

## ECONOMIC POLICY UNCERTAINTY IN GREECE: MEASURING UNCERTAINTY FOR THE GREEK MACROECONOMY

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### **Abstract**

We constructed the monthly Economic Policy Uncertainty (EPU) index for Greece for the period 1998-2018 using the Baker *et al.* (2016) methodology. This index is of critical importance for macroeconomic research given the presumed heightened levels of uncertainty in the Greek economy in the context of recent economic and political events. The newly-constructed time series of the uncertainty index is discussed and related to the recent economic and financial crisis in Greece and the Eurozone. Simple statistical analysis highlights the high levels of correlation in economic policy uncertainty between Greece, European countries and the USA. It is also shown that the uncertainty correlation between Greece and Europe is time varying and has become much lower since the onset of the Greek crisis.

**JEL Classification:** D80, E20, E66, G18

**Keywords:** Economic Policy Uncertainty Index, Greek Economy, European Uncertainty

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“The only certainty is that nothing is certain”,  
Pliny the Elder, Book II, sec. 7, *Naturalis Historia*

## 1. Introduction

Uncertainty is a puzzling and multi-dimensional concept that has been at the forefront of theoretical and empirical economics. It may be pertinent for various types of decision makers (consumers, firm managers or policymakers). It may also relate to uncertainty regarding the magnitude of macroeconomic variables (e.g., GDP growth and inflation) or exogenous non-economic events (wars or natural disasters). Uncertainty is also varying across both time and space. Evidence suggests that uncertainty is anticyclical and more prevalent in developing as compared to developed countries (Bloom, 2014).

Recent macroeconomic developments in industrial countries have provided the stimulus for uncertainty to become a hotly-debated topic in the academic community. During the last decade, due to the global financial crisis and the Euro Area crisis, increased interest has been focused on the uncertainty related to the US economy, as well as, the economies of Eurozone countries. Following the US Great Recession and the Euro-area debt crisis, economic uncertainty seems to be on the rise at a global scale and measuring such uncertainty has become a much-needed task. Baker, Bloom and Davis (henceforth BBD, 2016) have proposed a measure of uncertainty known as the Economic Policy Uncertainty (EPU) index, which is based on newspaper coverage frequency. Following their seminal paper on the construction of the index for the US economy, the EPU index has also been constructed for several other industrial countries by the same authors or independent researchers.

The ongoing Greek crisis highlights the increasing importance of the concept of economic uncertainty and raises the issue of the causal determinants of this uncertainty, as well as the issue of estimating the effects of uncertainty on macroeconomy. It is generally believed that heightened uncertainty in the Greek economy keeps the cost of international borrowing at high levels and hampers the prospects of economic growth. It is, therefore, vital to create a measure of economic uncertainty for the Greek economy. Despite the critical significance of a measure of uncertainty for the Greek economy, to date, no such measure exists. Hence, in this paper, we attempt to create a monthly index of EPU for Greece for the period 1998-2018 following the BBD (2016) methodology. This time period includes the year that preceded the launch of the Euro, the years following the creation of the Eurozone, and the time since the start of the recent Greek crisis. In addition to measuring economic uncertainty, we are also interested in providing a narrative analysis relating the uncertainty measure to international and national economic and political events. The newly-constructed index of uncertainty for the Greek economy is also related to similar indices for European countries using

simple statistical analysis. Our major results are the following: First, the values of the index seem to reflect, quite satisfactorily, major events occurring during the sample period, such as, the global financial crisis, the Eurozone crisis, the Greek elections and referendum of 2015, and the introduction of capital controls. Second, the Greek uncertainty index is highly correlated with similar indices constructed using the same methodology, such as the European, US and global indices, as well as with the indices for other European countries, and, in particular, France and Germany. Third, there is evidence for time-varying volatility in the correlation coefficient between the Greek and European EPU indices as the relation between the two uncertainty indices has been much lower since the start of the Greek crisis.

The paper is organized as follows: section 2 summarizes the main relevant literature, and section 3 describes the methodology. Section 4 provides the results and discusses the uncertainty index in the context of major economic and political events, both national and international. In addition, some simple correlation analysis between the Greek EPU and various uncertainty indices for other countries or regions is also performed. Finally, section 5 presents the conclusions.

## **2. A review of relevant literature**

Modern theoretical literature on uncertainty and its impact on economic activity are quite rich and diverse. A long string of this literature focuses on the impact of micro uncertainty on investment decisions. Craine (1989) shows that, under risk aversion and incomplete markets, the impact of uncertainty on investment is most likely negative. When risk neutrality or complete markets are present, the impact is ambiguous and may become positive (Hartman, 1972). Bernanke (1983) argues that, in the presence of irreversible investment, agents delay their decisions and uncertainty may affect investment negatively. This is the so called real-options argument (Bernanke, 1983; Bloom, 2009). However, uncertainty may also affect economic activity in a positive manner. According to the “growth options” argument, this happens if, in the presence of investment lags, there is a mean-preserving increase in demand uncertainty, which increases expected profit once the investment goes ahead (Bar-Ilan and Strange, 1996).

In international empirical literature, there are various ways of measuring uncertainty. Among the various measures, we have the volatility of a series (GDP or the stock market) proxied by the moving standard deviation of a time series, and the forecaster disagreement. Another proxy of uncertainty is derived from a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, according to which the conditional variance of a series is used as a measure of uncertainty concerning macroeconomic variables, such as inflation, output growth, oil prices, house prices and housing investment (Grier and Perry, 1998; Fountas, Karanasos and Kim, 2002, 2006; Bredin and Fountas, 2009; Bredin, Elder and

Fountas, 2011; Christidou and Fountas, 2018). In particular, the GARCH approach in measuring macroeconomic uncertainty has been one of the most widely accepted approaches in relevant literature as highlighted through applications by prominent macroeconomists (Hamilton, 2010). The objective of these studies is, firstly, to estimate a univariate or multivariate GARCH model of uncertainty and obtain a proxy of uncertainty captured by the conditional variance of the relevant macroeconomic series. At a second step, these studies estimate the impact of the uncertainty measure on variables expressing macroeconomic performance, such as inflation, output growth or housing investment.

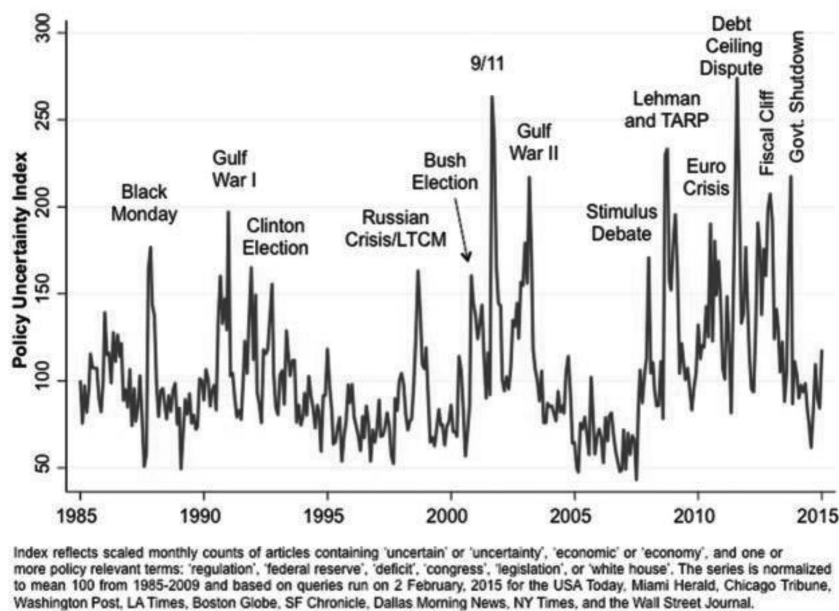
The EPU index proposed by BBD (2016) is a recent measure of a country's uncertainty that focuses on the uncertainty caused by economic policymaking. The EPU index depicts both short-run and long-run uncertainty arising from questions, such as, who will apply economic policy, what kind of economic policy will be followed, what regulations the policy makers will introduce and what will the effects of such regulations be on the economy. This index is quite volatile and its fluctuations may be attributed to macroeconomic variables (government spending and taxes) and political polarization (Baker *et al.*, 2014). The creation of the EPU index is based on newspaper coverage frequency of specific words, which will be discussed in the following section. The first EPU data series to be constructed by BBD was for the USA and covers the period from 1985 to the present. Subsequently, these authors developed the EPU series for other industrial countries, including large European countries, such as, France, Germany and the UK. In their Economic Policy Uncertainty site, BBD also report the European index using data from five European countries, and the Global index including data from nineteen countries.

BBD also proceeded with some tests of the credibility and validity of the EPU index for the US economy. Support of the credibility of the index is remarkable. Much research into the EPU index has been conducted, generating important results on the events depicted on an EPU graph, the causal effects between the EPU and macroeconomic or financial variables and the importance of uncertainty during economic crises. A study of relevant international literature indicates that the EPU index is affected by important economic and political events as made apparent by the US case. Figure 1, taken from BBD (2016), reports the values of the US EPU index and shows that the uncertainty index is highly volatile and can capture quite well important political and economic events corresponding to peaks at the level of uncertainty. According to several studies, a steep increase has been observed in each country's uncertainty index during or after the end of major events, such as national elections, oil crises and referenda (BBD, 2016; Davis, 2016; Cerda *et al.*, 2018).

Following the BBD's approach, other researchers have created the uncertainty series for several countries. In most cases, these papers employ Vector Autoregression (VARs) Analysis to examine the impact of uncertainty on domestic macroeconomic

variables. Arbatli *et al.* (2017) constructed several policy uncertainty indices for Japan and find that the indices captured domestic and international economic and political events in a satisfactory manner. Armelius *et al.* (2017) developed the EPU index for Sweden and found that policy uncertainty affects domestic GDP growth negatively. Another interesting finding is that European and US uncertainty affect Swedish output growth in the same way as domestic uncertainty. BBD (2016) provide evidence for negative responses from the sectors of investment, real GDP and employment to US EPU shocks. Cerda *et al.* (2018) constructed two EPU indices for Chile and found that these indices capture important national and international events. Luk *et al.* (2017) constructed an EPU index for Hong Kong and found evidence for spillover effects of uncertainty from industrial countries on Hong Kong economy. Sahinoz and Cosar (2018) developed the EPU index for Turkey and, using VAR analysis, found that policy uncertainty has affected economic growth, consumption and investment negatively. Tobbacck *et al.* (2018) argue that the EPU methodology is subject to measurement error and proposed a different methodology to measure uncertainty for Belgium, using text-mining techniques. Zalla (2017) constructed the EPU index for Ireland and performed VAR analysis to measure the impact of policy uncertainty on Irish macroeconomic variables. To date, an EPU index has been created for more than 22 countries<sup>1</sup>.

**Figure 1.** The EPU index for the USA (monthly data). Source: Baker, Bloom, and Davis (2016)



1. Data for all countries are available at [www.policyuncertainty.com](http://www.policyuncertainty.com)

### 3. Methodology

During the last few years researchers have attempted to measure EPU in several countries. However, to date, there have been no data for the EPU index for Greece. Identifying this lack of data and realizing the importance of uncertainty for a country like Greece, especially during the last decade with the ongoing crisis, our objective is to create the EPU index for Greece for the period 1998.1-2018.1. Furthermore, the methodology used in creating this uncertainty index will be used to keep the index continuously updated. The data will be freely available to the academic community on the formal website of the index ([www.policyuncertainty.com](http://www.policyuncertainty.com)).

As mentioned previously, the EPU index introduced by BBD is an index created through conducting digital research into specific terms in the digital archives of newspapers. The research has to be conducted on the digital archives of leading general or business-oriented daily newspapers. More specifically, in order to create the Greek EPU index we searched through the Greek daily newspaper *Kathimerini* archives for the number of articles per month that included at least one term of the 3 categories: economic, policy and uncertainty. Table 1 includes all the words that are part of the query. Then, the number of articles that include the terms of the 3 categories above is scaled by the total number of articles published by the newspaper per month. Following the appropriate normalization, we get the final data for the EPU index for Greece.

**Table 1.** Table of words being sought for the creation of the EPU index

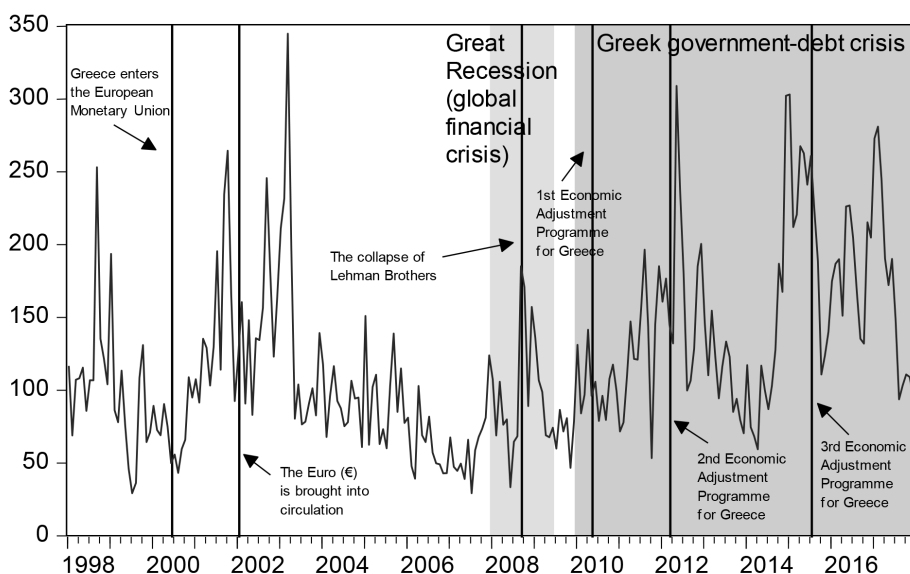
Uncertain <b>OR</b> Uncertainty <b>OR</b> Uncertainties	Αβεβαιότητα <b>Ή</b> Αβέβαιος, -η, -ο <b>Ή</b> Αβέβαια
<b>AND</b>	<b>KAI</b>
Economic <b>OR</b> Economy	Οικονομία <b>Ή</b> Οικονομικά <b>Ή</b> Οικονομικός, -ή, -ό
<b>AND</b>	<b>KAI</b>
Policy <b>OR</b> Congress <b>OR</b> Deficit <b>OR</b> Federal Reserve <b>OR</b> The Fed <b>OR</b> Legislation <b>OR</b> Regulation <b>OR</b> Regulatory <b>OR</b> The White House	Πολιτική <b>Ή</b> Πολιτικές <b>Ή</b> Κυβέρνηση <b>Ή</b> Έλλειμμα <b>Ή</b> Κεντρική Τράπεζα της Ελλάδος/Ελλάδας <b>Ή</b> Ευρωπαϊκή Κεντρική Τράπεζα <b>Ή</b> Νομοθεσία <b>Ή</b> Μεταρρύθμιση <b>Ή</b> Μεταρρυθμίσεις <b>Ή</b> Μεταρρυθμιστικός, -ή, -ό <b>Ή</b> Βουλή

#### 4. Results and discussion

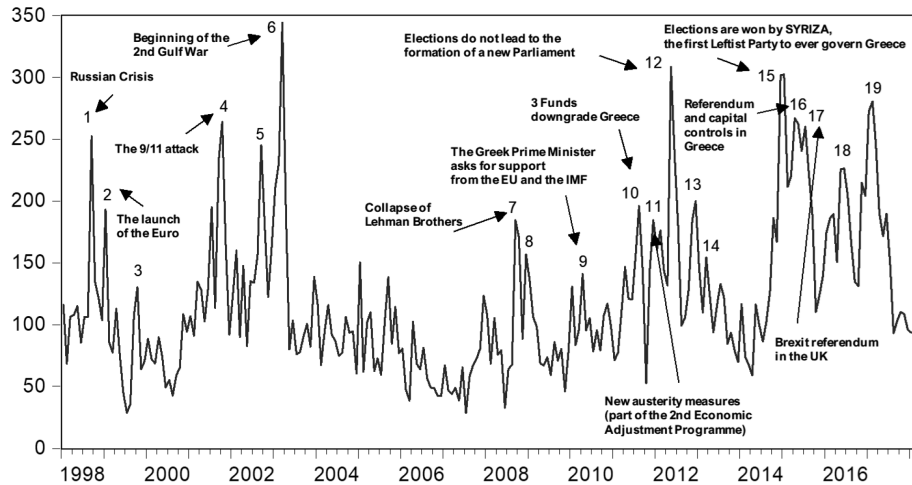
Figure 2 shows the monthly values of the EPU index for Greece for the period 1998.1-2018.1. The figure highlights the wide variability in policy uncertainty during the sample period. Uncertainty seems to be relatively low following the launch of the Euro (except for the first year) and for quite a long period till the collapse of Lehman Brothers. Perhaps not surprisingly, uncertainty has been on an upward trend since the onset of the global financial crisis around the time of the collapse of Lehman Brothers. The rise in uncertainty was exacerbated during the Greek government-debt crisis notching very high values of the uncertainty index during the first half of 2015, a period of political and economic uncertainty, which coincided with the elections that brought the Sy.ri.za party to power. It is noticeable that the index showed a rapid downward trend during 2017, as the economy entered a period of stabilization.

It is important to attempt to associate the peaks in the Greek uncertainty index with major economic and political events, both national and international, which may have an impact on the level of Greek uncertainty. To this end, Figure 3 reports the values of the index and events coinciding with peak values in the series of the index.

**Figure 2.** Greek Economic Policy Uncertainty Index (January 1998-January 2018)



**Figure 3.** Important peaks of the Greek Economic Policy Uncertainty Index (January 1998 – January 2018)



The following list includes important peaks of the Greek EPU index (as shown in Figure 3) and political and/or economic events that took place at the time of the peak:

- 1) 9/1998: Russian Crisis.
- 2) 1/1999: The Euro was launched in accounting form.
- 3) 10/1999: The Greek Stock Exchange crashed in September 1999 & a big earthquake struck Athens in September 1999.
- 4) 10/2001: A month after the terrorist attack of 9/11 in New York.
- 5) 9/2002: Oil price rise & fall of banking stocks.
- 6) 3/2003: American Forces invaded Iraq.
- 7) 9/2008: The collapse of Lehman Brothers (the beginning of the global financial crisis).
- 8) 12/2008: Perhaps the worst riots since the fall of the dictatorship (1974) occurred in major cities of Greece, following the murder of a teenage student, Alexandros Grigoropoulos, by two policemen in Athens. Since then, every year on the 6th of December, there are demonstrations in the student's memory.
- 9) 4/2010: The Greek Prime Minister (G. Papandreou) asked for financial support from the IMF, the EU and the ECB. Fitch downgraded Greece.
- 10) 7/2011: 3 Funds downgraded Greece.
- 11) 2/2012: New austerity measures & anticipation of the agreement for the 2nd Economic Adjustment Programme, which was finally agreed and signed the following month.



- 12)5/2012: General elections resulted in a transitional government due to absence of a parliamentary majority. A coalition government was vital, at that time, in order to implement the measures agreed 2 months earlier as part of the 2nd Economic Adjustment Programme. The coalition government was achieved at the elections of June 2012.
- 13)12/2012: One month after the Greek Parliament had approved the 3rd memorandum.
- 14)3/2013: Cyprus' bail-in and introduction of capital controls.
- 15)1/2015: Early general elections due to the inability of the government to elect the President of the Republic. The elections were won by SY.RI.ZA., the first left party to ever govern Greece. A coalition government was formed by SY.RI.ZA. and AN.EL. Parties.
- 16)7/2015: Greek referendum (8th July) to approve the bailout conditions proposed by the EU, the ECB and the IMF. The result of the referendum was "No". Finally, a bailout package was agreed on the 13th of July. A month earlier (June 2015) capital controls had been introduced.
- 17)6/2016: Brexit Referendum in the United Kingdom & terrorist attack at the International Airport of Istanbul.
- 18)11/2016: Presidential elections in the USA (Trump elected).
- 19)1/2017: the U.K. triggers article 50 for Brexit & beginning of Trump's presidency & terrorist attack in Istanbul (New Year's Eve).

Given the availability of similar EPU indices for several other industrial countries, and assuming that uncertainty is likely transmitted from one country to another during periods of economic turmoil, it would be very interesting and useful to determine the extent to which the Greek EPU index is correlated with other indices. This exercise would be even more relevant for European countries and, in particular, member states of the European Union, given the close economic links that have been developed since the founding of the EU. We, therefore, performed a simple correlation analysis of the Greek EPU index with similar indices available for other major industrial European countries. Table 2 reports the estimated simple correlation coefficients, the t-statistics and their respective probability values. Results show that the correlation coefficient is always statistically significant. The scale of the correlation coefficient of the Greek EPU index is higher for large countries, such as France, Germany and the UK.

Table 3 reports the correlation coefficients of the Greek EPU index for three regions, namely, the US, Europe-5 and the world-19. The European index has also been constructed by BBD and is available on the economic policy uncertainty site. It includes 5 countries, namely, France, Germany, Italy, Spain and the UK. The world uncertainty index includes data from nineteen countries, namely, Australia, Brazil,



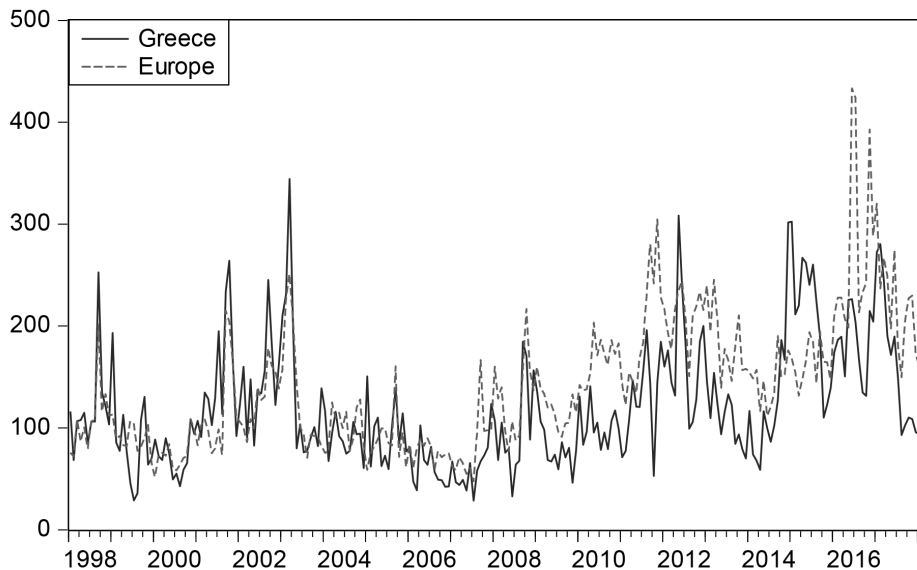
**Table 3.** Analysis of EPU index correlation between Greece, Europe, USA and the world

Correlation Analysis: Ordinary Sample: 1998M01-2018M01 Number of observations: 241			
	Europe-5	USA	World-19
Correlation (Greece)	0.639	0.545	0.672
t-statistics	12.876	10.063	14.046
probability	0.000	0.000	0.000

*Note:* The EPU index for Europe-5 includes five countries: France, Germany, Italy, Spain and the UK. The World EPU index includes nineteen 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.

**Table 4.** Correlations between Greece and Europe-5

	1/1998-12/2001	1/2002-3/2010	4/2010-1/2018
Correlation	0.792	0.736	0.387
t-statistics	8.800	10.738	3.998
probability	0.000	0.000	0.000

**Figure 4.** The Greek and European EPU indices

## 5. Conclusions

In this paper we have attempted to provide an initial measure of economic policy uncertainty for the Greek economy, following the framework suggested by BBD (2016), which is based on newspaper coverage frequency of specific words. Using the digital archives of a major daily newspaper, we constructed the monthly Greek EPU index for the period 1998.1-2018.1. Our major results are the following: First, a careful study of the values of the index shows that uncertainty has been quite volatile throughout the period of study and has been on the rise since the onset of the global financial crisis and, even more so, during the recent Greek government-debt crisis. Moreover, the values of the index seem to quite satisfactorily reflect major economic and political events occurring during the sample period, such as, the global financial crisis, the Eurozone crisis, the Greek general elections and referendum of 2015, and the introduction of capital controls. Second, the Greek uncertainty index is highly correlated with similar indices constructed using the policy uncertainty methodology, such as the European, US and global indices, as well as with the indices for other European countries, in particular France and Germany. Third, there is evidence for time-varying volatility in the correlation coefficient between the Greek and the European EPU indices as the relation between the two uncertainty indices has been much lower since the onset of the Greek crisis. This is due to the Greek index reflecting several national events since the onset of the Greek crisis associated

with general elections and prolonged negotiations between the Greek government and the EU authorities.

It would be rather interesting to consider some extensions of the present research. As shown by previous studies (BBD, 2016; Armelius *et al.*, 2017; Zalla, 2017), the EPU index is expected to impact macroeconomic variables of the national economy. In an accompanying paper (Fountas *et al.*, 2018), we have estimated VARs identified via Cholesky ordering and have used impulse response function analysis to examine the impact of domestic uncertainty on macroeconomic variables. Preliminary evidence seems to indicate that effects have the expected sign and are statistically significant. Further analysis using a structural VAR approach will shed further light on the robustness of these preliminary results.

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