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by

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Abstract

Increases in the real price of oil not explained by changes in global oil production or by global real demand for commodities are associated with significant increases in economic policy uncertainty. Oil-market specific demand shocks account for 30% of conditional variation in economic policy uncertainty and 21.5% of conditional variation in CPI forecast interquartile range after 24 months. Positive shocks due to global real aggregate demand for commodities significantly reduce economic policy uncertainty. Structural oil price shocks appear to have long-term consequences for economic policy uncertainty, and to the extent that the latter has impact on real activity the policy connection provides an additional channel by which oil price shocks have influence on the economy. As a robustness check, structural oil price shocks are significantly associated with economic policy uncertainty in Europe and energy-exporting Canada.

JEL classification: E31, E60, Q41, Q43
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1. Introduction

Following Hamilton's (1983) paper connecting oil price shocks with recession in the U.S., work by Lee et al. (1995), Hamilton (2005), Cunado and Perez de Garcia (2005), Jimenez-Rodriguez and Sanchez (2005) and Cologni and Manera (2008), amongst others, has confirmed the significance of real oil prices for real activity in the U.S. and other countries. Distinguishing the origin of oil price shocks has been shown to be important for assessing their impact on real activity. Kilian (2009) shows that oil price increases driven by precautionary demand for oil over uncertainty about future oil supply negatively affects real activity, and argues that in designing policies aimed at dealing with oil price shocks it is essential to distinguish the origins of the oil price shocks.

In parallel to the work on oil price shocks, a literature has grown that emphasizes the role of economic policy uncertainty on real activity. Bloom (2009) assigns a major role to uncertainty arising from important economic and political shocks to the business cycle. Baker, Bloom and Davis (2011) construct a measure of economic policy uncertainty and find that it strongly influences the intensity of recent recessions and recoveries.[1] Given the importance of oil price shocks for the economy the issue of the appropriate response by policy makers has naturally arisen. Oil price shocks influence the

[1] The effect of policy uncertainty on real activity can run along multiple channels. Hassett and Metcalf (1999) and Fernandez-Villaverde et al. (2011) find that certainty of tax credits provide an implicit subsidy to encourage firms' investment and fiscal volatility has significantly adverse effects on economic activity. Byrne and Davis (2004) show that increased inflation uncertainty negatively affects U.S. business fixed investment through a monetary policy channel. Gilchrist et al. (2010) and Pastor and Veronesi (2012a, 2012b) find that policy uncertainty drives up the cost of finance, intensifying disinvestment and economic contraction.

economy by changing relative prices, affecting inflation, and redistributing income with consequences for consumption, investment, production and welfare that draw the interest of policy makers.[2]

In this paper we investigate the effect of structural oil price shocks on economic policy uncertainty. Our concern here is not with how policy makers (with monetary, fiscal, or micro-level responsibilities) react to an oil price shock, but with the connection between structural oil price shocks and uncertainty about economic policy. A structural VAR model is estimated with monthly oil data and economic policy uncertainty indices. It is found that positive oil-market specific demand shocks, increases in the real price of oil not explained by changes in global oil production or by global real demand for commodities, significantly increase economic policy uncertainty. Positive shocks to global real aggregate demand, on the other hand, have a significant negative effect on economic policy uncertainty for about a year, and significantly increase real oil price. Increases in global real aggregate demand while raising real oil price, signal better times and alleviate concern about economic policy. Shocks to global oil production do not significantly affect economic policy uncertainty.

Oil-market specific demand shocks account for 30% of conditional variation in economic policy uncertainty and 21.5% of conditional variation in CPI forecast

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[2] Montoro (2012) and Natal (2012) argue that oil price shocks generate a trade-off between high inflation and low output stabilization that raises the policymakers' concern on the real consequences of oil price shocks. Pieschacón (2012) shows that fiscal policy provides a mechanism through which the effects of oil price shocks on economic activity are propagated. El Anshasy and Bradley (2012) find that higher oil prices cause larger government size in oil exporting countries. Bernanke et al. (2004) assign monetary policy an important role in explaining the transmission of oil price shocks to the economy. Early studies from Barro's (1979) tax-smoothing model to Becker and Mulligan's (1997) inefficient-tax model predict an adjustment of taxes and expenditure by the government in response to wealth shocks. Gelb (1988) finds that oil shocks cause a rise in federal government purchases.

interquartile range after 24 months. Shocks to global real aggregate demand for commodities are found to explain large statistically significant fractions of the conditional variance in federal expenditure policy uncertainties (37%) and in tax code expiration uncertainties (13%) at 24 months. As a robustness check, it is found that shocks to precautionary demand for oil also significantly influence economic policy uncertainty in Europe and energy-exporting Canada. Structural oil price shocks appear to have long-term consequences for economic policy uncertainty, and to the extent that the latter has impact on real activity the policy connection provides an additional channel by which structural oil price shocks have influence on the economy.

The paper is organized as follows. Section 2 describes data sources. Section 3 presents the structural VAR model. Section 4 discusses empirical results about the dynamics of oil shocks and economic policy uncertainty. Section 5 concludes.

2. Data

Data are monthly from January 1985 to December 2011. World production of crude oil, a proxy for oil supply, and U.S. refiner's acquisition cost of imported crude oil, a proxy for price of oil, are from the U.S. Department of Energy. The percent change in oil supply is measured by $100\times$ the log differences in world crude oil production in millions of barrels pumped per day averaged by month. The real price of oil is the nominal price of oil deflated by the U.S. CPI from the Bureau of Labor Statistics. Global real aggregate demand is measured by the index of global real economic activity constructed by Kilian (2009).[3] The index is based on equal-weighted dry cargo freight

[3] The data are available at Kilian's webpage: http://www-personal.umich.edu/~lkilian/paperlinks.html.

rates and indicates demand for shipping services arising from increases in real economic activity of the world, including emerging economies such as China and India that are excluded from conventional measures of aggregate activity using OECD countries alone.

The monthly economic policy uncertainty indices are obtained from Baker, Bloom and Davis (2011) and provide data from January 1985.[4] The index of overall economic policy uncertainty is a weighted average of four uncertainty components: news-based policy uncertainty, CPI forecast interquartile range, tax legislation expiration, and federal expenditures forecast interquartile range (denoted by news uncertainty, CPI disagreement, taxation expiration, and expenditure dispersion, respectively, for the simplicity of exposition).[5] The news-based policy uncertainty reflects the newspaper coverage of U.S. economic policy uncertainty, constructed by the month-by-month searches of Google News for articles containing the term 'uncertainty' and economic (e.g., monetary and fiscal) policies. The number of articles that discuss both the economy and policy uncertainty each month quantify as news uncertainty in that month.[6]

The other components of overall policy uncertainty are not news based. The CPI disagreement and federal expenditure dispersion are measured by the forecasters' disagreement (the interquartile range of forecast) over future outcomes about inflation rates and federal government purchases, respectively.[7] The taxation expiration is a 'transitory measure' constructed by the number of temporary federal tax code provisions

[4] The data can be found at http://www.policyuncertainty.com.

[5] Baker, Bloom, and Davis (2011) set the weights to 1/2 on the news uncertainty and 1/6 on each of taxation expiration, CPI disagreement, and expenditure dispersion components.

[6] The raw counts about the news uncertainty are normalized by the number of news articles that contain the term 'today' in order to mitigate the volume accumulation and high-frequency noise problems.

[7] The quarterly raw data of the forecast about inflation rates and federal government purchases are drawn from the survey of professional forecasters of Federal Reserve Bank of Philadelphia. The index value of monthly CPI disagreement and expenditure dispersion is held constant for each quarter.

set to expire in the contemporaneous calendar year and future ten years and reported by the Joint Committee on Taxation.[8]

Figure 1 shows real prices of crude oil and the index of (overall) economic policy uncertainty over 1985:01-2011:12. The timing of the outbreak of major historical events is marked in the figure. It can be seen that all dates of well-known events are followed by rises in the uncertainty. These events and Bloom's (2009) choice of major uncertainty shocks coincide with events that trigger oil price shocks identified by Hamilton (2009) and Kilian (2009). For example, the 2008-2009 financial crises caused shocks to precautionary demand for oil. The 1st/2nd Gulf War and Arab Spring caused supply-side oil price shock and oil-market specific demand shock.

3. Methodology

We use a structural VAR model to separate the three structural oil price shocks and to assess their relationship with U.S. economic policy uncertainty. The structural representation of the VAR model of order p is

$$A_0 y_t = c_0 + \sum_{i=1}^{p} A_i y_{t-i} + \varepsilon_t, \tag{1}$$

where $y_t = (\Delta prod_t, rea_t, rpo_t, pu_t)$, a 4×1 vector of endogenous variables, A_0 denotes the 4×4 contemporaneous coefficient matrix, c_0 represents a 4×1 vector of constant terms, A_i refers to the 4×4 autoregressive coefficient matrices, and ε_t stands for a 4×1

[8] The index value of taxation uncertainty is obtained for each January and kept constant for 12 months in the year.

vector of structural disturbances. The endogenous variables in the model are world oil production ($\Delta prod_t$), shocks to the global demand for all industrial commodities (rea_t), oil-market specific demand shocks captured by the changes in real oil prices (rpo_t), and either overall economic policy uncertainty or one of its four components in turn (pu_t).

We follow Kilian (2009) and Kilian and Park (2009) and take $p = 24$.[9] The long lag of 24 allows for a potentially long-delay in effects of structural oil price shocks on the policy uncertainty and for a sufficient number of lags to remove serial correlation.[10] Hamilton and Herrera (2004) argue that a lag length of 24 months is sufficient to capture the dynamics in the data in modeling business cycles in commodity markets.

The reduced form VAR is obtained by multiplying both sides of Equation (1) with A_0^{-1} which has a recursive structure such that the reduced form errors e_t are linear combinations of the structural errors ε_t in the following,

$$e_t = \begin{pmatrix} e_t^{\Delta prod} \\ e_t^{rea} \\ e_t^{rpo} \\ e_t^{pu} \end{pmatrix} = \begin{bmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} \begin{pmatrix} \varepsilon_t^{\Delta prod} \\ \varepsilon_t^{rea} \\ \varepsilon_t^{rpo} \\ \varepsilon_t^{pu} \end{pmatrix}, \tag{2}$$

[9] The previous literature has shown that long lags are important in structural models of the global oil market to account for the low frequency co-movement between the real price of oil and global economic activity.

[10] Sims (1998) and Sims, Stock and Watson (1990) argue that even variables that display no inertia do not necessarily show absence of long lags in regressions on other variables.

in which $\varepsilon_t^{\Delta prod}$ reflects the oil supply-side shocks, ε_t^{rea} captures the real aggregate demand shocks, ε_t^{rpo} denotes the oil market-specific demand shock, and ε_t^{pu} measures the economic policy uncertainty shocks.

The identifying restrictions on A_0^{-1} are motivated by Kilian (2009). The intuition is that crude oil supply does not respond to contemporaneous changes in oil demand within a given month, because of the high adjustment cost of oil production. Fluctuation in the real price of oil will not affect global real economic activity within a given month, due to the sluggishness of the global real reaction. The model ordering economic policy uncertainty last is motivated by Kilian and Vega (2011) who argue that oil prices are predetermined with respect to U.S. macroeconomic aggregates within a given month.

In Equation (2) $e_t \sim N(0,\Sigma)$, and the partial correlation coefficients quantifying the contemporaneous correlation between two components of the errors, $\rho = -\sigma^{ij} / \sqrt{\delta^{ii}\delta^{jj}}$, where σ^{ij} denotes the elements of the precision matrix Σ^{-1}, are [11]

$$\rho = \begin{bmatrix} & rea & rpo & pu \\ \Delta prod & 0.022 & -0.064 & -0.093 \\ & (0.26) & (0.54) & (0.95) \\ rea & & 0.186 & -0.006 \\ & & (1.94) & (0.07) \\ rpo & & & -0.092 \\ & & & (0.78) \end{bmatrix}.$$

[11] Values in the parenthesis of the matrix are absolute t-statistic to which the standard error is generated by recursive-design wild bootstrap with 2,000 replications proposed by Gonçalves and Kilian (2004).

The result provides supporting evidence on the identifying restrictions in the structual VAR model, in that the contemporaneous correlation between oil price shocks and policy uncertainty is small and statistically insignificant within a given month.[12]

To investigate the stationarity of the variables in the structural VAR model, we conduct the ADF and PP tests for each series. We find that we can reject the null hypothesis, based on the ADF test, that $\Delta prod_t$, rea_t, rpo_t and pu_t contain a unit root at the 5% significant level, and we also find that the PP test suggests that real price of oil (rpo_t) contains a unit root.[13] In this study the nonstationarity of the real price of oil is not a major concern since the impulse response estimates presented below are reasonably estimated.[14]

4. Empirical Result

4.1. Impulse Response Effects

Figure 2 reports the impulse response functions (IRFs) in 24 months of world oil production, global real economic activity, real price of oil, and economic policy uncertainty to one-standard deviation structural shocks. To generate the standard errors of

[12] Swanson and Granger (1997) suggest using the value of partial correlation coefficients to determine the variable ordering and relevant t-statistics for identifying restriction on the VAR models.
[13] Specifically, the p-values of z-test are 0.00, 0.00, 0.03 and 0.02 for $\Delta prod_t$, rea_t, rpo_t and pu_t, respectively, by the ADF test with a drift and 3 lags determined by Schwarz-Bayes information criterion. The MacKinnon approximate p-values are 0.00, 0.04, 0.55 and 0.01 for $\Delta prod_t$, rea_t, rpo_t and pu_t, respectively, by PP test with a drift and 3 lags determined by Newey-West automatic bandwidth selection criterion. The result is similar when using the ADF and PP tests with trend.
[14] The nonstationary of the real price of oil may lead to a loss of asymptotic efficiency reflected in a wider error bands in the estimation. However, differencing the real price series results in removal of the slow moving component in the series, and incorrectly differencing the real price of oil would cause the estimates to be inconsistent given the nature of standard unit root tests. Since the estimated impulse response is robust even if the stationary assumption is violated, we use the level of the real price of oil as in common with prior literature (e.g., Kilian (2009) and Kilian and Park (2009)).

the impulse-response function for the structural VAR model, we conduct recursive-design wild bootstrap with 2,000 replications proposed by Gonçalves and Kilian (2004), in that the modified recursive-design bootstrap method yields asymptotic refinements for autoregressive models. One-standard error and two-standard error bands indicated by dashed and dotted lines, respectively. The analysis of the IRFs presents the short-run dynamic response of dependent variables (i.e., vertical axis labels) to the structural shocks.

In the first column of Figure 2 are shown the responses of global oil production to structural innovations in global oil production, real economic activity, real price of oil and the economic policy uncertainty. The effect of an unanticipated supply disruption on global oil production is very persistent and highly significant. A positive global real activity shock has a persistent positive effect on global oil production that is statistically significant for up to 13 months. Shocks to oil-specific market demand and to economic policy uncertainty do not significantly affect global oil production.

An unanticipated aggregate demand expansion has a highly significant effect on global real economic activity for at least 15 months that falls over time in the second column of Figure 2. A positive shock to real oil price raises global aggregate demand significantly for several months before becoming significantly negative between 7 to 11 months. Unanticipated innovations to global oil production and to economic policy uncertainty do not cause significant effects on global aggregate demand. In the third column of Figure 2, an unanticipated global real aggregate demand expansion raises the real prices of oil and the effect becomes statistically significant after 15 months.

Unexpected oil supply disruptions on the real price of oil are statistically significant between 9 to 14 months. A surprise rise in economic policy uncertainty reduces the real price of oil by a statistically significant amount in a window between 11 and 15 months.

In the fourth column of Figure 2 the responses of economic policy uncertainty to one-standard structural shocks of each variable in the structural VAR model are presented. Unexpected oil supply disruptions do not have a statistially significant effect on U.S. economic policy uncertainty. An unanticipated positive innovation in global real aggregate demand has a negative effect on economic policy uncertainty that is statistically significant from the 2^{nd} month to the 12^{th} month. After one year the response becomes statistically insignificant and approaches zero. An unexpected positive shock to oil-market specific demand causes a persistent positive effect on economic policy uncertainty that is statistically significant from the 3^{rd} month through the 24^{th} months shown. Shocks to economic policy uncertainty have an immediate effect on economic policy uncertainty that gradually erode with a temporary bounce between 10 and 12 months.

In summary, the results shows that a positive shock to precautionary demand for crude oil causes an increase in real oil price and increased economic policy uncertainty, and a positive shock to global real aggregate demand causes an increase in real oil price and decreased economic policy uncertainty. Fluctuation in the real price of crude oil driven by precautionary demand and global real aggregate demand may be viewed as important indicators of U.S. economic policy uncertainty.

4.2. Cumulative Oil Shock Effects on Economic Policy Uncertainty

The cumulative contribution to economic policy uncertainty of the structural shocks to global oil production, global real aggregate demand, oil-market specific demand and economic policy uncertainty are reported in Figure 3 over 1988:01-2011:12. The historical decomposition of the effect of these structural oil shocks provides information on how the structural oil price shocks have contributed to economic policy uncertainty over time.

In Figue 3 the cumulative contribution of oil supply shocks to economic policy uncertainty is relatively small over time. In contrast, global real aggregate demand shocks and oil-market specific demand shocks are seen to cause long swings in the economic policy uncertainty. The effect of oil-market specific demand on economic policy uncertainty is decreasing before 1999 and increasing after 1999. The collapse of the OPEC cartel in late 1985 and substantial reduction in oil demand following the Asian financial crisis in 1997-1998 steadily diminished the precautionary demand for oil arising from uncertainty about future oil supply shortfalls. The effect of increased precautionary demand for oil on economic policy uncertainty reaches a peak during the period of financial crisis in 2008-2009.

Global real aggregate demand shocks reduce economic policy uncertainty following a surge in real economic activity that started around 2001. This pattern exhibits significant reversals after the financial crisis starting in late 2007. The historical decomposition suggests that the cumulative effects of a combination of global economic activity shocks and oil-market specific demand shocks have been the main influences on economic policy uncertainty since 1988:01. Oil supply shock disruptions have played only a minor role.

The last panel in Figure 3 shows that spikes in economic policy uncertainty are closely associated with well-known prominent geopolitical events in U.S. history. Following the Gulf War in 1990, during the first Clinton administration and after the terrorist attack in 2001, there are large rises in economic policy uncertainty. After Iraq War in 2003, the global financial crisis in 2008, the first year of the Obama administration in 2009, Euro Crisis in 2010, and the debt celling debate in 2011, there are significant increases in the policy uncertainty.

4.3. Variance Decomposition of Policy Uncertainty to Structural Oil Shocks

4.3.1. Economic Policy Uncertainty

The forecast error variance decompositions (FEVDs) of the (overall) economic policy uncertainty are reported in Panel A of Table 1. It shows the percent contribution of structural shocks in the crude oil market to the overall variation of U.S. economic policy uncertainty. In the first few months the effects of three structural oil price shocks on U.S. economic policy uncertainty are negligible. Over time the explanatory power of the three structural shocks in the crude oil market increases. After 24 months 31% of the volatility in economic policy uncertainty is accounted for by the innovations of unanticipated precautionary demand for oil. After 60 months this becomes 58%. These effects are statistically significant at the 1% level. Over the longer term the forecast error variance decompositions (FEVDs) of economic policy uncertainty to innovations in global oil production and in world demand are not statistically significant.

4.3.2. Economic Policy Uncertainty Components

We now turn to an investigation of the effects of the structural oil price shocks on the underlying policy-uncertainty components, namely, the broad news-based policy uncertainty, tax legislation expiration, federal expenditures forecast interquartile range, and CPI forecast interquartile range. It is important to note that the last three components of economic policy uncertainty index are not news based. The analysis is conducted by estimating four analogous structural VAR models with each component ordered last instead of the overall economic policy uncertainty in Equation (1).

The variance decomposition results for components of economic policy uncertainty are reported in panel B, C, D and E of Table 1. Oil-market specific demand shocks explain statistically significant 21.5% of the variance in news-based economic policy uncertainty at 24. This result is similar to the results for the overall economic policy uncertainty in that news-based economic policy uncertainty is given a weight of half in the overall index.

Oil-market specific demand shocks explain statistically significant 22.9% and 47.7% of the variance in the CPI forecast interquartile range at 24 and 60 months, respectively. Shocks to global real aggregate demand are found explain large statistically significant fractions of the variance in federal expenditure policy uncertainties (29.8%) and of the variance in tax code expiration uncertainties (45.9%) at 60 months. These results suggest that uncertainty about economic policy (fiscal and monetary policies) play an important role as a transmission channel through which the effect of oil price shocks on the economy is propagated with a delay of at least a year.

4.4. Robustness Check: International Evidence

This subsection examines how oil shocks affect economic policy uncertainty in Europe and Canada in order to establish the robustness results. We utilize price of Brent crude oil for Europe and Canada as a proxy of oil price. Nominal oil prices are deflated by CPI of each area to obtain the real variables. The sample period is over 1997:01-2011:12 determined by the availability of the index of economic policy uncertainty in Canada starting on January 1997. Table 2 presents the forecast error variance decompositions of policy uncertainty in each area. Consistently oil-market specific demand shocks account for 17.8% and 27.5% of the long-run variation of domestic policy uncertainty at 24 months in Europe and Canada, respectively.

5. Conclusion

This paper analyzes how U.S. economic policy uncertainty reacts to structural shocks to global oil production, global real aggregate demand and oil-market specific demand. It is found that positive oil price shocks arising from increased precautionary demand for crude oil are associated significant increases in U.S. economic policy uncertainty. Positive shocks to global real aggregate demand have a significant negative effect on economic policy uncertainty and significantly increase real oil price. Shocks to global oil production do not significantly affect economic policy uncertainty.

Oil-market specific demand shocks account for 30% of conditional variation in economic policy uncertainty and 21.5% of conditional variation in CPI forecast interquartile range after 24 months. Shocks to global real aggregate demand explain large statistically significant fractions of the variance in federal expenditure policy uncertainties and of the variance in tax code expiration uncertainties several years out. The results suggest that economic policy uncertainty is a transmission channel for the effect of oil price shocks on the economy over a several year horizon.

The paper contributes to the literature by connecting structural oil price shocks to economic policy uncertainty. It finds that fluctuations in the real price of crude oil driven by precautionary demand and by global aggregate demand are important indicators of economic policy uncertainty and its components.

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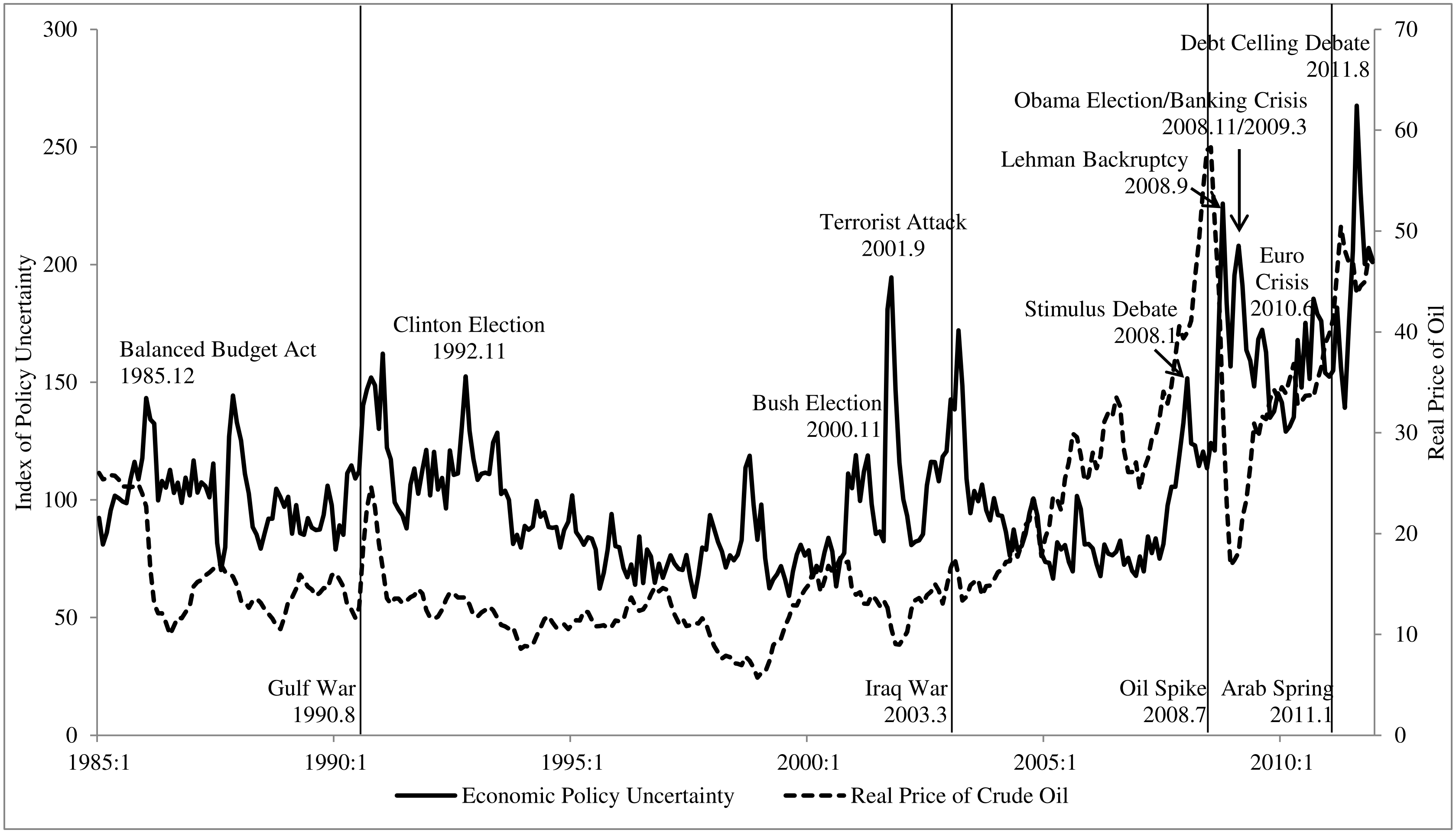
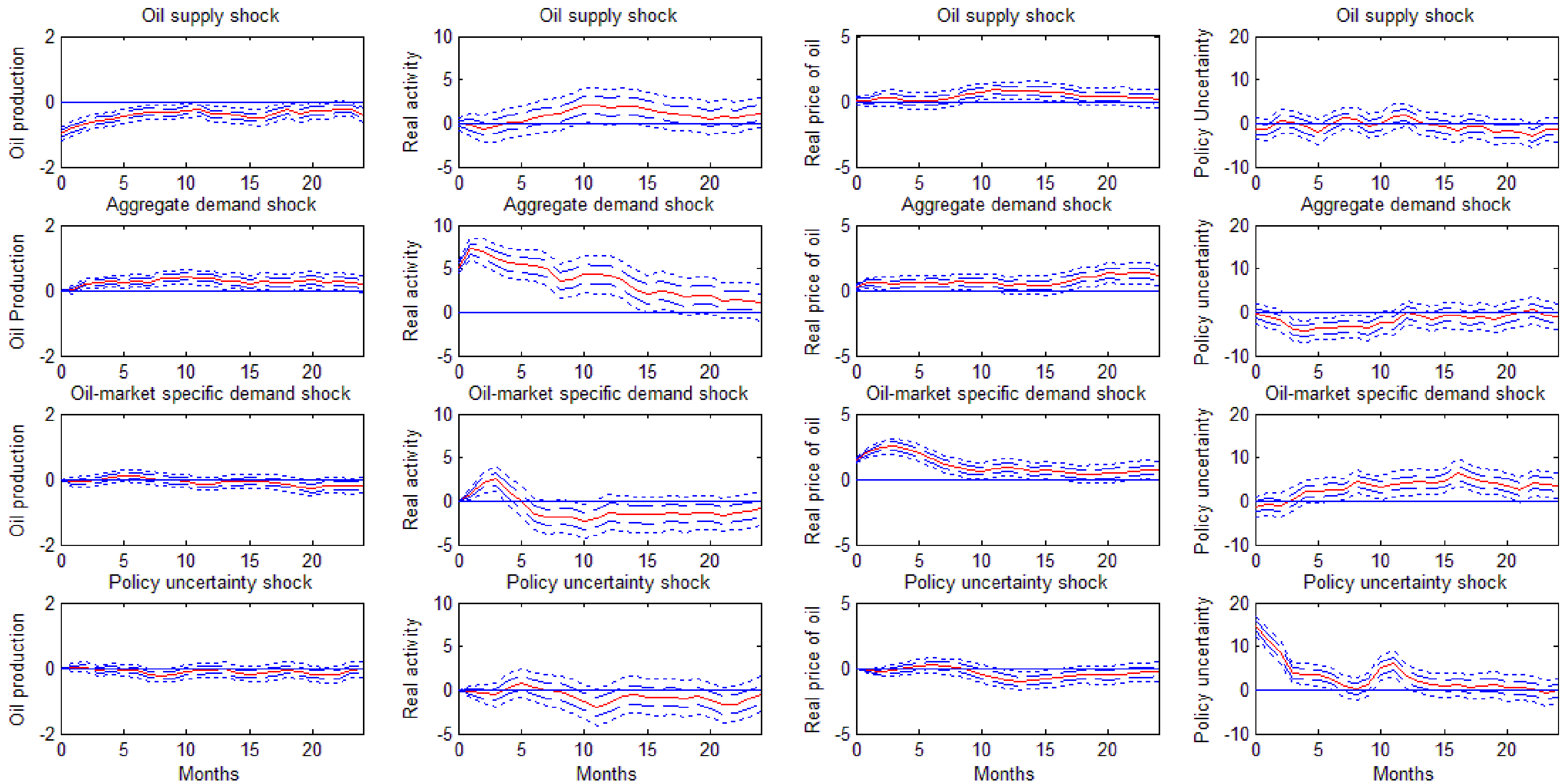


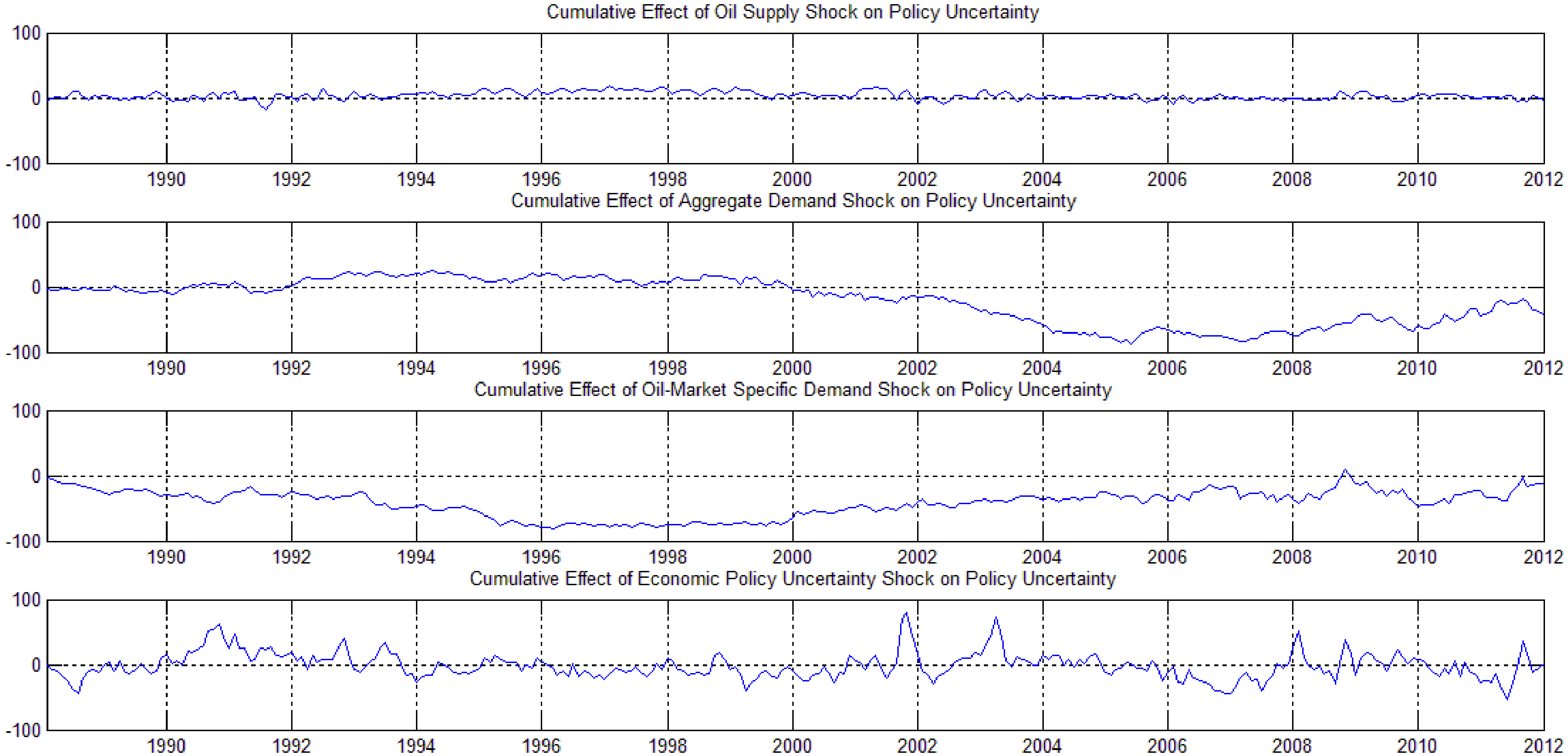
Figure 1. Real price of crude oil/economic policy uncertainty, 1985:1-2011:12.
Notes: the index of economic policy uncertainty is drawn from Baker et al. (2011), and the real price of oil is the nominal price of oil deflated by the U.S. CPI from the Bureau of Labor Statistics.

Figure 2. Responses to One-Standard Deviation Structural Shocks



Notes: Point estimates, with one- and two- standard error bands, derived from the structural VAR model described in the text. The confidence intervals were constructed using a recursive-design wild bootstrap.

Figure 3. Historical Decomposition of Policy Uncertainty, 1988:1-2011:12



Notes: Estimates derived from the structural VAR model described in the text.

Table 1. Forecast Error Variance Decomposition (FEVD) of U.S. Policy Uncertainty

Horizon	Oil Supply Shock		Aggregate Demand Shock		Oil-market Specific Demand Shock		Other Shocks	
Panel A. FEVD of overall Policy Uncertainty								
1	0.008	(0.32)	0.001	(0.04)	0.008	(0.39)	0.983	(30.06)
3	0.010	(0.37)	0.010	(0.40)	0.007	(0.30)	0.973	(23.02)
12	0.018	(0.53)	0.154	(2.07)	0.116	(1.68)	0.713	(8.05)
24	0.039	(0.87)	0.121	(1.94)	0.310	(2.99)	0.530	(5.51)
60	0.062	(0.99)	0.095	(1.17)	0.580	(4.69)	0.263	(2.81)
Panel B. FEVD of News-Based Policy Uncertainty								
1	0.009	(0.39)	0.000	(0.04)	0.006	(0.33)	0.984	(33.09)
3	0.011	(0.44)	0.011	(0.42)	0.007	(0.29)	0.972	(23.93)
12	0.019	(0.61)	0.089	(1.51)	0.149	(2.09)	0.744	(8.79)
24	0.049	(1.16)	0.093	(1.63)	0.215	(2.55)	0.642	(7.04)
60	0.052	(1.08)	0.073	(1.20)	0.505	(4.64)	0.370	(3.98)
Panel C. FEVD of Expenditure Dispersion								
1	0.010	(0.41)	0.031	(1.01)	0.018	(0.86)	0.941	(20.44)
3	0.013	(0.43)	0.024	(0.80)	0.017	(0.72)	0.946	(19.07)
12	0.051	(0.83)	0.308	(2.73)	0.037	(0.80)	0.604	(5.38)
24	0.101	(1.20)	0.367	(3.07)	0.075	(1.06)	0.457	(4.01)
60	0.155	(1.78)	0.298	(2.78)	0.142	(1.50)	0.405	(4.10)
Panel D. FEVD of CPI Disagreement								
1	0.004	(0.21)	0.001	(0.07)	0.002	(0.18)	0.993	(38.92)
3	0.007	(0.29)	0.012	(0.45)	0.008	(0.41)	0.973	(22.84)
12	0.017	(0.51)	0.029	(0.80)	0.048	(0.97)	0.906	(13.59)
24	0.035	(0.92)	0.064	(1.36)	0.229	(2.84)	0.672	(8.15)
60	0.031	(0.78)	0.074	(1.15)	0.477	(4.55)	0.418	(4.82)
Panel E. FEVD of Taxation Expiration								
1	0.001	(0.12)	0.032	(1.08)	0.003	(0.18)	0.964	(28.98)
3	0.002	(0.14)	0.051	(1.10)	0.007	(0.29)	0.940	(18.45)
12	0.031	(0.58)	0.052	(0.72)	0.127	(1.47)	0.790	(7.31)
24	0.063	(1.02)	0.127	(1.54)	0.274	(2.61)	0.537	(4.85)
60	0.073	(1.08)	0.459	(3.35)	0.125	(1.59)	0.343	(2.87)

Notes: Table 1 shows percent contribution of demand and supply shocks in the crude oil market to the overall variability of policy uncertainty. The forecast error variance decomposition is based on the structural VAR model. The values in parentheses represent the absolute t-statistic when standard errors were generated using a recursive-design wild bootstrap.

Table 2. Forecast Error Variance Decomposition (FEVD) of Policy Uncertainty in Europe and Canada

Horizon	Oil Supply Shock		Aggregate Demand Shock		Oil-market Specific Demand Shock		Other Shocks	
Panel A. FEVD of overall Policy Uncertainty in Europe								
1	0.015	(0.33)	0.002	(0.05)	0.007	(0.18)	0.976	(15.31)
3	0.021	(0.37)	0.034	(0.54)	0.082	(0.97)	0.863	(8.19)
12	0.072	(1.17)	0.173	(1.81)	0.145	(1.80)	0.611	(5.98)
24	0.133	(1.80)	0.159	(1.87)	0.178	(2.14)	0.530	(5.37)
60	0.114	(1.35)	0.176	(1.55)	0.359	(3.02)	0.351	(3.28)
Panel B. FEVD of overall Policy Uncertainty in Canada								
1	0.079	(0.97)	0.123	(1.48)	0.092	(1.23)	0.707	(6.48)
3	0.052	(0.75)	0.167	(1.62)	0.115	(1.21)	0.666	(5.43)
12	0.062	(0.88)	0.226	(2.19)	0.216	(2.22)	0.496	(4.98)
24	0.135	(1.62)	0.185	(2.01)	0.275	(2.83)	0.406	(4.51)
60	0.116	(1.29)	0.162	(1.54)	0.534	(4.24)	0.188	(2.17)

Notes: Table 2 shows percent contribution of demand and supply shocks in the crude oil market to the overall variability of policy uncertainty. The forecast error variance decomposition is based on the structural VAR model. The values in parentheses represent the absolute t-statistic when standard errors were generated using a recursive-design wild bootstrap.