search yields a monthly frequency count of SCMP articles about policy-related economic uncertainty. They divide the monthly frequency count by the number of all SCMP articles in the same month and then normalize the resulting series to a mean value of 100 from January 1995 to December 2011 by applying a multiplicative factor.
Chile	January 1993 - Present	El Mercurio, La Segunda	EPU: considers articles pertaining to economic policy uncertainty related to domestic and foreign events. EPUC: seeks to capture domestic policy-related economic uncertainty only (includes "Chile" word).	Monthly counts of articles that contain term pertaining to uncertainty, economics and one or more of policy-relevant terms. After obtaining these raw counts, they scale by the number of articles published in the same newspaper and month. They standardize each newspaper's scaled frequency counts to have a unit standard deviation from January 1993 to October 2016, and then compute the simple average across newspapers by month. Finally, they multiplicatively normalize the series to have a mean of 100 from January 1993 to October 2016.
Brazil	January 1991 - May 2017	Folha de Sao Paulo	EPU: containing “incerto” or “incerteza”, “econômico” or “economia”, and one or more policy-relevant terms that include regulação, déficit, orçamento, imposto, “banco central”, planalto, congresso, senado, legislação, and tarifa	They count the number of articles containing the relevan terms by month. To obtain the EPU rate, they scale the raw EPU counts by the number of all articles in the same newspaper and month. They multiplicatively rescale the resulting series to a mean of 100 from January 1991 to December 2011.

Figure A.1 - EPU Index Methodology

Source: Economic Policy Uncertainty indexes - http://www.policyuncertainty.com

Figure A.2 - Complete estimations of PCA

```
. pca DesvioTC12* EPUGLOBAL* EPUBrasil* EPUChile*

Principal components/correlation                  Number of obs    =        154
                                                  Number of comp.  =          4
                                                  Trace            =          4
    Rotation: (unrotated = principal)             Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.36825	1.55197	0.5921	0.5921
Comp2	.816279	.317527	0.2041	0.7961
Comp3	.498751	.182031	0.1247	0.9208
Comp4	.31672	.	0.0792	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
DesvioTC12m	0.4099	0.8038	0.2951	0.3144	0
EPUGLOBAL	0.5769	0.0287	-0.0100	-0.8162	0
EPUBrasil	0.5278	-0.1422	-0.7476	0.3772	0
EPUChile	0.4697	-0.5770	0.5949	0.3044	0

Source: Authors' calculations

Figure A.3 – Cross Correlations

Sample: 2004Q1 2017Q4
Included observations: 56
Correlations are asymptotically consistent approximations

DLOG(GDP_TRD),CPU(-i)	DLOG(GDP_TRD),CPU(+i)	i	lag	lead
******| . |	******| . |	0	-0.5871	-0.5871
******| . |	*****| . |	1	-0.6105	-0.4621
*****| . |	****| . |	2	-0.4680	-0.4090
***| . |	****| . |	3	-0.3248	-0.4303
***| . |	*****| . |	4	-0.2520	-0.4916
.**| . |	*****| . |	5	-0.2347	-0.5228
.**| . |	*****| . |	6	-0.2415	-0.4904
.**| . |	****| . |	7	-0.2095	-0.4077
.*| . |	****| . |	8	-0.1453	-0.3597
.**| . |	****| . |	9	-0.1544	-0.3599
.**| . |	***| . |	10	-0.1960	-0.3281
***| . |	***| . |	11	-0.2548	-0.2493
***| . |	.*| . |	12	-0.2698	-0.1367
.**| . |	. | . |	13	-0.2057	-0.0395
.*| . |	. | . |	14	-0.1405	-0.0112

Sample: 2004Q1 2017Q4
Included observations: 56
Correlations are asymptotically consistent approximations

DLOG(GDP_TRD),SU(-i)	DLOG(GDP_TRD),SU(+i)	i	lag	lead
******| . |	******| . |	0	-0.5871	-0.5871
******| . |	*****| . |	1	-0.6105	-0.4621
*****| . |	****| . |	2	-0.4680	-0.4090
***| . |	****| . |	3	-0.3248	-0.4303
***| . |	*****| . |	4	-0.2520	-0.4916
.**| . |	*****| . |	5	-0.2347	-0.5228
.**| . |	*****| . |	6	-0.2415	-0.4904
.**| . |	****| . |	7	-0.2095	-0.4077
. *| . |	****| . |	8	-0.1453	-0.3597
.**| . |	****| . |	9	-0.1544	-0.3599
.**| . |	***| . |	10	-0.1960	-0.3281
***| . |	***| . |	11	-0.2548	-0.2493
***| . |	. *| . |	12	-0.2698	-0.1367
.**| . |	. | . |	13	-0.2057	-0.0395
. *| . |	. | . |	14	-0.1405	-0.0112

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