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Economic Policy Uncertainty and Inflation Expectations

Klodiana Istrefi
Banque de France, klodiana.istrefi@banque-france.fr

Anamaria Piloiu
Deutsche Bank Research, anamaria.piloiu@db.com

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Klodiana Istrefi and Anamaria Piloiu

Banque de France       DB Research

SEM Conference 2015
22-24 July, Paris
The views expressed herein are those of the authors and should under no circumstances be interpreted as reflecting those of the Banque de France or the Eurosystem.
Is there an effect of policy-related uncertainty on inflation expectations?
Motivation

- High levels of uncertainty, with policy uncertainty being a prominent contributor;
  - Policy uncertainty has negative effects on economic activity;
  - However, not much known if such uncertainty affects beliefs and perceptions about policy, inflation expectations;
  - Long-term inflation expectations, information about the extent to which a central bank’s commitment to price stability is perceived as credible.
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What we do

- Highlight a new channel through which policy uncertainty can affect the macroeconomy.

- Study the link between policy-related uncertainty and inflation expectations.

- Bayesian Panel VAR (US and the euro area).


- Identify policy uncertainty shocks.
In this paper

What we do

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What we find

• Given a policy uncertainty shock:
  • economy contracts, short-term inflation expectations and interest rate fall;
  • long-term inflation expectations rise;

• Monetary and fiscal policy uncertainty, both important;

• Results robust to several specifications.
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1 Macroeconomic effects of economic policy uncertainty

✓ Fernandez-Villaverde at al. (2013), Born and Pfeifer (2014)
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Measuring policy-related uncertainty

- News-based EPU for US and the euro area:

- Evaluations: Human News Audit (corr. 0.76), Beige Book (corr. 0.8).
Data and Model specification

- Panel BVARs for US and euro area with, \( y_{i,t} = \begin{pmatrix} epu_{i,t} \\ gdp_{i,t} \\ \pi_{i,\text{long}|t}^e \\ \pi_{i,\text{short}|t}^e \\ i_{i,t} \end{pmatrix} \)

where:

- \( epu_{t} \), news-based EPU (data);
- \( gdp_{t} \), real GDP, seasonally adjusted;
- \( \pi_{\text{long}|t}^e \), 5 to 10 years ahead inflation expectations;
- \( \pi_{\text{short}|t}^e \), one year ahead inflation expectations;
- \( i_{t} \), short-term interest rate.

- Recursive identification \(( epu_{t}, gdp_{t}, \pi_{\text{long}|t}^e, \pi_{\text{short}|t}^e, i_{t} \).\)
  - EPU reacts on impact only to its own innovations.
  - an innovation to EPU can have an immediate effect on the variables ordered after.
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- We study variations for:
  - News-based:
    - overall policy uncertainty
    - monetary policy uncertainty
    - fiscal policy uncertainty
  - Sources for inflation expectations:
    - Consensus Economics
    - SPF of Fed Philadelphia and of ECB

- Optimal lag selection with BIC. Lag selected 2.
- Flat prior, as in Uhlig (2005).
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Empirical Results

- IRFs to an overall policy uncertainty shock
  - IRFs of long- and short-term inflation expectations for:
    ✓ Different sources of inflation expectations.
    ✓ Specific type of policy uncertainty shock.
  - Contribution of policy uncertainty shocks to long-term inflation expectations (FEVD).
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Given two standard deviation innovation in EPU:
- Long-term inflation expectations rise.
- Short-term expectations fall.

Policy uncertainty shocks in our sample three to four st. deviations.
- Long-term inflation expectations rise up to 10 bp.
- Sufficient to miss the ECB’s "below, but close to, 2%" or Fed’s 2% inflation objective.
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IRFs of inflation expectations

Consensus Economics

Survey of Professional Forecasters

(a) Overall policy uncertainty

(b) Monetary policy uncertainty

(c) Fiscal policy uncertainty
Contribution of policy uncertainty shocks

Table: FEVD (posterior median) of long-term inflation expectations

<table>
<thead>
<tr>
<th></th>
<th>Overall PU</th>
<th>MP Uncertainty</th>
<th>FP Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consensus Economics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 20 quarters</td>
<td>13.59</td>
<td>11.11</td>
<td>6.71</td>
</tr>
<tr>
<td></td>
<td>(4.56,26.61)</td>
<td>(4.36,22.30)</td>
<td>(2.15,16.05)</td>
</tr>
<tr>
<td><strong>SPF</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 20 quarters</td>
<td>8.66</td>
<td>17.14</td>
<td>7.67</td>
</tr>
<tr>
<td></td>
<td>(3.34,9.52)</td>
<td>(8.04,28.03)</td>
<td>(3.16,16.19)</td>
</tr>
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</table>

*Notes*: Posterior median of FEVD from the panel BVAR. In brackets its 68% posterior distribution.
Robustness checks

1. Assumptions for identification
   - Order EPU index last

2. Selected sample
   - Exclude the recent crisis
   - Exclude or dummy for period with unconventional MP

3. A different proxy for uncertainty,

4. Individual VARs

   - Our key result is robust!
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   - BVAR US
   - BVAR EA

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Robustness checks

1. Assumptions for identification
   - Order EPU index last (Re-ordering)

2. Selected sample
   - Exclude the recent crisis (Sample2006)
   - Exclude or dummy for period with unconventional MP (Dummy)

3. A different proxy for uncertainty, (VIX)

4. Individual VARs (BVAR US, BVAR EA)
   - Our key result is robust!
In response to policy uncertainty shocks:

- Long-term inflation expectations increase.
  - ✓ New empirical result.
  - ✓ Monetary policy uncertainty not always the reason.
  - ✓ Up to 17% of its variance explained.

- Economy contracts.
  - ✓ In line with previous work in literature.
  - ✓ Monetary and fiscal policy uncertainty equally harmful.

- Results are robust.

- The effects are stronger for the US.
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Thank you for your attention!
IRFs of IE for US

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IRFs of IE for euro area

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Reordering 2: IRFs to policy uncertainty shocks for the panel-BVAR with CE expectations

(g) Overall policy uncertainty

(h) Monetary policy uncertainty

(i) Fiscal policy uncertainty
Dummy: IRFs to policy uncertainty shocks for the panel-BVAR with CE expectations

(j) Overall policy uncertainty

(k) Monetary policy uncertainty

(l) Fiscal policy uncertainty
Sample U06: IRFs to policy uncertainty shocks for the panel-BVAR with CE expectations

(m) Overall policy uncertainty

(n) Monetary policy uncertainty

(o) Fiscal policy uncertainty
IRFs to VIX uncertainty shocks for the panel-BVAR

(p) CE Panel

(q) SPF Panel
Bayesian Estimation (1)

Let \( k = np + m + 1 \) and \( \Theta_{(k \times n)} = (A_0, A_1, \ldots, A_p, B_0)' \). Define:

\[
Y_{(T \times n)} = \begin{bmatrix} y'_1 \\ y'_2 \\ \vdots \\ y'_T \end{bmatrix}, \quad X_{(T \times k)} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_T \end{bmatrix}, \quad x_t = (1, y'_{t-1}, \ldots, y'_{t-p}, z'_t) \quad \text{and} \quad U_{(T \times n)} = \begin{bmatrix} u'_1 \\ u'_2 \\ \vdots \\ u'_T \end{bmatrix}.
\]

The VAR can be conveniently rewritten as:

\[
Y = X\Theta + U. \tag{2}
\]

The likelihood function of \((\Theta, \Sigma)\) based on \(Y\) is:

\[
p(Y|\Theta, \Sigma) \propto \frac{1}{|\Sigma|^{T/2}} \times \exp \left\{ -\frac{1}{2} \text{trace}[\Sigma^{-1}\hat{S}] \right\} \times \exp \left\{ -\frac{1}{2} \text{trace}[\Sigma^{-1}(\Theta - \hat{\Theta})'X'X(\Theta - \hat{\Theta})] \right\}, \tag{3}
\]

where

\[
\hat{\Theta} = (X'X)^{-1}(X'Y) \quad \text{and} \quad \hat{\Sigma} = \frac{1}{T}(Y - X\hat{\Theta})'(Y - X\hat{\Theta}) \tag{4}
\]

with \( \hat{S} = (Y - X\hat{\Theta})'(Y - X\hat{\Theta}) \).
Bayesian Estimation (2)

Our prior and posterior for \((\Theta, \Sigma)\) belong to the Normal-Whishart family. If the prior is described by \(\bar{\Theta}_0, N_0, S_0\) and \(\nu_0\), then the posterior is described by \(\bar{\Theta}_T, N_T, S_T\) and \(\nu_T\) where

\[
\begin{align*}
\nu_T &= T + \nu_0, \\
N_T &= N_0 + X'X, \\
\bar{\Theta}_T &= N_T^{-1} (N_0 \bar{\Theta}_0 + X'X\hat{\Theta}), \\
S_T &= \frac{\nu_0}{\nu_T} S_0 + \frac{T}{\nu_T} \hat{\Sigma} + \frac{1}{\nu_T} (\hat{\Theta} - \bar{\Theta}_0)'N_0N_T^{-1}X'X(\hat{\Theta} - \bar{\Theta}_0).
\end{align*}
\]

Using a week prior with \(N_0 = 0, \nu_0 = 0, S_0\) and \(\bar{\Theta}_0\) being arbitrary, then the posterior is characterized by \(N_T = X'X, \nu_T = T, S_T = \hat{\Sigma}\) and \(\bar{\Theta}_T = \hat{\Theta}\).
EPU index is a proxy variable and subject to measurement errors. It is often questioned whether it is just another measure of the state of the economy or whether it suffers from political slant.

Baker, Bloom and Davis (2012) evaluate the index in several ways and argue that these errors do not undermine the accuracy of the index.

1. Strong correlation between the computerized newspaper component of the EPU index and a measure of what a human reader would call economic policy uncertainty.

2. EPU index consistent with the frequency of the word "uncertain" in the FOMC Beige Book and with the responses of the stock market generated by policy news.

3. EPU index does not appear to be strongly affected by newspaper political slant.
The VIX is highly correlated with a news index of equity market uncertainty.

Source: Baker, Bloom and Davis (2012).

Notes: Frequency of the triple of "economy/economic", "uncertain/uncertainty" and one of a collection of financial market terms (stock price, equity price, stock market) in 10 major US papers and normalized by the total number of articles, by month and paper. Both series scaled to same mean. Each series set to mean of 100 over entire period.
Inflation expectations

- With respect to the general public only short-term inflation expectations are available

- Long-term inflation expectations can profoundly influence current macroeconomic behavior
  - Closely monitored by monetary authorities
  - Well anchored long-term inflation expectations crucial indicator of central bank credibility
  - Key to the well functioning of the monetary policy transmission mechanism

- Different measures of long-term inflation expectations:
  - Survey-based measures (surveys of professional forecasters)
  - Financial market-based measures (Break Even Inflation Rates)

- We use the survey-based measures of long-term inflation expectations
Measuring inflation expectations

Inflation Expectations SPF median (short-term)

Inflation Expectations SPF median (long-term)

Inflation Expectations CE (short-term)

Inflation Expectations CE (long-term)
News-based EPU

- Automated search; an article must include terms pertaining to:
  1. uncertainty
  2. the economy
  3. policy

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