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ECONOMIC POLICY UNCERTAINTY IN THE US: DOES IT MATTER FOR THE EURO AREA?

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May 2013

"MARCO FANNO" WORKING PAPER N.160

Economic policy uncertainty in the US: Does it matter for the Euro Area?

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April 2013

Abstract: We investigate the effects of a US economic policy uncertainty shock on some Euro area macroeconomic aggregates with a number of Structural VARs. We model the indicators of economic policy uncertainty recently developed by Baker, Bloom and Davis (2013) jointly with a set of standard indicators of aggregate price and the business cycle for the two above indicated economic areas. According to our SVARs, a one standard deviation shock to US economic policy uncertainty leads to a statistically significant fall in the European industrial production and prices of -0.12% and -0.06%, respectively. The contribution of the US uncertainty shock on the European aggregates is shown to be quantitatively larger than the one exerted by an Euro area-specific uncertainty shock.

Highlights: ► We estimate a VAR for assessing the possible spillovers going from the US to the Euro area economics. ► We focus on shocks to the US economic policy uncertainty. ► Our VARs predict a negative and significant reaction of Euro area price and quantity indicators. ► The contribution of such shock is estimated to be larger than that of a Euro-area specific uncertainty shock.

JEL classification: E32, E52, F42

Keywords: Economic policy uncertainty, US-Euro area spillovers, Structural Vector Autoregressions.

*We thank Efrem Castelnuovo and Giovanni Caggiano for useful comments. All remaining errors are ours. Author's details: Valentina Colombo, Department of Economics and Management, University of Padova, via del Santo 33, 35123 Padova (PD), Italy. Phone: +39 049 827 4217; Fax: +39 049 827 4211; email account: valentina.colombo@studenti.unipd.it.

1 Introduction

The attention on the macroeconomic effects of uncertainty has been recently reignited by Bloom's (2009) highly influential paper. A number of VAR investigations have been proposed to quantify the impact of uncertainty shocks at a macroeconomic level (see e.g., Bloom, 2009; Alexopoulos and Cohen, 2009; Leduc and Liu, 2013; Baker et al., 2013). Such investigations have typically followed a "within-the-US-country approach", i.e., they have focused on the reaction of a set of US variables to a shock to the level of uncertainty affecting the US economy itself. While being a somewhat natural approach, shocks hitting a leading economy such as the United States may very well spillover onto other countries. Investigations documenting the existence of spillovers include Kim (2001), who quantified the role of US macroeconomic shocks in triggering business cycles at an international level, and Favero and Giavazzi (2008) and Ehrmann and Fratzscher (2009), who look at spillover effects regarding financial markets. As for the literature dealing with uncertainty shocks, Mumtaz and Theodoridis (2012) estimate an open-economy VAR focusing on the potential impact of the volatility of shocks to US real activity on UK. They find that spillovers across these two areas may very well be present and important.

This paper asks the following question: *"Are there spillovers from the US economy to the Euro area due to economic policy uncertainty shocks?"* To answer this question, we model a VAR including both US and Euro area aggregates. Then, we identify a US uncertainty shock via the imposition of short-run restrictions, and focus on the responses of Euro area prices and quantities. The uncertainty shock is identified by appealing to the "economic policy uncertainty indicator" recently developed by Baker et al. (2013). *The answer* provided by our empirical investigation *turns out to be positive:* a one-standard deviation shock to US economic policy uncertainty leads in the short-run to a statistically significant fall in the European industrial production and prices of -0.12% and -0.06%, respectively.

Our paper is structured as follows. Section 2 focuses on the data and the identification scheme employed in our VAR-approach. Section 3 presents the results. Section 4 concludes.

2 Data definition and VAR specification

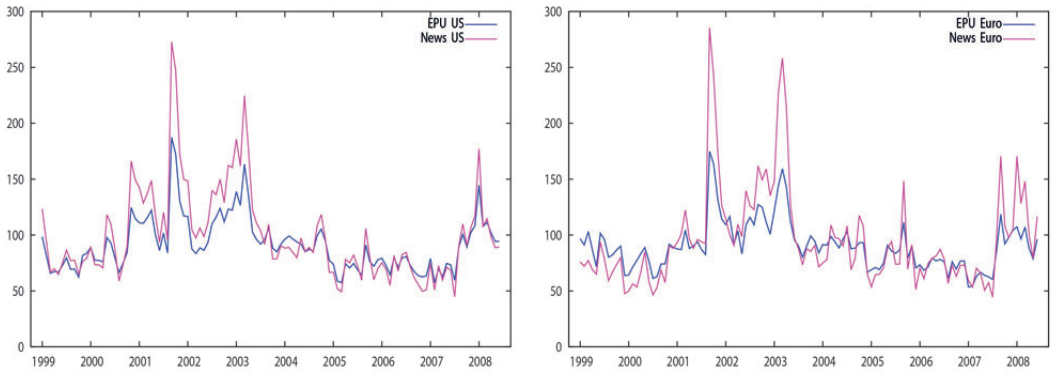
We analyze the transmission of structural shock from the US to Euro area within a two-country Structural Vector Autoregressive model (SVAR). A common representation of the SVAR is:

$$B_0 y_t = B(L) y_{t-p} + \varepsilon_t \tag{1}$$

where $B(L)$ is an autoregressive lag-polynomia, and ε_t is the structural innovation. The vector $y_t = [CPI^{US}\ IPI^{US}\ i^{US}\ News^{US}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ News^{Euro}]'$ includes

all the endogenous variables in our model and relies on two blocks: the first one refers to "foreign" variables (US), whereas the second one includes "domestic" variables (Euro area). Each regional block includes: the consumer price index (CPI for the US and HCPI for the Euro area), as measure of prices; the industrial production index (IPI), as proxy for business cycle; the short-run interest rate (indicated with "i" in the vector above), which is the Federal Funds Rate for the US and the three-month interest rate for the Euro area, as a proxy for the monetary policy instrument. To account for economic policy uncertainty in the US and the Euro area, we employ two country-specific empirical proxies carefully constructed by Baker et al. (2013). The policy-related economic uncertainty for the US (EPU^{US}) relies on three components: a news-based component quantifying newspaper coverage on economic policy uncertainty ($News^{US}$); a measure of the federal tax code provisions; and a measure of disagreement among forecasters. The policy-related economic uncertainty for the Euro area (EPU^{Euro}) relies on two components: a news-based component ($News^{Euro}$); and a measure of disagreement among forecasters. Since the overall economic policy uncertainty indexes rely on different components, we focus on uncertainty indexes based on news coverage. The correlation between the EPU indicator and its news-based component is 0.97 and 0.93 for the US and Euro area, respectively. Hence, we include in vector y_t the news-based components, $News^{US}$ and $News^{Euro}$, as proxies for the economic policy uncertainty.[1] Figure 1 plots the monthly time series of the overall uncertainty indexes and news components, both for the US and the Euro area.

Figure 1: Plots of time series of EPU and news policy uncertainty indexes for US and Euro (1999M1-2008M6).



To understand the structure of the economy we need to recover the structural shock ε_t from $\varepsilon_t = B_0 u_t$ where B_0 contains the contemporaneous relationships between the reduced-form and the structural shocks. To identify B_0, we employ a standard Cholesky decomposition imposing a lower triangular matrix. Since we are interested in the effects of an external policy uncertainty shock (US) on the domestic macroeconomic variables (Euro area), we impose short-run restriction following a country-based exogenous approach.

[1] Our results are robust to the use of the overall indexes instead of their news components.

Since we are using a Cholesky decomposition, the ordering of the variables in our vector y_t is important. Following Giavazzi and Favero (2008), we assume that shocks hitting the Euro-area exert no contemporaneous effects on the US variables. Consequently, the US block is ordered before the Euro area-block in our vector. Second, within each country-specific block, we order uncertainty last. We do so to "purge" the uncertainty indicator in our VAR of the contemporaneous movements of our macroeconomic indicators (prices, industrial production), therefore sharpening the identification of the uncertainty shocks.

Our data are monthly and span the period 1999M1 to 2008M6. The beginning of the period is determined by the creation of the Euro-area, whereas the end is chosen to avoid considering possible non-linearities due to the intensification of the financial crisis. All variables are in log-levels, except for the interest rate and the uncertainty indexes, which are in levels.[2] We select the optimal number of lags in the SVAR model combining an initial lag selection based on information criteria[3] with an LMF test for no serial correlation in the error terms. Our SVAR(3) includes an equation-specific constants and linear trends. The data have been retrieved from the Federal Reserve Bank of St. Louis' database (US industrial production, price level, and federal funds rate), the European Central Bank's Statistical Warehouse (industrial production, price level, and the three-month interest rate), and the "Economic Policy Uncertainty" website (http://www.policyuncertainty.com/).

3 Results

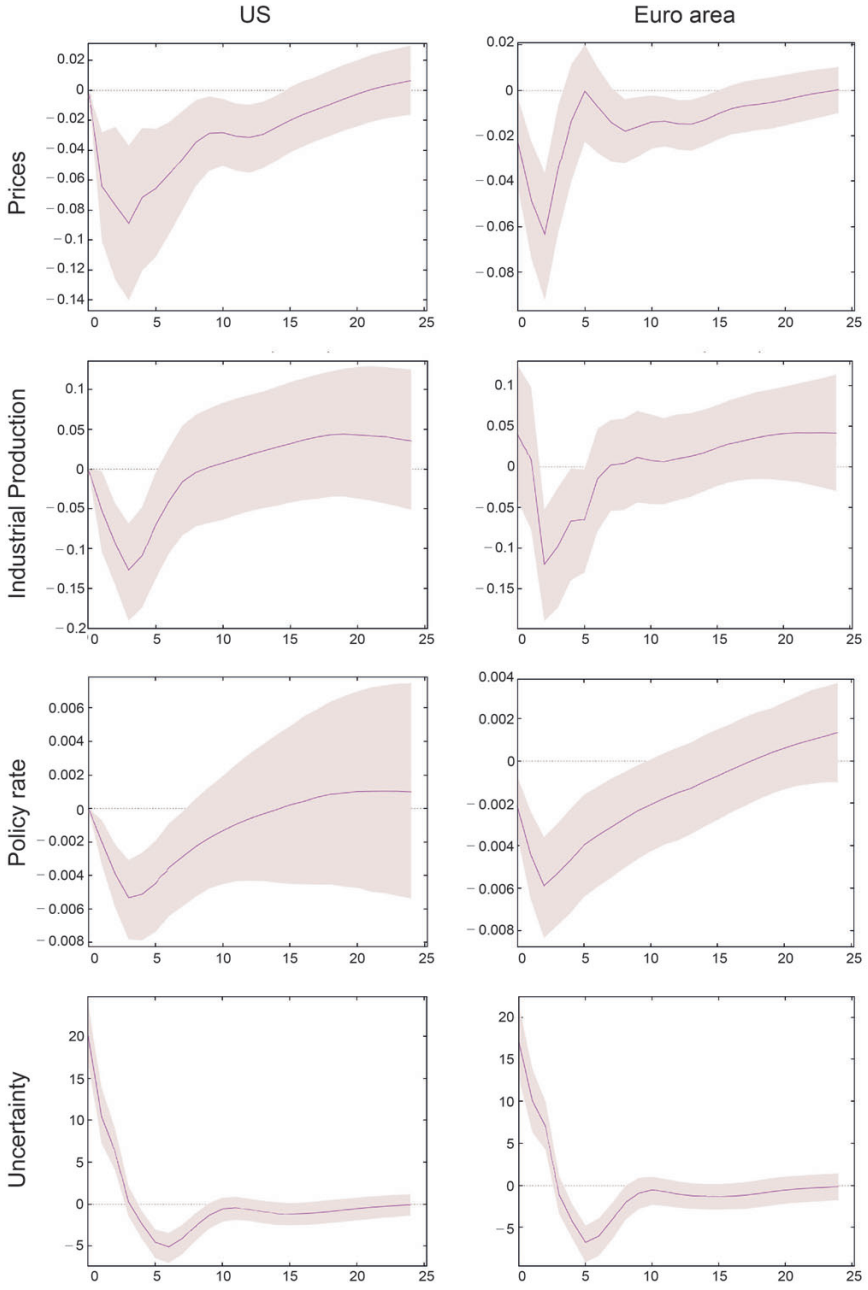
Figure 2 depicts the impulse response functions to a one-standard deviation shock to the US uncertainty index. In the US, the responses of industrial production and consumer prices are statistically significant, and suggest a decline in production and a deflationary phase after an increase in uncertainty. Both the industrial production and prices hit their bottom values after three months, reaching a minimum around -0.13% and -0.08%. The Federal Reserve reacts fast to the economic condition by adopting an expansionary monetary policy. As the economy settles on the recovery path, the interest rate goes back to its steady state. Our results corroborate those reported in previous contributions on the "demand" type of effects triggered by uncertainty shocks in the US economy (Bloom, 2009; Alexopoulos and Cohen, 2009; Leduc and Liu, 2013; Baker et al., 2013).

Moving to our research question our VARs predict *a negative and significant reaction of Euro area price and quantity indicators to an unexpected increase in the US policy uncertainty.*

[2] Sims et al. (1990) show that VAR in log-levels provide consistent estimates of the IRFs even in presence of co-integrating vectors.We do not attempt to model co-integrating vectors given the small size of our sample.

[3] SIC and BIC information criteria suggest a VAR(1) whereas AIC a VAR(2). However, the results are robust for different lag-length choices.

Figure 2: Empirical Impulse Responses to a US Economic Policy Uncertainty Shock



Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

The industrial production and consumer prices drop to -0.12% and -0.06%, respectively, two months after the shock. Then, they slowly go back to their pre-shock level.

One possible explanation is that increases in uncertainty lead both households and firms to postpone their consumption and investment decisions due to a precautionary saving-motive (the former) and an increase of the option-value of waiting (the latter). The fall in aggregate demand may be responsible for the temporary deflation predicted by our VARs. The monetary policy easing associated to a temporary reduction in the nominal interest rate is consistent with an inflation-targeting strategy pursued by the monetary policymakers.[4] Notably, our impulse responses suggest that, following an exogenous increase in the US economic policy uncertainty, the Euro area-related uncertainty also increases. Obviously, given the high level of contamination involving the US and the Euro area at commercial and financial levels, policy (in)decisions in the United States may very well increase the perceived uncertainty surrounding policy moves in Europe. Admittedly, our VARs do not distinguish between reactions by European aggregates due to an increase in the US uncertainty *per se* vs. reactions to an increase in the endogenous component of the Euro-area related uncertainty. This, however, does not affect our main message, i.e., US economic policy uncertainty shocks exert a significant effect on Euro area macroeconomic aggregates. How important is a US uncertainty shock? Table 1 highlights the contribution of the US and European policy uncertainty shocks in explaining the short-run fluctuation in the European variables.

Table 1: Forecast error variance decomposition of the European variables due to US and European economic policy uncertainty shock (percentage)

Horizon	Consumer Prices		Industrial Production		Policy rate	
(in months)	News^{US}	$\text{News}^{\text{Euro}}$	News^{US}	$\text{News}^{\text{Euro}}$	News^{US}	$\text{News}^{\text{Euro}}$
1	2	0	0	0	7	0
6	7	1	4	2	18	3
12	6	1	3	2	11	2
18	6	1	2	2	7	2
24	6	1	2	2	6	2

In the short-run, the Euro area variables are estimated to respond stronger to US uncertainty shock than to the European counterpart. At a six month horizon, the US shock explains 4% of the variation in the European industrial production whereas the European policy uncertainty accounts for 2%. The change in the European consumer prices and policy rate in response to a US uncertainty shock is six times larger than under the European counterpart. Therefore, the US policy shock explains an appreciable share of the variance of the forecast error of the Euro area variable (above all, the policy rate). More importantly, such shock appears to be more relevant on European aggregates

[4] Our results are robust to: i) ordering the news indexes first in each country-specific block; ii) different lag-length specifications; iii) the introduction of extra-variables in the VAR (i.e., Nominal effective exchange rate, Chicago Fed National Activity Index and EuroCoin business cycle indicator, University of Michigan Consumer Sentiment Index); iv) alternative uncertainty indexes instead of the news ones (EPU^{US}/EPU^{Euro} and $VIX/VSTOXX$). The robustness checks are documented in the Appendix.

than its European counterpart.

4 Conclusions

We investigate to what extent US economic policy uncertainty shock may trigger reactions at a macroeconomic level in the Euro area. Our VARs find a negative and significant reaction of Euro area price and quantity indicators to such shock. We find the contribution of exogenous variations of the US uncertainty indicator to be larger than that induced by its European counterpart.

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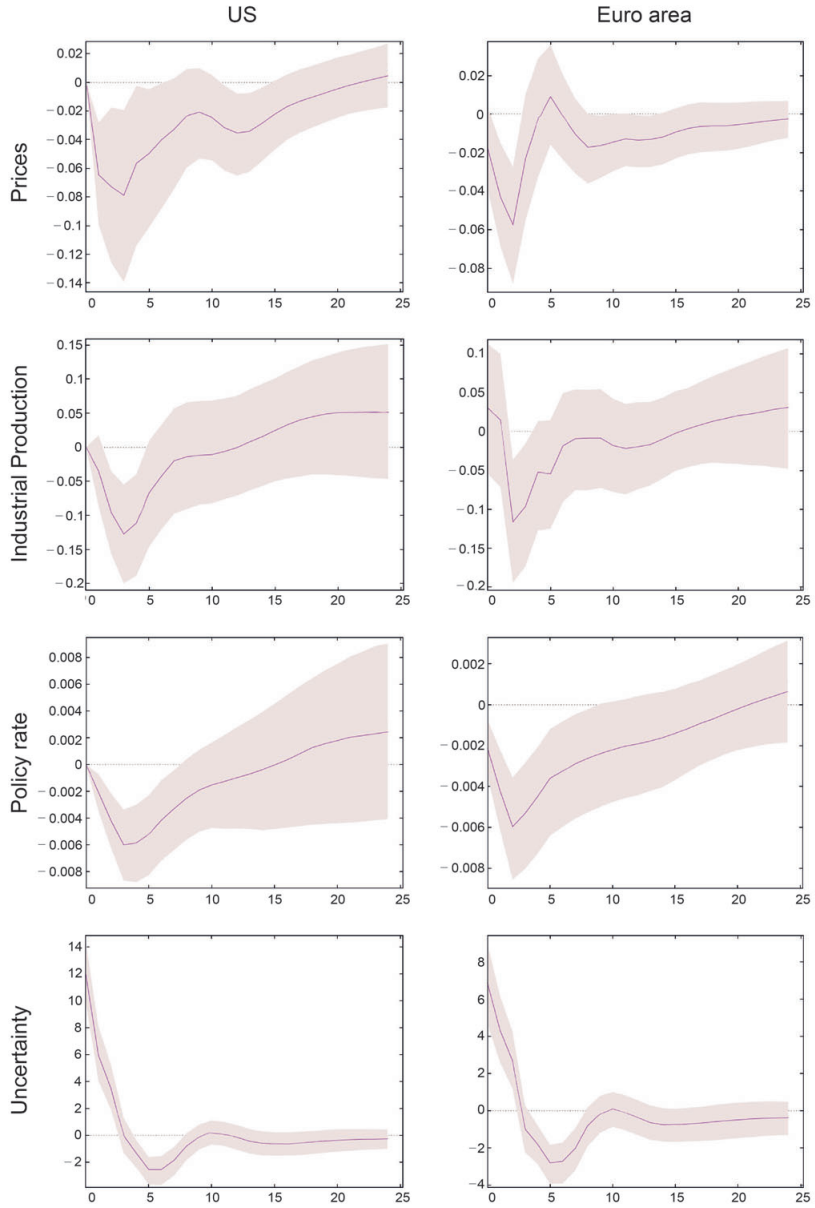
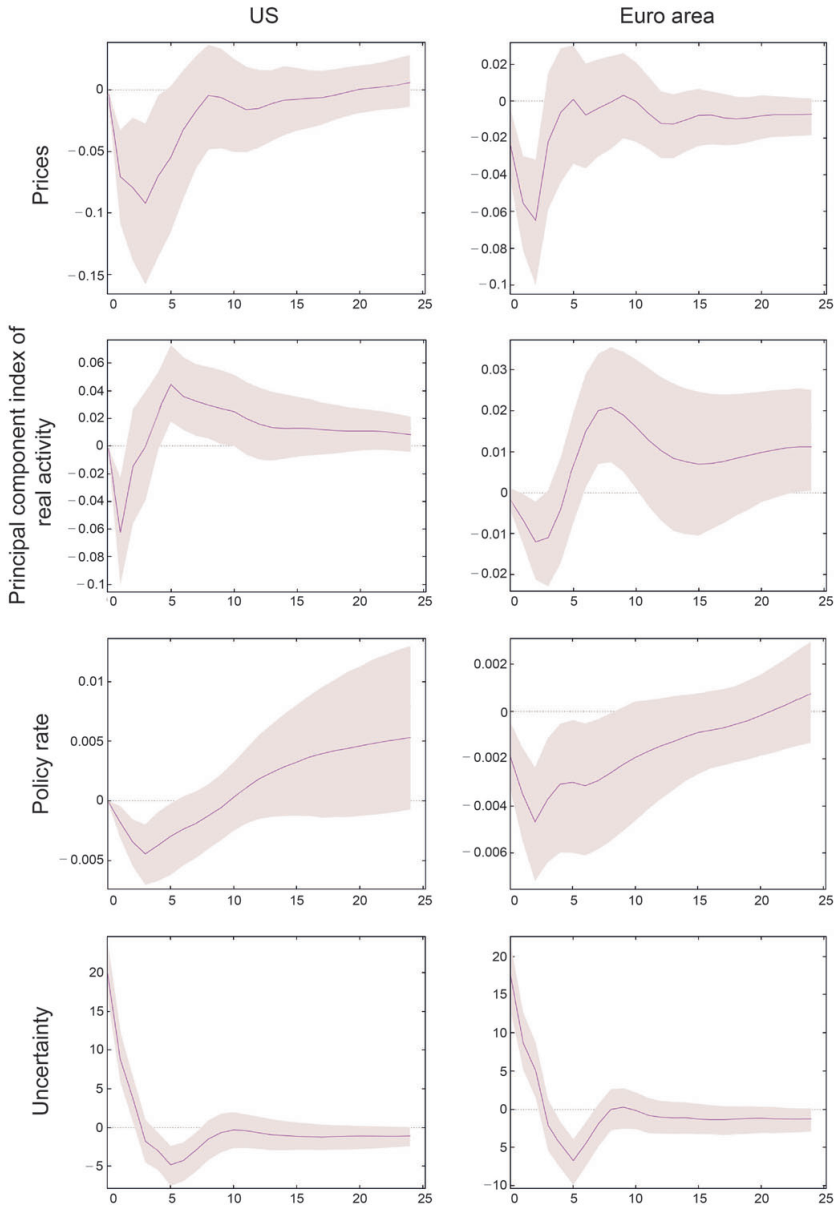
Appendix

Figure A.1: Empirical Impulse Responses to an Uncertainty Shock (substituting the economic policy uncertainty indexes)



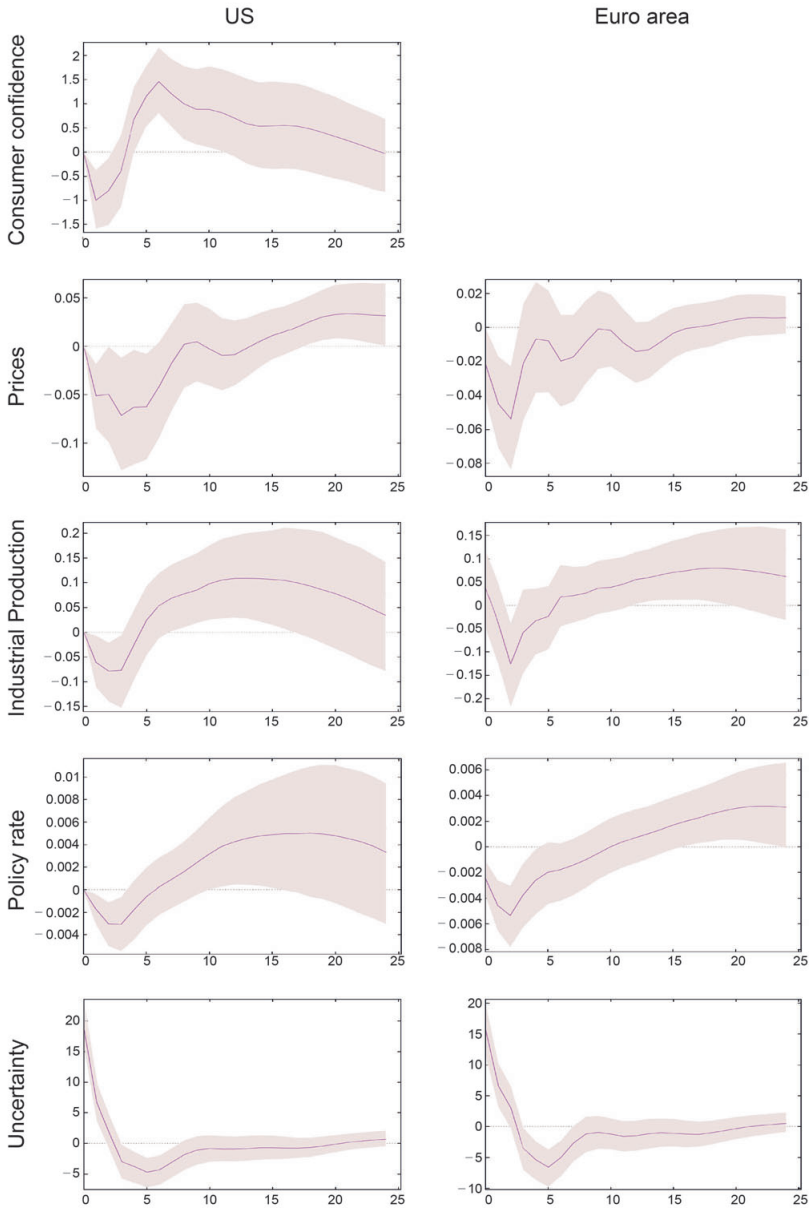
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We set the EPU^{US} and the EPU^{Euro} instead of the US and Euro area news component and we estimate $y_t = [CPI^{US}\ IPI^{US}\ i^{US}\ EPU^{US}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ EPU^{Euro}]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.2: Empirical Impulse Responses to a US Economic Uncertainty Shock (with Business cycle indicators)



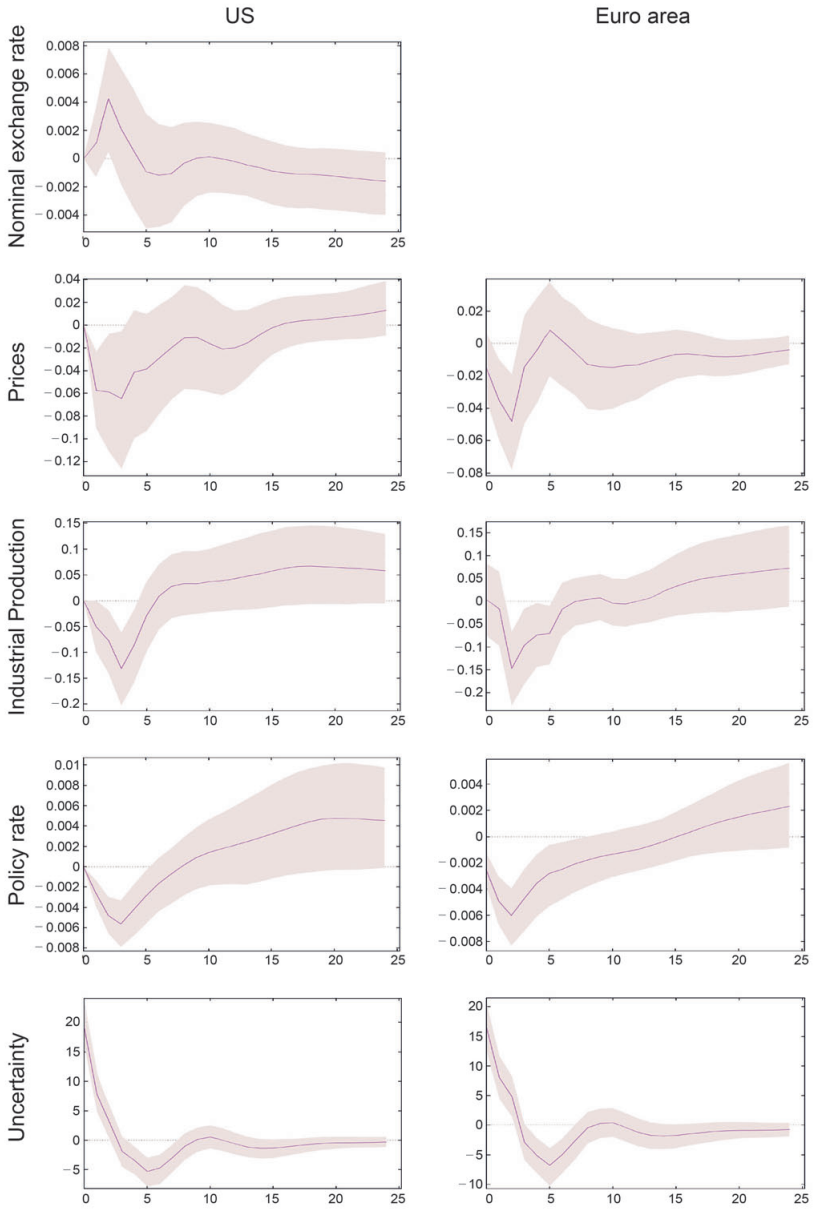
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We set two principal component indexes of real activity, the CFNAI and the EuroCoin business cycle (source: Datastream), instead of the US and Euro area industrial production. We estimate the following vector $y_t = [CPI^{US}\ CFNAI\ \ i^{US}\ News^{US}\ HCPI^{Euro}\ EuroCoin\ i^{Euro}\ News^{Euro}]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.3: Empirical Impulse Responses to a US Economic Uncertainty Shock (with the US consumer confidence)



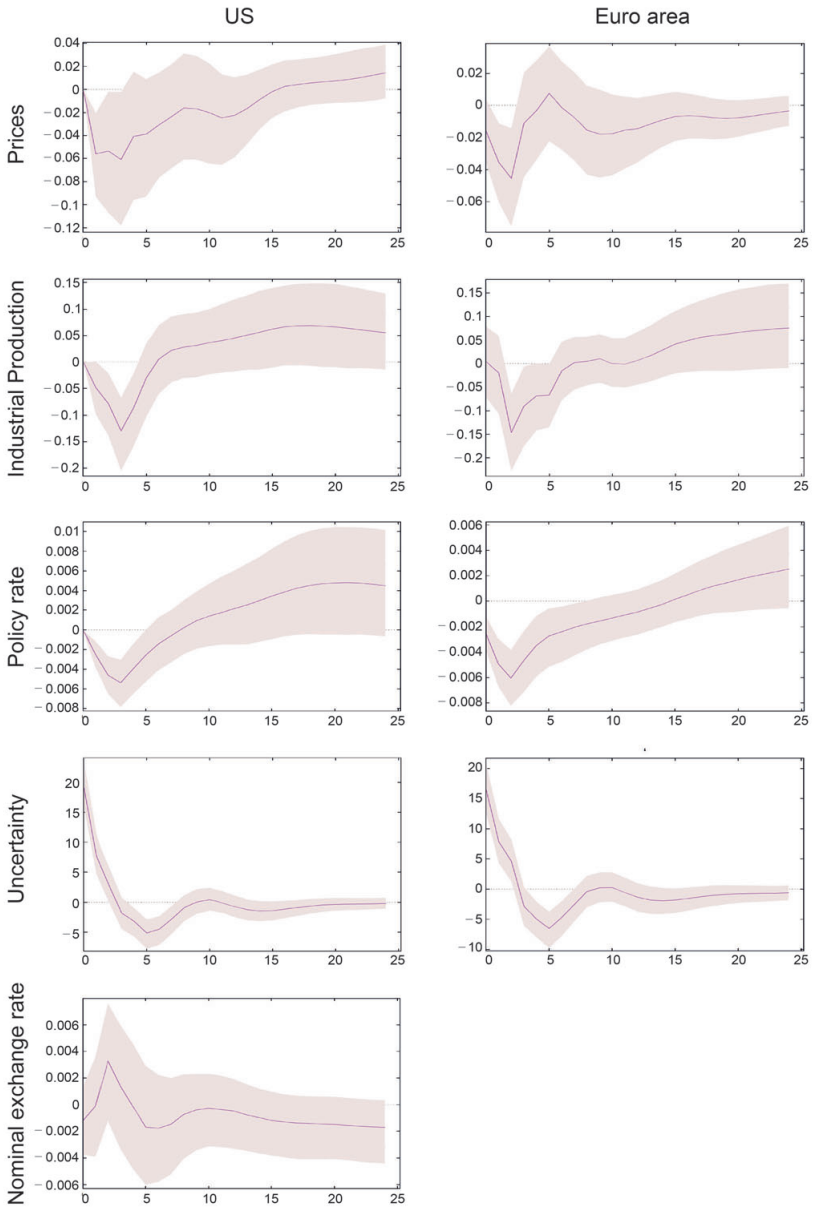
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We add to our baseline model the University of Michigan Consumer Sentiment Index. We estimate $y_t = [Cons.\ Conf\ CPI^{US}\ IPI^{US}\ i^{US}\ News^{US}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ News^{Euro}]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.4: Empirical Impulse Responses to a US Economic Uncertainty Shock (with the Nominal exchange rate ordered first)



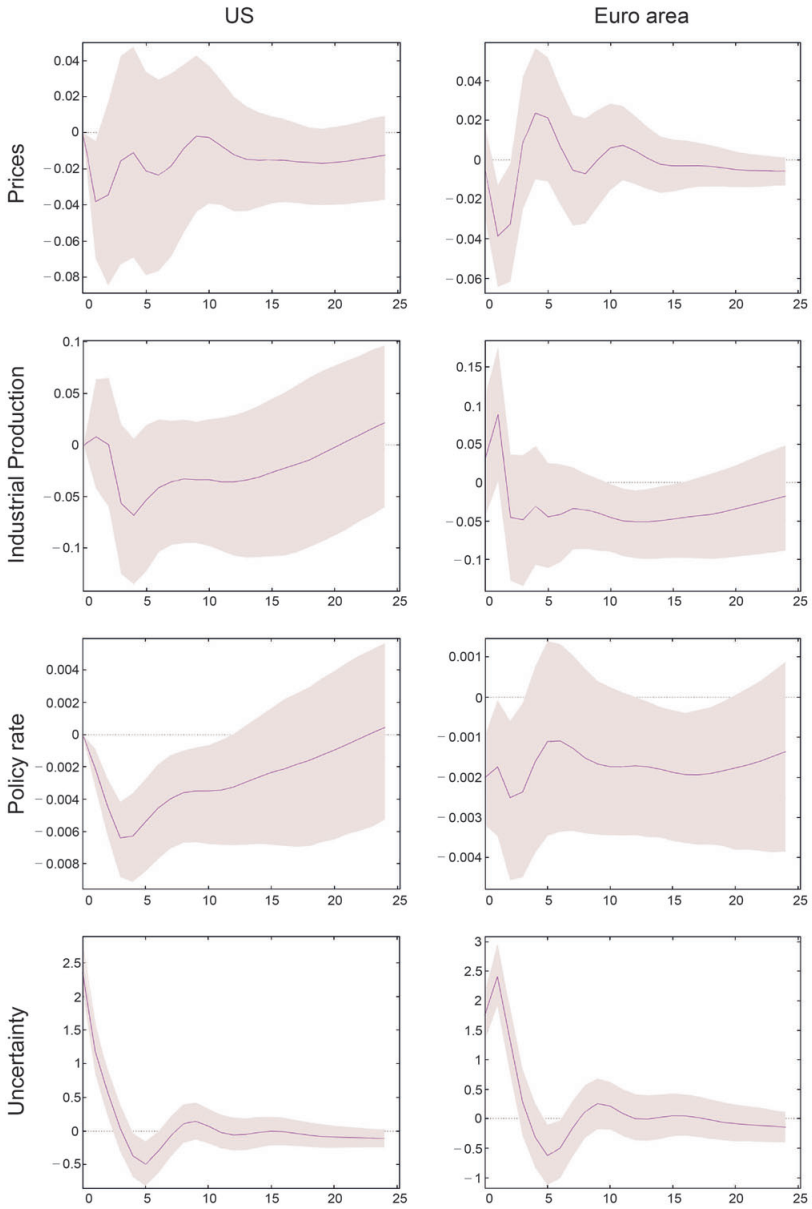
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We add to our baseline model the Nominal effective exchange rate (USD/EUR). We estimate $y_t = [Exchange\ rate\ CPI^{US}\ IPI^{US}\ i^{US}\ News^{US}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ News^{Euro}]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.5: Empirical Impulse Responses to a US Economic Uncertainty Shock (with the Nominal exchange rate ordered last)



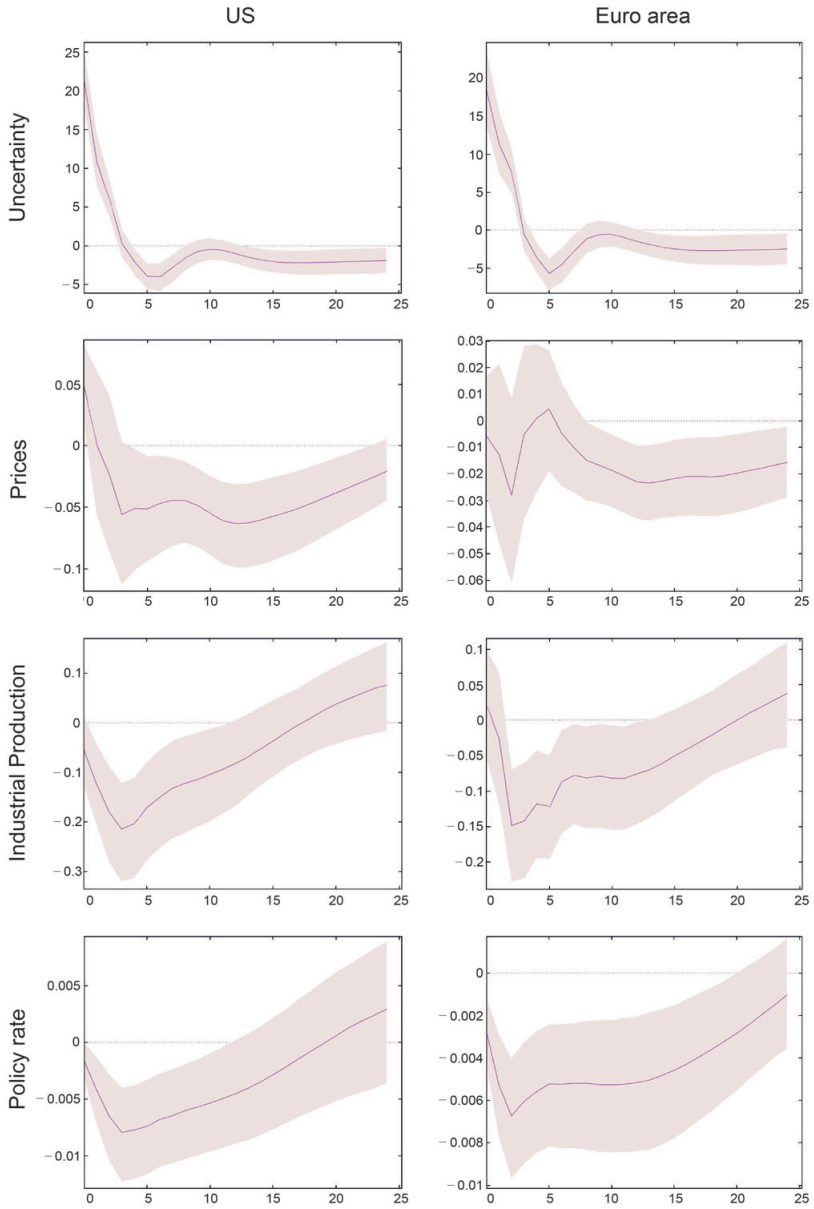
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We add to our baseline model the Nominal effective exchange rate (USD/EUR). We estimate $y_t = [CPI^{US}\ IPI^{US}\ i^{US}\ News^{US}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ News^{Euro}\ Exchange\ rate]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.6: Empirical Impulse Responses to a US Economic Uncertainty Shock (substituting the economic policy uncertainty indexes)



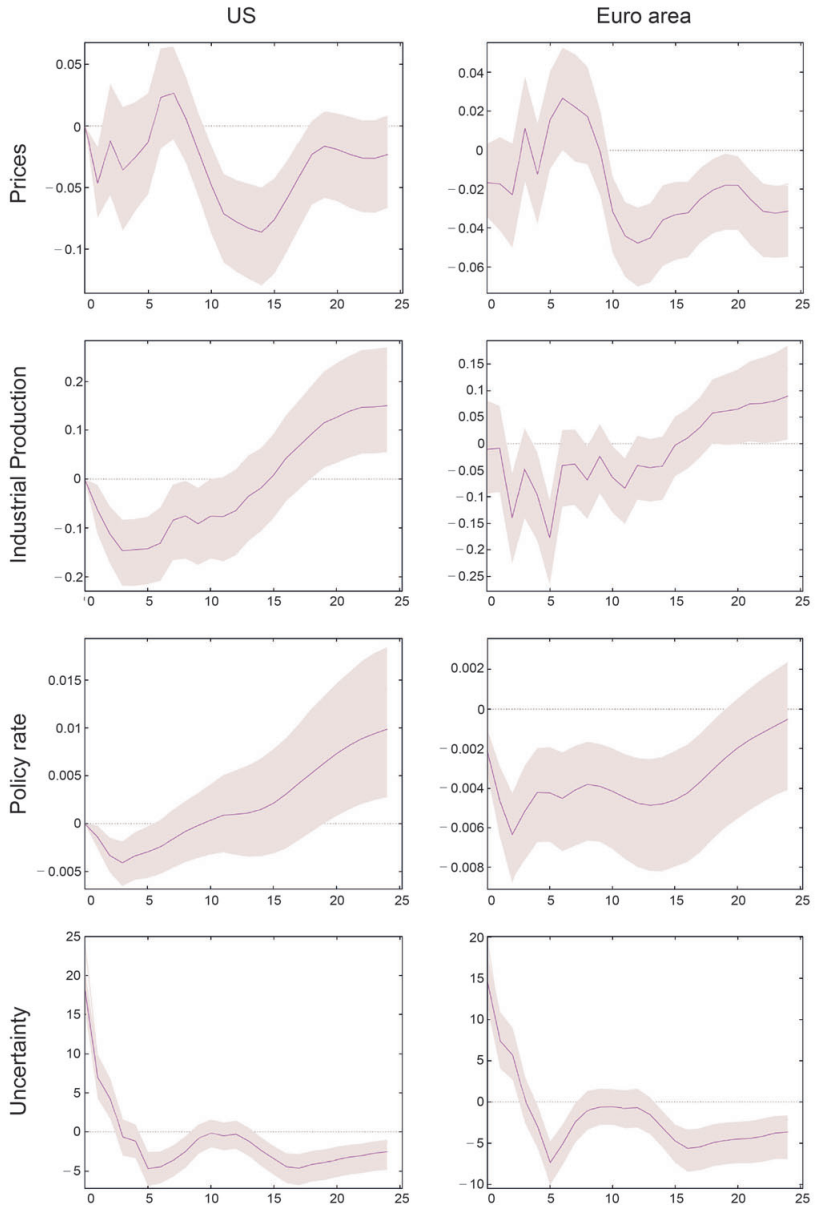
Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We set the VIX (Leduc and Liu, 2013; Bloom et al., 2013) and the VSTOXX instead of the US and European policy uncertainty index, respectively. We estimate the following vector $y_t = [CPI^{US}\ IPI^{US}\ i^{US}\ VIX\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}\ VSTOXX]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.7: Empirical Impulse Responses to a US Economic Uncertainty Shock (trying a different ordering)



Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We order the policy uncertainty indexes first in each country-block. We estimate the following vector $y_t = [News^{US}\ CPI^{US}\ IPI^{US}\ i^{US}\ News^{Euro}\ HCPI^{Euro}\ IPI^{Euro}\ i^{Euro}]'$. The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.

Figure A.8: Empirical Impulse Responses to a US Economic Uncertainty Shock (with a different lag specification)



Notes: The figure reports orthogonalized impulse responses to an unanticipated US economic policy uncertainty shock. We estimate our baseline model with a different lag specification, a SVAR(5). The columns on the left and on the right report the IRFs for the US and European variables, respectively. The solid lines denote the median IRFs. The shaded areas identify the bootstrap-after-bootstrap (Kilian, 1998) confidence intervals at 90% level (2,000 replications). The economic policy uncertainty indexes are expressed in levels, whereas all the other variables are expressed in percent deviations with respect to their steady state. The horizontal axis identifies months.