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Uncertainty and the Great Recession

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Abstract

Has heightened uncertainty been a major contributor to the Great Recession and the slow recovery in the U.S.? To answer this question, we identify exogenous changes in six uncertainty proxies and quantify their contributions to GDP growth and the unemployment rate. Our results are threefold. First, only a minor part of the rise in uncertainty measures during the Great Recession was driven by exogenous uncertainty shocks. Second, while increased uncertainty explains less than one percentage point of the drop in GDP, macroeconomic uncertainty shocks increased the unemployment rate by up to 0.7 percentage points in 2010 and 2011. Third, economic policy uncertainty had only minor effects on real activity.

JEL-Classification: C32, E32

Keywords: Uncertainty Shocks, Structural VAR

1 Introduction

How much has increased uncertainty contributed to the Great Recession and the ensuing weak recovery in the United States? This question has captivated economists, politicians, and the blogosphere alike, the popular argument being that uncertainty reduces firms' hiring and investment and consumers' spending. However, while the literature on the effects of fluctuations in uncertainty on economic activity has rapidly expanded following the seminal paper by Bloom (2009),[1] few

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[1]See Bloom (2014) for a survey.

papers have actually quantified the specific effects of uncertainty on U.S. GDP and unemployment in the aftermath of the financial crisis. In a "back-of-the-envelope" calculation, Bloom (2014) reckons that the rise in uncertainty in 2008 potentially accounted for a three percentage point loss in GDP in 2008 and 2009. This is roughly in line with Baker, Bloom, and Davis (2013) who find that the increase in policy uncertainty during the years 2006 to 2011 can be connected to a GDP decline of 2.3 percent.[2] For the U.S. unemployment rate, Leduc and Liu (2014) find that uncertainty shocks account for a one percentage point increase during the crisis and recovery.

We contribute to this literature by providing quantitative estimates of the pure uncertainty effects on the U.S. economy since 2008. To this end, we employ a two-step estimation strategy adopted from the literature on oil price shocks (Kilian, 2009) to identify and map monthly exogenous changes in a wide range of uncertainty proxies into quarterly fluctuations in GDP and the unemployment rate. We then compute quarterly growth contributions of these identified uncertainty shocks to determine their influence on GDP and unemployment during the Great Recession and the subsequent slow recovery.

Employing a wide range of uncertainty proxies has the advantage of capturing different kinds of uncertainty, such as (among others) economic policy uncertainty (Baker et al., 2013), (aggregate) macroeconomic uncertainty (Jurado, Ludvigson, and Ng, forthcoming), and (idiosyncratic) firm-specific uncertainty (Bachmann, Elstner, and Sims, 2013).[3] At the same time these measures are constructed using very different approaches, e.g. newspaper searches (Baker et al., 2013) or the common volatility in the unforecastable component of a large number of economic indicators (Jurado et al., forthcoming), further robustifying our results. The monthly uncertainty proxies allow us to identify uncertainty shocks in a monthly structural vector autoregression (SVAR) where identifying timing assumptions are less strong compared to the quarterly case. However, the caveat of the monthly frequency in earlier studies is that one then has to rely on manufacturing production as a measure of real activity, a measure that only accounts for about 12 percent of U.S. GDP. By using the Kilian (2009) approach, we can identify the shocks at the monthly level, clean them of confounding factors, and still look at the response of quarterly GDP to an uncertainty shock.

Our results are threefold. First, while all of the employed uncertainty measures reached record

[2]However, Born and Pfeifer (2014) find that policy uncertainty has had only small effects on post-World War II U.S. business cycles.

[3]See Table A for the complete list of measures.

highs during the Great Recession, only a minor part of this rise was driven by exogenous uncertainty shocks. It rather seems that most fluctuations in these measures came from first moment shocks. In other words, the role of uncertainty might be overstated when not controlling appropriately for concomitant level effects. Second, despite being widely discussed in political and economic circles, economic policy uncertainty has only minor effects on economic activity, both at the monthly and quarterly level. In all our estimations, its effects are trumped by more general macroeconomic uncertainty. Third, estimating the growth contributions of uncertainty to GDP and unemployment, we find that uncertainty explains less than one percentage point of the 9 percent drop in GDP[4] during the Great recession. However, macroeconomic uncertainty shocks increased the unemployment rate by 0.3 to 0.7 percentage points in 2010 and 2011, supporting the view that uncertainty shocks might be a contributor to the "jobless recovery" after the crisis.

The remainder of the paper is structured as follows. Section 2 describes the uncertainty measures and our empirical approach. In Section 3, we report our estimation results and present the estimated dynamic responses of manufacturing production, GDP, and unemployment to exogenous movements in uncertainty. In Section 4, we answer the question of whether heightened uncertainty worsened the Great Recession and holds back the pace of the ensuing recovery. Section 5 concludes.

2 Methodology

2.1 Measuring uncertainty

Measuring uncertainty is inherently difficult. Ideally, one would like to know the subjective probability distributions over future events from firms and households. As this is almost impossible to quantify directly, there exists no agreed measure of uncertainty in the literature and we have to rely on proxies. For our analysis, we take six widely-cited U.S. uncertainty measures from the literature. Considering this wide range of uncertainty proxies has the advantage that we are able to capture different kinds of uncertainty, such as economic policy, (aggregate) macroeconomic, and (idiosyncratic) firm-specific uncertainty.

Specifically, the six uncertainty measures are (i) the macroeconomic uncertainty proxy proposed by Jurado et al. (forthcoming), (ii) the economic policy uncertainty index of Baker et al. (2013), (iii)

[4] Measured against trend, see Footnote 15.

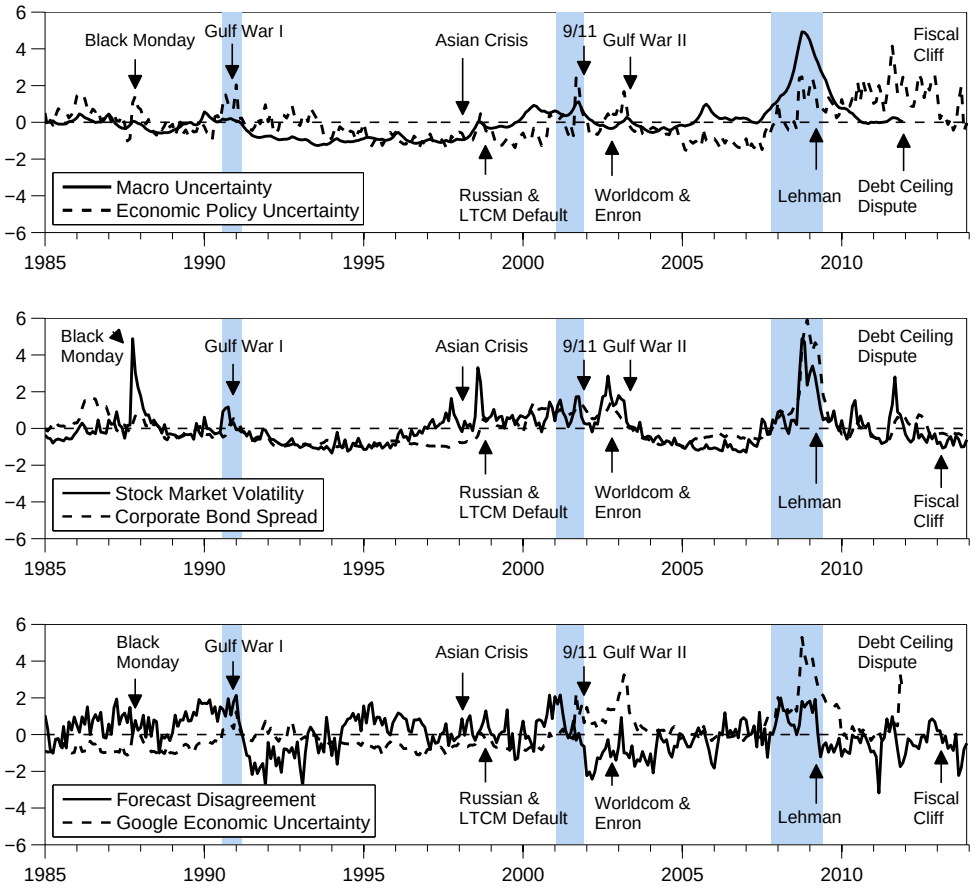
stock market volatility, (iv) corporate bond spreads, (v) a broader, general economic uncertainty index also provided by Baker et al. (2013) based on Google searches, and (vi) a survey-based measure proposed by Bachmann et al. (2013) using the dispersion of firms' forecasts about the general business outlook as a measure of (firm-specific) idiosyncratic uncertainty.[5]

Figure 1 presents the evolution of the six measures between January 1985 and December 2013. For comparison, each series has been demeaned and standardized; shaded areas mark recessions as dated by the NBER. Overall, the graphs are in line with well-known stylized facts concerning uncertainty proxies (see e.g. Bloom, 2009): First, there is a sizeable degree of co-movement between the uncertainty indices. The (mostly) positive unconditional correlation coefficients in Table 1 support this finding. Second, uncertainty is higher after political shocks like the 9/11 terrorist attack or Gulf War II. Third, the uncertainty proxies are countercyclical. Most of them increase noticeably before and during recessions while they are rather low during periods of stable economic expansion. The countercyclicality of uncertainty holds both at monthly as well as quarterly frequency as can be seen in the lower half of Table 1.

While these findings are interesting in itself, they provide no information about a causal effect of uncertainty on economic activity. We therefore have to resort to more sophisticated methods presented in the next subsection.

[5]See Appendix A for more details on the construction of these measures.

Figure 1: U.S. uncertainty measures



Notes: Each series has been demeaned and standardized by its standard deviation. The sample period is January 1985 to December 2013. For the macro uncertainty proxy and the Google economic uncertainty index, we only have data until the end of 2011. Shaded areas mark recessions as dated by the NBER.

Table 1: Cross-correlations

	EPU	MU	VXO	$Spread$	$FDISP$	GEU
			Uncertainty Measures			
EPU	1	0.39***	0.38***	0.42***	-0.03	0.52***
MU		1	0.54***	0.83***	0.21*	0.70***
VXO			1	0.67***	0.20**	0.52***
$Spread$				1	0.22*	0.62**
$FDISP$					1	-0.09
GEU						1
			Monthly Activity Variables			
$\Delta \log MP$	-0.19**	-0.51***	-0.22	-0.49***	-0.24***	-0.42***
UR	0.70***	0.17*	-0.02	0.14*	-0.28***	0.30***
			Quarterly Activity Variables			
$\Delta \log GDP$	-0.38***	-0.61***	-0.32	-0.55***	-0.29***	-0.59***
UR	0.75***	0.17***	-0.02	0.14***	-0.30***	0,31***

Notes: Numbers are pairwise unconditional time-series correlation coefficients. Significance of correlation coefficients is tested via a nonparametric block bootstrap where *** denotes 1% significance, ** 5% significance and * 10% significance, respectively. All variables are seasonally adjusted. Abbreviations: economic policy uncertainty (EPU), macro uncertainty (MU), stock market volatility (VXO), corporate bond spread ($Spread$), forecast disagreement ($FDISP$), and Google economic uncertainty (GEU). The activity variables are month-on-month growth of manufacturing production ($\Delta \log MP$), the quarter-on-quarter growth of GDP ($\Delta \log GDP$) and the unemployment rate (UR). To compute the correlation with $\Delta \log GDP$ and (UR), we take quarterly averages of the monthly uncertainty measures. The sample period is January 1985 to December 2013, except for the macro uncertainty proxy and the Google economic uncertainty index, where we only have data until December 2011.

2.2 Two-stage estimation approach

One key question for our analysis is the identification of exogenous movements in uncertainty. A prominent approach in the literature is to assume that uncertainty does not react contemporaneously to movements in real activity (see, e.g., Baker et al., 2013; Bloom, 2009). As this assumption is arguably too strong at the quarterly level, studies so far have employed monthly data, including manufacturing production as a proxy for GDP. Manufacturing production, however, only accounts for about 12 percent of U.S. GDP and it seems reasonable to assume that other sectors might differ in their response to heightened uncertainty.[6] Given that we are ultimately interested in the link between uncertainty and GDP, we adapt the two step procedure proposed by Kilian (2009) in the context of oil price shocks. Specifically, in a first step, we identify the structural uncertainty shocks via monthly structural vectorautoregressions (SVARs) including manufacturing production. In a second step, we then compute the quarterly means of these structural shocks and use them as regressors to explain fluctuations of quarter-on-quarter GDP growth and the level of the unemployment rate.

The first-stage VAR model is given by

$$y_t = A(L)y_{t-1} + u_t, \tag{1}$$

where $A(L)$ denotes a lag polynomial and we also include a constant and a linear trend. Following Bloom (2009), the vector of endogenous variables y_t includes the log S&P 500 index, a measure of uncertainty, the Federal Funds rate, the log wage in manufacturing, the log aggregate CPI, average hours worked in manufacturing, log manufacturing employment and log manufacturing production.[7] We estimate the VAR using monthly data from January 1985 onwards. This starting date is determined by the economic policy uncertainty index and the Google-based economic uncertainty index. Our benchmark estimation includes 12 lags.[8] To identify the structural uncertainty shocks we apply a Cholesky decomposition. The uncertainty series are ordered second after the log level of the

[6] E.g., adjustment costs for labor and capital or the dependence on external financing might be different.

[7] In contrast to Bloom (2009) and Jurado et al. (forthcoming), we do not apply detrending procedures to our times series but include all variables in levels. According to the VAR literature this is the more common and recommended specification. Moreover it is robust to cointegration among trending variables, (see, e.g., Christiano, Eichenbaum, and Evans, 1999, 2005; Uhlig, 2005) and the references therein.

[8] Changing the number of lags to 6 or 24 has negligible qualitative or quantitative effects.

S&P 500 index as it is standard in the literature (e.g., Bloom, 2009; Jurado et al., forthcoming).[9]

In the second step, we take the identified structural uncertainty innovations and use them to explain fluctuations of quarter-on-quarter GDP growth rates. To this end, we first calculate quarterly averages of the monthly uncertainty innovations, say, $\bar{e}_t$, and then estimate a regression of the form

$$q_t = \alpha + \sum_{i=0}^{12} \phi_i \bar{e}_{t-i} + \varepsilon_t \ , \tag{2}$$

where the number of lags is set to 12 quarters. By including the contemporaneous value of $\bar{e}_t$ we assume that our first stage uncertainty innovations are predetermined within the same quarter with respect to GDP or the unemployment rate which seems plausible after our identification procedure in the first stage.

3 Impulse Response Analysis

In this section we first look at the outcomes of the first-stage monthly SVARs. Figure 2 depicts the estimated impulse response functions (IRFs) of manufacturing production to one-standard-deviation uncertainty shocks. For all but one of the measures, increases in uncertainty are, on impact, accompanied by negative movements in manufacturing production.[10] The magnitude of the response, however, differs notably across the various measures. An uncertainty innovation in the macroeconomic uncertainty proxy proposed by Jurado et al. (forthcoming) has a comparatively large and prolonged negative effect on manufacturing production, with a maximum decline of about 0.5 percent after 10 months. In contrast, for all other uncertainty measures the negative reactions are rather small, less prolonged and occasionally insignificant. The maximum production decline after a sudden increase in economic policy uncertainty, for instance, is just half that of the decline after an increase in macroeconomic uncertainty.

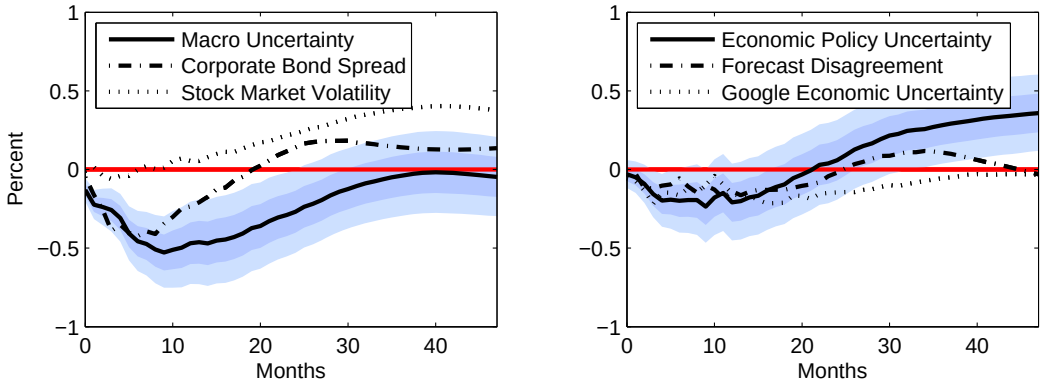
Concerning the IRFs' shape, we find some evidence for the well-known rebound in production following the maximum decline. Hence, our results are broadly consistent with the "wait and

[9] Our results are robust to changing the order of the variables.

[10] Uncertainty shocks derived from stock market volatility do not seem to negatively impact U.S. manufacturing production. This is in line with Choi (2013) who finds that sudden increases in stock market volatility have no impact on U.S. manufacturing production since the beginning of the Great Moderation. This might reflect that movements in stock market volatility are not only driven by uncertainty but also, to a large degree, by time-varying risk aversion (see, e.g., Bekaert, Hoerova, and Duca, 2013).

see" dynamics stressed by Bloom (2009).[11] That our first-stage results are in line with those typically found in the empirical literature is reassuring as the correct identification of the structural uncertainty innovations is crucial for determining the quantitative effects of exogenous uncertainty innovations on GDP and unemployment in the second stage of our approach.

Figure 2: Uncertainty shocks on manufacturing production



Notes: IRFs of U.S. manufacturing production to one-standard-deviation uncertainty shocks derived from monthly VAR including one of the six uncertainty measures (see text for details). Dark and light blue shaded areas: 68% and 95% confidence bands, respectively, constructed using a recursive design wild bootstrap of Goncalves and Kilian (2004) and plotted for macro uncertainty and economic policy uncertainty.

The results derived from the monthly SVARs reveal another interesting insight. The corresponding structural uncertainty shocks do not seem to be the main drivers of variation in the actual uncertainty measures. To show this we compute historical decompositions for the macro uncertainty proxy and the economic policy uncertainty index.[12] Figure 3 plots the cumulative effects of the respective uncertainty shocks. Interestingly, the structural shocks are not able to explain the huge surge in both measures of uncertainty in 2008 and 2009. It rather seems that the other variables of the SVAR capture first moment shocks that drive the measures, e.g. a large share of the variation in the economic policy uncertainty proxy is explained by shocks to the labor market (not shown here).[13]

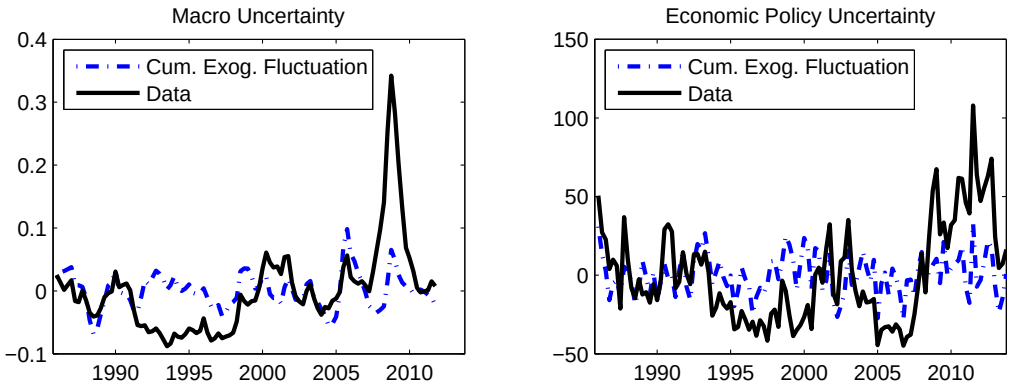
Figure 4 displays the results of the second stage of our empirical approach, i.e. the estimated

[11] However, it is worthwhile to note that the Federal Funds Rate declines immediately after the shock (not shown here). Thus, the rebound is at least partly driven by the endogenous response of monetary policy, as emphasized by Bachmann et al. (2013).

[12] The results for the other measures are similar but not reported for the sake of brevity.

[13] Cesa-Bianchi, Pesaran, and Rebucci (2014) also find that uncertainty is rather a symptom than a cause of macroeconomic instability.

Figure 3: Historical decomposition of uncertainty measures



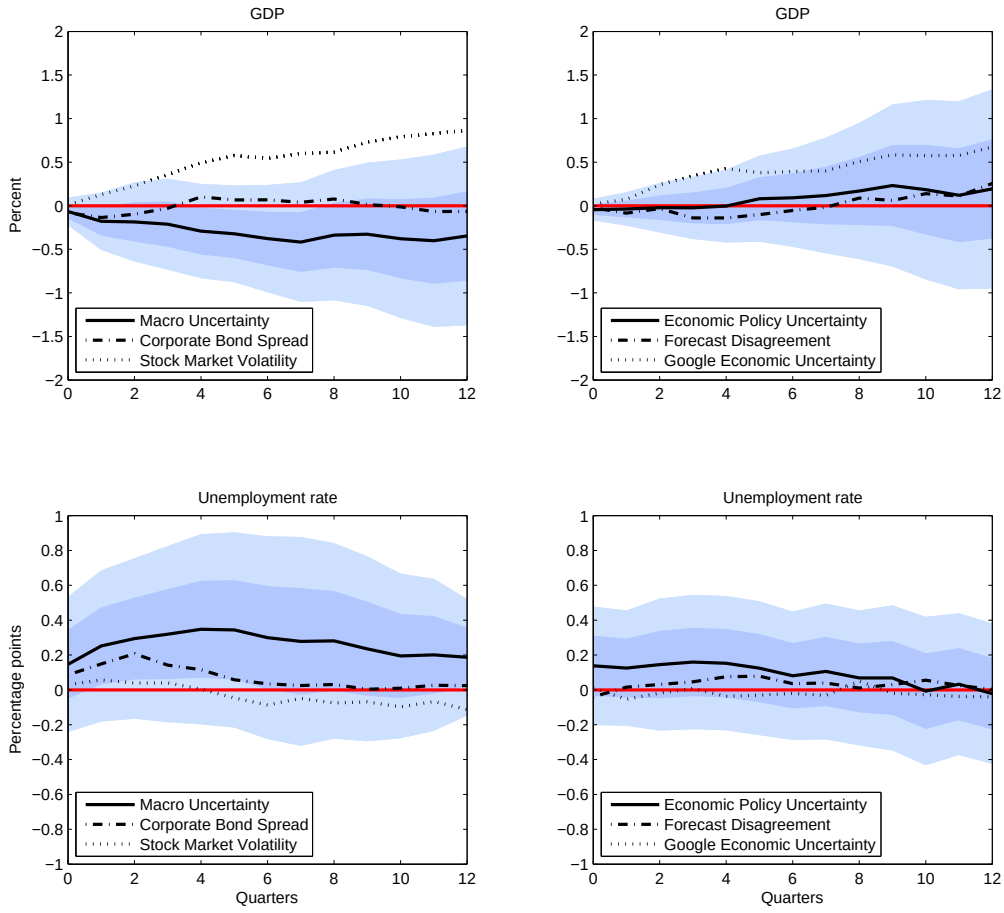
Notes: Historical decomposition; dashed blued line: part of fluctuation in macro uncertainty and economic policy uncertainty, resp., explained by corresponding structural uncertainty innovation. Solid black line: actual demeaned uncertainty measure. For readability, we plot the quarterly averages of these time series.

level responses of real GDP (upper row) and the unemployment rate (lower row) to a one-standard-deviation increase in one of our exogenous uncertainty shock series.[14] Compared to the response of manufacturing production in the monthly VAR, the GDP contraction is less severe across all uncertainty measures. Only the macroeconomic uncertainty proxy continues to show noticeable negative effects on economic activity. Additionally, the rebound, or overshooting, reaction after the initial decline disappears almost completely.

Heightened uncertainty has also been found to be partly responsible for the slow recovery of the U.S. labor market after the financial crisis (Leduc and Liu, 2014). We indeed find that an increase in exogenous uncertainty is followed by a rise in unemployment (see the lower row of Figure 4). Focusing on our two baseline measures, the maximum increase in the unemployment rate is slightly less than 0.4 percentage points in case of macroeconomic uncertainty and about 0.2 percentage points in case of economic policy uncertainty. Overall, our results for GDP and the unemployment rate are therefore consistent with our first-stage finding that macroeconomic uncertainty has a stronger negative output effect than economic policy uncertainty.

[14] We use the standard deviation of the final quarterly shock time series after taking the quarterly average of the monthly uncertainty shocks.

Figure 4: IRFs to quarterly uncertainty shocks



Notes: upper (lower) row: IRFs of GDP (unemployment rate) to quarterly uncertainty shocks in model (2). Shocks are extracted in the first stage from monthly VARs including one of the six uncertainty measures (see text for details). Dark and light blue shaded areas: 68% and 95% (block) bootstrapped confidence bands, respectively, plotted for Macro Uncertainty and Economic Policy Uncertainty.

4 Has Higher Uncertainty Contributed to the Great Recession?

To obtain an estimate of the quantitative impact of exogenous fluctuations on the U.S. economy since 2007, we proceed as follows: first, we calculate for each uncertainty measure the quarterly averages of the identified monthly structural uncertainty shocks from the SVARs. In a second step, we use the quarterly regression model (2) and the historical quarterly uncertainty shocks to compute the predicted historical values for GDP growth and the unemployment rate. As an example, we compute the predicted value for GDP growth for the first quarter in 2010, $\widehat{q}_{2010q1}$, given the quarterly averages of structural shocks, $\bar{e}$, as:

$$\widehat{q}_{2010q1} = \widehat{\alpha} + \widehat{\phi}_0 \bar{e}_{2010q1} + \widehat{\phi}_1 \bar{e}_{2009q4} + \ldots + \widehat{\phi}_{12} \bar{e}_{2007q1} \ . \tag{3}$$

The predicted values enable us to study the cumulative effects of the structural uncertainty shocks on GDP growth and the unemployment rate, i.e. we obtain a historical decomposition. The first row of Figure 5 depicts the historical quarterly averages of macro uncertainty shocks (left column) and economic policy uncertainty shocks (right column) since 2007. The second (third) row of Figure 5 shows the results for GDP growth (the unemployment rate), where the cumulative effects of the structural uncertainty shocks are depicted by the blue thin bars and the observed activity variable by beige thick bars.

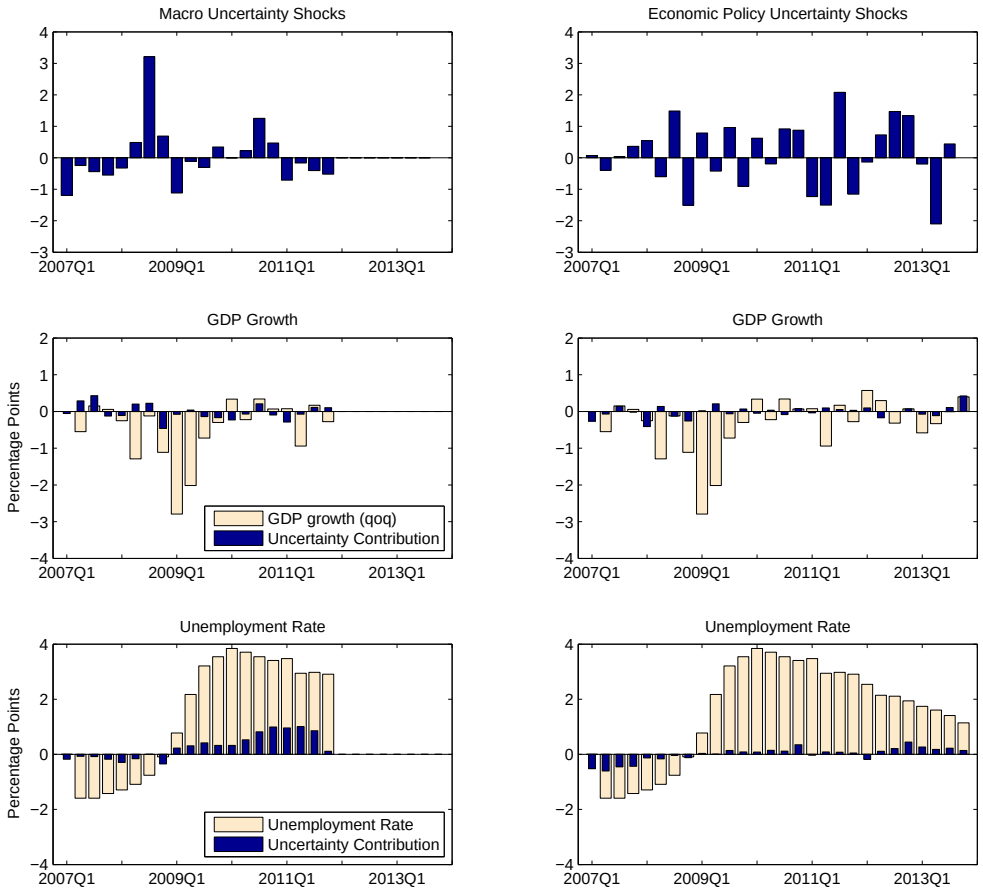
The graphs suggest that the exogenous increases in macro uncertainty in the year 2008 and in economic policy uncertainty in the middle of 2011 and the end of 2012 – see upper panel of Figure 5 – had only a limited effect on economic activity since the financial crisis. For macro uncertainty, we find that the total negative impact on GDP growth amounts to 0.3 percentage points in 2009 and 0.4 percentage points in 2010 (see upper panel of Table 2). Economic policy uncertainty exhibited its most detrimental effect of 0.4 percentage points in 2008. To put these numbers into perspective Bloom (2014) states that the U.S. economy experienced a 9 percent drop in GDP against trend during the years 2008 and 2009.[15] We find that exogenous fluctuations in macro and economic policy uncertainty explain less than one percentage point of that 9 percent drop in GDP. The results are broadly consistent for the other uncertainty measures (see Table 2). They deliver negative

[15] This number is derived from the prior trend growth rate of real GDP in the period between 1980 and 2007 of 3.1 percent and the somewhat more than 3 percent actual production decline over the years 2008 and 2009.

growth contributions in the range of 0 to 0.5 percentage points over the years 2008 and 2009. For the subsequent recovery in the years 2010 to 2013 we find almost no negative uncertainty effects on GDP.

Concerning the repercussions of uncertainty on unemployment, the picture does not change substantially. Exogenous macro uncertainty shocks increased the unemployment rate by 0.3 to 0.7 percentage points in 2010 and 2011. That finding supports the view that second moment shocks might be a factor for the "jobless recovery" after the crisis. They, however, do not seem to be the major driver. Except for corporate bond spread shocks, the numbers for the other measures are quite lower. Overall, our results support the view that higher uncertainty was more a concomitant of bad negative first moment shocks rather than a cause of the Great Recession and the subsequent "jobless recovery".

Figure 5: Cumulative effects of structural uncertainty shocks on economic activity



Notes: left column: contributions of macro uncertainty shocks; right column: contributions of economic policy uncertainty shocks. Estimates are based on model (2). The blue thin bars display the cumulative effects of the structural uncertainty shocks. The beige thick bars show the actual demeaned quarter-on-quarter GDP growth rates (second row) and unemployment rates (third row). Shock series in the first row are normalized by their standard deviation.

Table 2: Contributions of uncertainty shocks to U.S. economic activity from 2008 to 2013

Years	EPU	MU	VXO	$Spread$	$FDISP$	GEU	*Actual Realizations*
GDP growth							
2008	-0.4	0.2	-0.1	-0.1	0.1	-0.2	-0.3
2009	-0.1	-0.3	0.0	-0.2	-0.5	0.0	-2.8
2010	0.0	-0.4	0.1	0.3	0.0	0.1	2.5
2011	0.1	-0.2	0.8	0.1	0.5	-0.6	1.8
2012	0.1		0.2	-0.2	0.6		2.8
2013	0.0		-0.4	-0.2	-0.1		1.9
Unemplyoment rate							
2008	-0.5	-0.1	0.2	-0.1	0.0	0.0	5.8
2009	-0.1	-0.2	0.1	-0.3	-0.1	0.0	9.3
2010	0.1	0.3	0.1	0.4	0.1	0.0	9.6
2011	0.2	0.7	-0.1	0.2	0.1	0.0	8.9
2012	0.1		-0.2	-0.2	-0.1		8.1
2013	0.2		-0.1	0.1	0.0		7.4

Notes: growth contributions (in percentage points) of the respective structural uncertainty shocks to annual GDP growth and the unemployment rate. Estimates are based on model (2). Abbreviations: economic policy uncertainty (EPU), macro uncertainty (MU), stock market volatility (VXO), corporate bond spread ($Spread$), forecast disagreement ($FDISP$), and Google economic uncertainty (GEU).

5 Conclusion

In this paper we estimated the quantitative impact of exogenous fluctuations in uncertainty on U.S. GDP and unemployment in the Great Recession and the ensuing recovery. To do so, we employed a two-step strategy to map monthly exogenous changes in six uncertainty proxies into quarterly growth contributions. We found that, first, only a minor part of the rise in uncertainty measures during the crisis was driven by exogenous uncertainty shocks. Second, while any kind of uncertainty explains less than one percentage point of the 9 percent drop in GDP (against trend) during the Great recession, we find that macroeconomic uncertainty shocks increased the unemployment rate by 0.3 to 0.7 percentage points in 2010 and 2011. Macroeconomic uncertainty might therefore be a candidate to explain the slow recovery of the labor market after the crisis. Third, the effects of economic policy uncertainty are much smaller than those of the more general macroeconomic uncertainty.

While our results are robust across different uncertainty proxies and econometric specifications, it might be that our linear setup misses non-linearities that could be important during the crisis. Employing a non-linear smooth-transition VAR, Caggiano, Castelnuovo, and Groshenny (2014) find that uncertainty shocks have a larger effect on unemployment in recessions. Using DSGE models including a zero lower bound for the nominal interest rate, Johannsen (2013) and Fernández-Villaverde, Guerrón-Quintana, Kuester, and Rubio-Ramírez (2012) find that the effects of fiscal policy uncertainty are amplified when the central bank is constrained. It might therefore be worthwhile to consider a non-linear setup in future research.

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A Appendix Uncertainty Measures

Table 3: Description and Sources: U.S. Uncertainty Measures

Variable	Description	Source
Policy Uncertainty Index (EPU)	aggregation of four components: a scaled count of news articles that refer to the economy, uncertainty and policy; a discounted dollar-weighted sum of scheduled expirations of federal tax code provisions; and indexes of disagreement among professional forecasters about future CPI inflation and about future government purchases of goods and services; from 1/1985 - 12/2013	Baker, Bloom, and Davis (2013)
Macro Uncertainty Factor (MUF)	common factor of six-months ahead forecast error variance decomposition as in Jurado, Ludvigson, and Ng (forthcoming); from 1/1985 - 12/2011	Jurado, Ludvigson, and Ng (forthcoming)
Google Uncertainty Index ($GOOGLE$)	Google News subindex based on economic uncertainty (as opposed to political uncertainty) only; from 1/1985 - 12/2011	Baker, Bloom, and Davis (2013)
Stock Market Volatility (VXO)	concatenated series of the monthly volatility of daily SP500 returns (from 1/1985 to 12/1985) and the implied volatility index from options (VXO) (from 1/1986 to 12/2013)	Standard and Poor's
Corporate Bond Spread ($SPREAD$)	spread of the 30-year Baa-rated corporate bond yield index over the 30-year treasury bond yield; in months where the 30-year treasury bond was missing the 20-year treasury bond was used; from 1/1985 - 12/2013	Federal Reserve Board
Forecast Disagreement ($FDISP$)	Cross-sectional standard deviation of BOS general business expectation question; manufacturing, third FED district, seasonally adjusted; from 1/1985 - 12/2013	BOS

Notes: All series were downloaded from the cited sources in July 2014 at the most recent vintage available at that time.

B Appendix Data Sources

Table 4: Data Sources: US Other Variables

Variable	Description	Source
Manufacturing Production (MP)	index (2005=100), monthly, manufacturing, seasonally adjusted; from 1/1985 - 12/2013	OECD Main Economic Indicators
Gross Domestic Product (GDP)	billions of chained 2009 dollars, quarterly, seasonally adjusted; from Q1/1985 - Q4/2013	Federal Reserve Bank St. Louis
Manufacturing Employment	all employees, monthly, manufacturing, seasonally adjusted; from 1/1985 - 12/2013	BLS
Manufacturing Average Hours	production workers, monthly, manufacturing, seasonally adjusted; from 1/1985 - 12/2013	BLS
CPI	index(1982-1984=100), all urban consumers, US city average, monthly, seasonally adjusted; from 1/1985 - 12/2013	BLS
Wage	average hourly earnings of production workers, monthly, manufacturing, seasonally adjusted; from 1/1985 - 12/2013	BLS
Federal Funds Rate	Fed Funds Effective Rate, monthly average, seasonally adjusted; from 1/1985 - 12/2011	Federal Reserve Board
Stock Index	SP500 index; from 1/1985 - 12/2013	Standard and Poor's

Notes: All series were downloaded from the cited sources in July 2014 at the most recent vintage available at that time.