Policy Uncertainty in Japan

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Economics Working Paper 19109

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August 5, 2019

We develop new economic policy uncertainty (EPU) indices for Japan from January 1987 onwards, building on the approach of Baker, Bloom and Davis (2016). Each index reflects the frequency of newspaper articles that contain certain terms pertaining to the economy, policy matters, and uncertainty. Our overall EPU index co-varies positively with implied volatilities for Japanese equities, exchange rates and interest rates and with a survey-based measure of political uncertainty. The EPU index rises around contested national elections and major leadership transitions in Japan, during the Asian financial crisis and in reaction to the Lehman Brothers failure, U.S. debt downgrade in 2011, Brexit referendum, and Japan's deferral of a consumption tax hike. Our uncertainty indices for fiscal, monetary, trade, and exchange rate policy co-vary positively but also display distinct dynamics. For example, our trade policy uncertainty (TPU) index rocketed upwards when the U.S. withdrew from the Trans-Pacific Partnership in January 2017. VAR models imply that upward EPU innovations foreshadow deteriorations in Japan's macroeconomic performance, as reflected by impulse response functions for investment, employment and output. Our study adds to evidence that credible policy plans and strong policy frameworks can favorably influence macroeconomic performance by, in part, reducing policy uncertainty.

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[1] We would like to thank Luc Everaert, Divya Kirti, Sigari Kitao, Masayuki Morikawa, Carlos Mulas-Granados, Atsushi Nakajima, Todd Schneider, Yasushi Sugayama, Katsiaryna Svirydzenka, Vlodomyr Tulin, Francis Vitek and Sungwook Yoon for very useful comments and suggestions and Yihan Liu for excellent research assistance. We are especially grateful to Ikuo Saito, who was a coauthor on an earlier draft. Steven J. Davis gratefully acknowledges financial support from the U.S. National Science Foundation and the Booth School of Business at the University of Chicago.

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JEL Codes: D80, E20, E52, E62, F13
Keywords: Policy uncertainty, Japan, aggregate investment

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Abstract:

We develop new economic policy uncertainty (EPU) indices for Japan from January 1987 onwards, building on the approach of Baker, Bloom and Davis (2016). Each index reflects the frequency of newspaper articles that contain certain terms pertaining to the economy, policy matters, and uncertainty. Our overall EPU index co-varies positively with implied volatilities for Japanese equities, exchange rates and interest rates and with a survey-based measure of political uncertainty. The EPU index rises around contested national elections and major leadership transitions in Japan, during the Asian financial crisis and in reaction to the Lehman Brothers failure, U.S. debt downgrade in 2011, Brexit referendum, and Japan's deferral of a consumption tax hike. Our uncertainty indices for fiscal, monetary, trade, and exchange rate policy co-vary positively but also display distinct dynamics. For example, our trade policy uncertainty (TPU) index rocketed upwards when the U.S. withdrew from the Trans-Pacific Partnership in January 2017. VAR models imply that upward EPU innovations foreshadow deteriorations in Japan's macroeconomic performance, as reflected by impulse response functions for investment, employment and output. Our study adds to evidence that credible policy plans and strong policy frameworks can favorably influence macroeconomic performance by, in part, reducing policy uncertainty.

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I. INTRODUCTION

Reinvigorating Japan's economy has proved challenging. Despite significant policy accommodation, growth over the past two decades has been weak, the share of non-regular employment has increased, wages have stagnated, and inflation expectations remain below the Bank of Japan's inflation target. Observers cite demographic headwinds, other structural factors, the zero lower bound, external shocks, and policy mistakes as reasons for Japan's chronically weak economic performance. We focus on another, overlapping factor: uncertainty about policy and its effects.

Previous studies and policymaker remarks suggest that uncertainty about U.S. and European policies contributed to a steep economic decline in 2008-09 and slow recoveries thereafter.[2] Policy uncertainty has returned to the forefront amid concerns over the European immigration crisis, the Brexit saga, a failed coup in Turkey, the 2016 U.S. election outcome, tighter capital controls in China, presidential removals in Brazil and South Korea, a barrage of tariff hikes and threats, and populist political forces in several countries.[3] According to an aggregation of newspaper-based indices for 21 countries in Davis (2016), global economic policy uncertainty since the fourth quarter of 2018 exceeds even the high levels reached in 2008 Q4 and 2009 Q1.[4]

In Japan, an unsustainable fiscal trajectory, constraints on monetary policy, and weak growth present major challenges that intensify policy uncertainty. Shinzo Abe's election as Prime Minister in December 2012 and his economic reform initiatives ("Abenomics") marked an important milestone and a clearer policy direction after six prime ministers in six years. The economy grew during this period, and there was some progress in boosting inflation and structural reforms. But maintaining confidence in Abenomics has proved difficult. Fiscal policy targets are no longer seen as credible, contributing to policy uncertainty. A consumption tax hike initially scheduled for 2015 was postponed twice, first to April 2017 and then to October 2019. Frequent use of supplementary budgets adds to uncertainty about the near-term fiscal stance. New monetary easing measures and technical changes to the monetary policy framework also contributed to uncertainty. Structural reforms related to labor markets, immigration and trade policy could improve growth prospects, but whether and how Japan will achieve these reforms is highly uncertain.[5] Uncertainty around trade policies rose sharply when the U.S. withdrew from the Trans-Pacific Partnership in January 2017 and as U.S.-China trade policy tensions ratcheted upwards in 2018 and 2019.

Against this backdrop, we take up three questions: How has policy uncertainty moved over time in Japan? Which policy areas account for the largest share of policy uncertainty and its

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[2] Examples include the minutes of the Federal Open Market Committee meeting on 15-16 December 2009, the International Monetary Fund (2012, pages xv-xvi and 49-53, and 2013, pages 70-76), Baker et al., (2012, 2016), and Stock and Watson (2012).

[3] For example, see "Global Political Uncertainty Weighs on Growth Outlook," Ian Talley, *Wall Street Journal,* 10 October 2016.

[4] Updates of the Global Economic Policy Uncertainty Index are available at www.PolicyUncertainty.com/global_monthly.html.

[5] A survey of 3,438 Japanese firms in 2015 finds (a) firms perceive policies related to the social security system, taxes, government spending, and international trade to be highly uncertain, and (b) uncertainty about tax policy, labor market regulations, the social security system, and environmental regulations had the largest effects on firms' decisions about investment and hiring (Morikawa, 2013, 2016).

movements? What do changes in policy-related uncertainty portend for Japan's economic performance? To address these questions, we construct several newspaper-based policy uncertainty measures for Japan following the methods in Baker et al. (2016). We interpret these measures as proxies for policy-related uncertainty, as perceived by households and businesses. We relate our measures to other uncertainty measures, examine their behavior over time, and consider their dynamic relationship to aggregate economic performance.

Our measures aim to capture uncertainty about *who* will make economically relevant policy decisions, *what* policy actions will be undertaken and *when*, and the economic *effect*s of policy actions (or inaction). To construct our overall measure of economic policy uncertainty (EPU), we count articles in four major Japanese newspapers (Yomiuri, Asahi, Mainichi and Nikkei) that contain at least one term in each of three categories: (E) 'economic' or 'economy'; (P) 'tax,' 'government spending', 'regulation,' 'central bank' or certain other policy-related terms; and (U) 'uncertain' or 'uncertainty'. We scale the EPU counts by the number of articles in the same newspaper and month, standardize each paper's series of scaled counts to the same variability over time, adjust for seasonality, and then average across papers by month to obtain our EPU index. We also construct uncertainty indices for monetary policy, fiscal policy, trade policy and exchange rate policy. To do so, we specify additional criteria for those articles that contain our triple of terms about the economy, policy and uncertainty. Our measures are monthly from 1987, with updates at www.PolicyUncertainty.com/japan_monthly.html.

Our overall EPU index co-varies positively with implied volatilities for Japanese equities, exchange rates and interest rates and with Ito's (2016) survey-based measure of political uncertainty in Japan. The index peaks during the Asian financial crisis and in reaction to the failure of Lehman Brothers, the U.S. debt-ceiling fight in 2011, the Brexit referendum and the recent deferral of a hike in Japan's consumption tax rate. The index also shows a clear tendency to rise around contested national elections and major leadership transitions. It displays moderately countercyclical fluctuations,[6] perhaps because policymakers are more inclined to experiment with new policies in bad times (Pastor and Veronesi, 2013).

Uncertainty indices for fiscal, monetary, trade and exchange rate policy correlate positively with one another, while also displaying distinct and sensible dynamics. For example, implied interest rate volatility correlates more highly with our monetary policy uncertainty index than our fiscal policy uncertainty index. In contrast, Ito's (2016) measure of political uncertainty, which weighs the approval ratings of ruling and opposition parties, correlates more highly with fiscal policy uncertainty. Among all articles that satisfy our E, P and U criteria, 56 percent reference fiscal policy matters, 24 percent reference monetary policy, 9 percent reference trade policy, and only 2 percent reference exchange rate policy. This finding strongly suggests that fiscal matters are the most important source of policy uncertainty in Japan, at least in the perception of journalists and their editors and, presumably, typical newspaper readers as well. Since May 2018, trade policy matters have become the second most cited source of economic policy uncertainty in Japanese newspapers.

Our EPU measures have predictive power for Japan's economic performance conditional on standard measures of economic activity and uncertainty. In particular, vector autoregressive

[6] In line with evidence for other national and global EPU indices in Baker et al. (2016) and Davis (2016) and a broader tendency for uncertainty measures to fluctuate counter cyclically (Bloom, 2014).

(VAR) specifications imply that upward EPU innovations foreshadow deteriorations in Japan's macroeconomic performance, as reflected in impulse response functions for investment, employment and output. We also find a significant effect of global policy uncertainty on Japan's economic performance. These results do not prove a causal effect of policy uncertainty on economic performance, but they show that our EPU index contains useful information not captured by other forward-looking indicators. Upward innovations to our EPU index for Japan also foreshadow a larger decline in macroeconomic aggregates than innovations to the Japan EPU index in Baker et al. (2016), suggesting that our efforts to improve the index deliver a better measure and stronger results in downstream econometric work.

II. RELATED LITERATURE

Compared to the Japan EPU index in Baker et al. (2016), we expand coverage from two to four major newspapers, and we deploy a better term set that reflects our auditing efforts and our expertise in Japanese economic policy. We also develop new indices for several policy categories, which we see as helpful in diagnosing the proximate sources of policy uncertainty and as potentially quite useful in analyzing policy uncertainty effects on industry- and firm-level outcomes. Alexopoulos and Cohen (2015), Hlatshwayo and Saxegaard (2016), Azzimonti (2018), Caldara and Iacoviello (2018), Hassan et al. (2019), Husted, Rogers and Sun (2019) and Baker et al. (2019), among others, also use text analysis to quantify policy uncertainty and related concepts. Other approaches to quantification of policy uncertainty include Ito's (2016) survey-based measure for Japan, the country-level volatility of government consumption shocks in Fátas and Mihov (2013), the use of multivariate GARCH models in Grier and Perry (2000) and Vitek (2002), and time-varying measures of fiscal policy uncertainty derived from an estimated New Keynesian model in Fernandez-Villaverde et al. (2015).

Theoretical work identifies several channels through which uncertainty can affect economic outcomes. First, heightened uncertainty provides an incentive to delay or forego investments that are costly to reverse (Bernanke, 1983, McDonald and Siegel, 1986, Dixit and Pindyck, 1994, and Bloom, 2009). High uncertainty also encourages households to postpone costly-to-reverse purchases of durable goods (Eberly, 1994). Second, when there are search frictions in labor markets or fixed costs of hiring and firing, uncertainty can retard hiring or induce firms to adjust on flexible margins such as part-time employment (Schaal, 2015, and Valetta and Bengali, 2013). Leduc and Liu (2016) show how nominal rigidities can interact with labor market search frictions to amplify the negative effects of uncertainty in DSGE models. Related to these channels, uncertainty can slow the growth of productivity and output by discouraging the reallocation of capital and labor inputs (Bloom et al., 2012). Third, uncertainty can depress investment by raising risk premiums, as stressed by several models with financial frictions (Christiano et al., 2014, Gilchrist et al., 2014, and Arellano et al., 2016). Fourth, greater uncertainty raises precautionary savings by households, which can reduce output in the presence of nominal rigidities, especially under constraints on monetary policy (Johansen, 2014, and Fernandez-Villaverde et al., 2015). Fiscal policy uncertainty also reduces output by intensifying monopoly pricing distortions in the model of Fernandez-Villaverde et al. Fifth, uncertainty can stimulate investment by increasing the value of growth options (Paddock et al.,

1988, and Bar-Ilan and Strange, 1996). See Bloom (2014) for a fuller discussion of how uncertainty affects economic activity.[7]

Several recent empirical studies investigate the effects of policy uncertainty on economic outcomes in Japan and elsewhere. Ito (2016) finds negative effects of policy uncertainty on employment and expenditures for consumer durables. Morikawa (2013, 2016) provides survey-based evidence of how Japanese companies perceive the relevance of policy uncertainty. Morikawa (2010), Ono and Sullivan (2013) and Matsuura (2013) find a greater use of non-regular workers at firms with greater sales growth volatility. Beyond the Japanese context, Durnev (2012), Julio and Yook (2012, 2016), Giavazzi and McMahon (2012) and Kelly, Pastor and Veronesi (2016) investigate the effects of election-related uncertainty on corporate investment, international capital flows, precautionary savings, and stock price volatility. Handley and Limao (2015) develop evidence that lower uncertainty about trade policy stimulates investment in export capacity. Gulen and Ion (2016) find negative effects of policy uncertainty on corporate investment using the Baker et al. (2016) EPU measure for the United States. Similarly, Baker et al. (2016) find larger negative effects of their newspaper-based EPU measures on investment rates and employment growth, and larger positive effects on stock price volatility, for firms with greater exposure to policy risks. Using the EPU index for India in Baker et al., Anand and Tulin (2014) find negative effects of policy uncertainty on firm-level investment flows, with stronger effects on new projects than ongoing ones.

Another branch of the literature investigates the dynamic relationship of policy uncertainty, or economic uncertainty more broadly, to macroeconomic performance. Examples include Stock and Watson (2012), Colombo (2013), International Monetary Fund (2013), Jurado et al. (2015), Ludvigson et al. (2015), Baker et al. (2016), Leduc and Liu (2016) and Ghirelli et al. (2019. These studies find that higher (policy) uncertainty foreshadows a deterioration in macroeconomic performance, broadly in line with our evidence for Japan. Romer (1990) marshals evidence that the 1929 stock market crash triggered a sharp rise in income uncertainty that led households to forego purchases of consumer durables, accentuating the collapse of aggregate demand at the onset of the U.S. Great Depression. Evidence in Constantinescu et al. (2017) suggests that high policy uncertainty depresses international trade in goods and services. Survey data in Altig et al. (2019) and econometric evidence in Caldara et al. (2019) indicate that higher trade policy uncertainty since 2017 has dampened U.S. business investment.

In summary, a variety of studies find evidence that high (policy) uncertainty undermines economic performance by leading firms to forego investments and new hires, by slowing productivity-enhancing factor reallocation, and by depressing expenditures on consumer durables. This evidence points to a positive payoff in the form of stronger macroeconomic performance if policymakers can deliver greater predictability in the policy environment. For Japan, possibilities in this regard include a concrete and credible medium-term fiscal plan, clear follow through on structural reform plans, and a stronger communications framework at the Bank of Japan. A smaller literature finds that greater uncertainty causes households and firms to become less responsive on the margin to cuts in interest rates and taxes, in line with predictions of real options theory. See Bertola et al. (2005), Bloom et al. (2007), Bloom (2009),

[7] A smaller literature examines the welfare consequences of policy uncertainty. Kitao (2018), for example, quantifies the welfare effects of uncertainty about the timing and nature of social security reform in Japan using a calibrated general equilibrium life-cycle model.

Aastveit et al. (2013) and Vavra (2014). These studies suggest that a stronger policy framework also increases the potency of countercyclical stabilization policies.

III. Measuring Economic Policy Uncertainty in Japan

Following Baker et al. (2016), we use frequency counts of newspaper articles to construct our EPU indices. As a first step, we obtain raw monthly EPU article counts for Yomiuri, Asahi, Mainichi and Nikkei from January 1987 onwards. Our primary data sources are Kikuzo II, MAISAKU, Nikkei Telecom, and Yomidas Rekishikan. To meet our EPU criteria, an article must contain at least one term in the "economy" (E), "policy" (P) and "uncertainty" (U) categories listed in Table 1. The E and U categories are straightforward. For the P category, we sought to cover major policymaking institutions (e.g., "lower" and "upper house," "Diet," "central bank" and "Prime Minister") and major policy areas (e.g., "taxes," "government deficit," "government debt," "(de)regulation" and "structural reform"). We conducted a series of small-scale audits and other investigations to help select and refine the E, P and U term sets, as detailed in the appendix.

In a second step, we scale the raw EPU counts by the total number of articles in the same newspaper and month to obtain a relative EPU frequency count. Scaling in this manner adjusts for differences in article volume across newspapers and volume changes over time. Third, we standardize each newspaper's relative EPU counts to unit standard deviation from 1987 to 2015. Fourth, we seasonally adjust the resulting newspaper-level series in view of the pronounced and distinctive seasonal pattern at certain papers. The appendix provides more information about seasonality and explains how we perform the adjustment. Fifth, after the scaling, standardization and seasonal adjustment steps, we average the resulting series across the four papers by month to obtain our overall monthly Japan EPU index. The third, fourth and fifth steps ensure that each newspaper receives (roughly) equal weight in determining the behavior of the overall index, despite differences across papers in the share and variability of articles about business and economics. Finally, we multiplicatively normalize the four-paper average EPU series to a mean of 100 from 1987 to 2015.

To accurately mirror variation in policy-related uncertainty over time, our EPU index must satisfy two requirements. First, the E, P and U criteria must yield counts that move in line with actual newspaper coverage of economic policy uncertainty. We relied on several small-scale audits to evaluate and refine our choice of terms, with an eye towards minimizing classification errors. See the appendix for details. Second, newspaper coverage must reflect movements in policy uncertainty. To address this requirement, we compared our newspaper-based EPU measures to other measures of economic and political uncertainty for Japan. We also conducted a descriptive assessment of the key economic and policy developments associated with heightened levels of policy uncertainty according to our index. We report the results of these investigations below.

Table 1. Term Sets for the Overall Japan EPU Index

Japanese term	English term
A. Economy terms	
経済 or 景気	"economic" or "economy"
B. Uncertainty terms	
不透明 or 不確実 or 不確定	"uncertain" or "uncertainty"
不安	"concern"
C. Policy terms	
税	"tax(es)"
税制 or 課税	"taxation"
歳出	"government spending" or "government expenditure"
歳入 or 財源	"government revenue(s)"
予算 or 財政	"government budget"
公的債務	"public debt"
国債 or 国の借金 or 国の債務 or 政府債務 or 政府の債務	"government debt"
財政赤字	"government deficit(s)"
日銀	"BOJ"
日本銀行	"Bank of Japan"
中央銀行	"central bank(s)"
連銀	"The Fed"
連邦準備	"Federal Reserve"
規制 or 自由化	"regulation(s)" or "regulatory" or "regulate" or "deregulation" or "deregulate"
構造改革	"structural reform"
法案	"legislation"
参議院 or 参院	"upper house"
衆議院 or 衆院	"lower house"
国会	"Diet"
首相 or 総理	"Prime minister"
官邸	"Prime minister's office"

The Japan Economic Policy Uncertainty Index

Figure 1 plots our overall EPU index for Japan from January 1987 to June 2019. The index peaks during the Asian and global financial crises and the U.S. debt-ceiling crisis in the summer of 2011. It also spikes in reaction to the "Twisted Diet" election outcome in 1998,[8] the introduction of Quantitative Easing in 2001, the Takenaka Plan for tackling longstanding problems with non-performing loans at Japanese banks, the Greek Crisis and Twisted Diet election outcome in 2010, the introduction of negative interest rates in early 2016, and the consumption tax hike delay a few months later.

[8] "Twisted Diet" means that no single party controls both the upper and lower houses of Japan's parliament and no party has a super majority (two-thirds) in the Lower House.

The Japan EPU index is somewhat countercyclical, but it also displays many strong movements not tied directly to cyclical conditions. In April 2001, Junichiro Koizumi became Prime Minister, a position he held until 2006, making him one of the longest serving Prime Ministers in Japan's history. The EPU index drifts down during this period of political continuity and reaches some of its lowest values in our sample period. The index also exhibits a period of gradual decline starting in 2013, coinciding with the launch of Abenomics and an improvement in confidence indicators.[9] Since 2015, policy uncertainty has risen again amid concerns about developments in China, a new negative interest rate policy, the Brexit referendum, consumption tax hike delays, and intensifying trade policy tensions in 2018 and 2019.

Figure A.1 compares our overall Japan EPU index to the one in Baker et al. (2016). The two indices are highly correlated, as expected given the overlap in newspapers and term sets, but there are differences. For example, the Baker et al. index displays higher volatility during the late 1980s and early 1990s. Our Japan EPU index shows a more persistent rise during the Asian financial crisis. It also shows larger spikes in reaction to the Lehman Brothers failure and the U.S. debt downgrade. As mentioned earlier, our index reflects articles in four rather than two Japanese newspapers – including the Nikkei, which specializes in business and economics. Doubling the number of papers lets us average out more of the idiosyncratic, newspaper-level noise. Unlike Baker et al. (2016), we adjust for seasonality. Finally, our expanded and refined set of terms also leads to differences between the two indices.

Uncertainty Indices for Policy Categories

We also constructed uncertainty indices for fiscal, monetary, trade and exchange rate policy. To obtain raw frequency counts for these indices, we flagged articles that meet the E, P and U criteria, as before, *and* that contain one or more of the terms listed in Table 2. We then followed the same sequence of steps as for the overall EPU index. Here as well, we relied on informal audits and other investigations to inform our choice of term sets in Table 2. See the appendix for details.

Figures 2 and 3 display our Japan uncertainty indices for fiscal and monetary policy.[10] Their movements broadly conform to our priors – rising around major economic and political events and policy announcements. The two indices correlate at 0.67. Both indices exhibit large jumps during the Asian financial crisis and in reaction to the Brexit referendum.[11]

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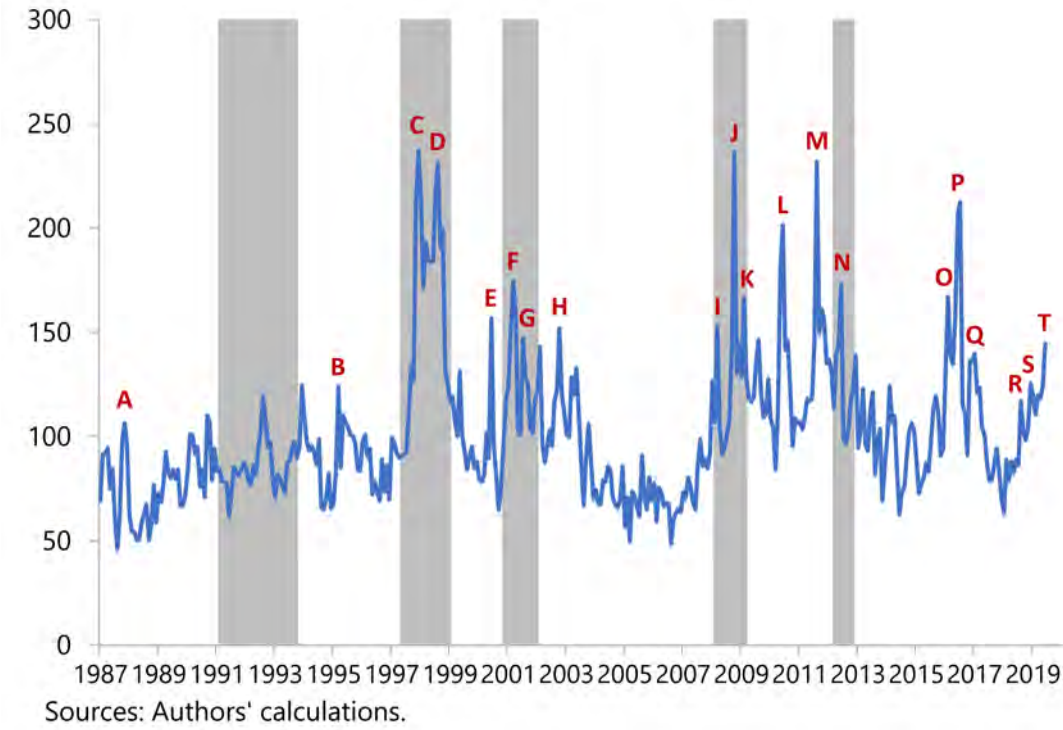
[9] The Bank of Japan Tankan index (business confidence indicator) bottomed out in December 2012 and peaked in March 2014. The Opinion Survey conducted by the Bank of Japan also showed a similar improvement during this period.

[10] The Bank of Japan is responsible for financial stability, and it played a prominent role during the banking crisis of the 1990s. It also has a role in exchange rate policy through foreign exchange intervention on behalf of the Ministry of Finance. These multiple, overlapping responsibilities make it hard to construct a pure measure of monetary policy uncertainty for Japan.

[11] Table A.1 reports pairwise correlations between policy category uncertainty indices. Husted, Rogers and Sun (2016) construct another newspaper-based index of monetary policy uncertainty for Japan. Figure A.2 compares their index to ours; the correlation is 0.22 and 0.32 at monthly and quarterly frequencies, respectively. While both indices are news-based, we use Japanese newspapers, while they

(continued…)

Figure 1. Japan Economic Policy Uncertainty Index (1987M1-2019M6)



A, October 1987: Black Monday. Takeshita becomes LDP President. Budget conflicts between President Reagan and Congress. FX intervention. B, March 1995: Bailout plans for two Shinkin banks in Tokyo face objection at metropolitan congress. Yen surges despite FX intervention. Debate about policy rate cut. C, November-December 1997: Asian financial crisis, successive failures of banks and securities firms, and policy debates about fiscal consolidation. D, July-August 1998: LDP's defeat in Upper House election yields Twisted Diet. Russian crisis. E, June 2000: Lower House election. F, February-March 2001: Political confusion over PM Mori's resignation. Introduction of Quantitative Easing. G, July 2001: Upper House election. H, October 2002: Takenaka plan to tackle non-performing bank loans. Introduction of Financial Revitalization Program. Stimulus debate. Expansion of QE. I, March 2008: DPJ rejects BOJ Governor nominations. J, September-October 2008: Lehman Brothers failure. BOJ cuts policy rate. Stimulus debate. K, February 2009: Concerns over delay in passing U.S. stimulus package. "Buy American" provisions in Congress. L, May-June 2010: Greek crisis. PM Hatoyama resigns. PM Kan takes office installs and new cabinet. M, August 2011: U.S. debt-ceiling crisis. Concerns over European debt crisis. Further monetary easing. Japan FX intervention. PM Kan resigns. N, June 2012: Greek elections. Concerns over Spain's financial system. Tri-party agreement on taxes and social security. O, January-February 2016: Introduction of negative interest rates. P, May-June 2016: Consumption tax hike delay. Brexit referendum. Q, November 2016-January 2017: U.S. Presidential election and withdrawal from the TPP. R, August 2018: U.S. threatens more tariff hikes on Chinese imports. S, December 2018: U.S.-China trade tensions intensify before Presidents Trump and Xi Jinping agree to a 90-day truce. T, June 2019: U.S.-China trade tensions worsen.
Note: Shaded areas indicate recession periods.

They also display distinct movements. For example, the fiscal policy uncertainty index responds (more) to contested elections, Twisted Diet episodes, political confusion surrounding

use three major international and American papers (Financial Times, New York Times, Wall Street Journal). Another difference is that our index relies on a broader term set that includes "quantitative easing," "negative interest rate" and "inflation target."

Prime Minister Mori's resignation, debates over stimulus packages in 2002 and 2008, and the ruling DPJ party's talks with the opposition LDP and Komeito parties in 2012 about social security and tax bills. The fiscal policy uncertainty index also picks up major external developments such as the U.S. government debt downgrade and the European debt crisis. In contrast, the monetary policy uncertainty index spikes around the introduction of Quantitative Easing (QE) in 2001, uncertainty over its expansion in 2001-02 and 2010-11, and the introduction of negative rates in 2016. It also peaks in March 2008 amid concerns surrounding a vacancy in the Bank of Japan's Governor position, which arose because the ruling parties could not secure Diet approval for the proposed appointee.

Table 2. Term Sets for Policy Category Uncertainty Indices

A. Fiscal Policy

Japanese term	English term
財政	"government budget"
予算	"supplementary budget" or "government budget" or "discretionary fiscal policy"
一般会計	"General Account"
特別会計 or 特会	"Special Account"
財政赤字	"government deficit"
基礎的財政収支 or プライマリーバランス	"primary balance"
歳入 or 財源	"government revenue(s)"
税	"tax(es)"
課税 or 税制	"taxation"
歳出	"government spending" or "government expenditure"
社会保障費 or 社会保障給付	"social security expenditures"
年金財政 or 年金の給付 or 年金の支給 or 年金給付 or 年金支給	"pension expenditures"
年金保険料	"pension insurance premium"
健康保険料	"health insurance premium"
医療費	"healthcare expenditures" or "medical care expenditures"
介護給付	"nursing care expenditures"
介護保険料	"nursing care insurance premium"
診療報酬	"public medical fee schedule"
公務員給与 or 公務員の給与	"salaries of government employees"
政府開発援助	"official development aid"
防衛費	"defense spending"
軍事費	"military spending"
財政投融資	"Financial Investment and Loan"
財投	"FIL"
債務残高	"outstanding government debt"
公的債務	"public debt"
国債	"Japanese government bonds" (excluding purchase by the BOJ)
政府債務 or 政府の債務 or 国の借金 or 国の債務 or 公債	"government debt"
地方債	"local government debt"

B. Exchange Rate Policy

Japanese term	English term
市場介入	"market intervention"
為替介入	"foreign exchange intervention"
協調介入	"coordinated intervention" or "concerted intervention" or "joint intervention"
円売り・ドル買い介入	"yen-selling and dollar-buying intervention"
ドル買い・円売り介入	"dollar-buying and yen-selling intervention"
円売り・ユーロ買い介入	"yen-selling and euro-buying intervention"
ユーロ買い・円売り介入	"euro-buying and yen-selling intervention"
円買い・ドル売り介入	"yen-buying and dollar-selling intervention"
ドル売り・円買い介入	"dollar-selling and yen-buying intervention"

C. Monetary Policy

Japanese term	English term
金融政策	"monetary policy"
日本銀行	"Bank of Japan"
日銀	"BOJ"
金融緩和	"monetary easing"
追加緩和	"further easing"
量的緩和 or QE	"quantitative easing"
量的・質的緩和	"quantitative and qualitative easing"
金融引き締め	"monetary tightening"
マイナス金利	"negative interest rate"
政策金利	"policy rate"
公定歩合	"official discount rate"
金融調節	"monetary operation(s)"
市場調節 or 市場操作	"market operation(s)"
インフレ目標	"inflation target"
物価目標	"price target"

D. Trade Policy

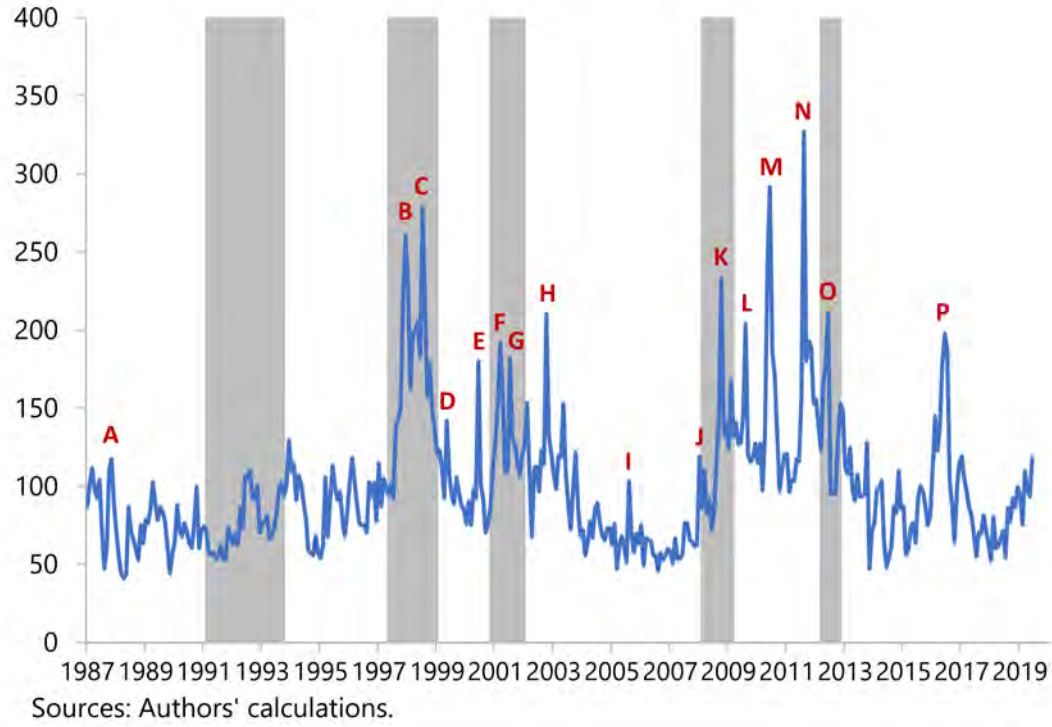
Japanese term	English term
貿易摩擦 or 通商摩擦	"trade friction(s)"
通商問題	"trade issue"
非関税障壁	"non-tariff barrier"
輸入制限	"import restriction"
スーパー 301 条	"the Super 301 provision of the Omnibus Trade and Competitiveness Act of 1988"
貿易政策 or 通商政策	"trade policy"
貿易交渉	"trade negotiation(s)"
WTO	"WTO"
GATT	"GATT"
貿易ルール	"trade rule"
関税引き下げ or 関税の引き下げ	"cutting tariff(s)" or "cut in tariff(s)"
貿易自由化 or 貿易の自由化	"trade liberalization"
輸入自由化 or 輸入の自由化	"import liberalization"
市場アクセス	"market access"
ミニマムアクセス	"minimum access"
貿易協定	"trade agreement"
環太平洋戦略的経済連携協定 or 環太平洋戦略的経済パートナーシップ協定 or 環太平洋パートナーシップ協定 or 環太平洋経済協定 or 環太平洋連携協定	"Trans-Pacific Strategic Economic Partnership Agreement"
TPP	"TPP"
経済連携協定	"Economic Partnership Agreement"
EPA	"EPA"
自由貿易協定	"Free Trade Agreement"
FTA	"FTA"
投資協定	"investment agreement"

Figures 4 and 5 compare our fiscal and monetary policy uncertainty indices with their U.S. counterparts in Baker et al. (2016).[12] They correlate at about 0.3 for both fiscal and monetary policy. Fiscal policy uncertainty was higher and more volatile in the U.S. during the late 1980s and early 1990s. The reverse pattern held during the Asian financial crisis. In recent years, U.S. fiscal policy uncertainty fell to low levels after 2013 and stayed low until Donald Trump's election. Fiscal policy uncertainty in Japan rose sharply in mid 2016 as the government contemplated and then announced a delay in plans for a hike in consumption taxes. Monetary policy uncertainty indices rose for both countries around the stock market crash of 1987, the Asian financial crisis, and in the early 2000s. They fell for both during the mid-to-late 2000s, then rose again during the global financial crisis. U.S. monetary policy uncertainty is modest in recent years, but the June 2016 Brexit referendum leaves a clear mark, as do rising trade policy tensions and slowdown fears since late 2018. The Japan monetary policy uncertainty index surged upwards in 2016, first in reaction to the introduction of negative interest rates in late January and again several months later when the yen appreciated sharply, triggering a debate

[12] The U.S. fiscal policy uncertainty index in Baker et al. reflects terms for taxes, government spending, government debt and deficits, fiscal stimulus, debt ceilings, and the like.

over foreign exchange intervention. See Cecchetti and Schoenholtz (2016), Nagle and Yates (2017) and Shirai (2018) for fuller discussions of recent policy shifts by the Bank of Japan.

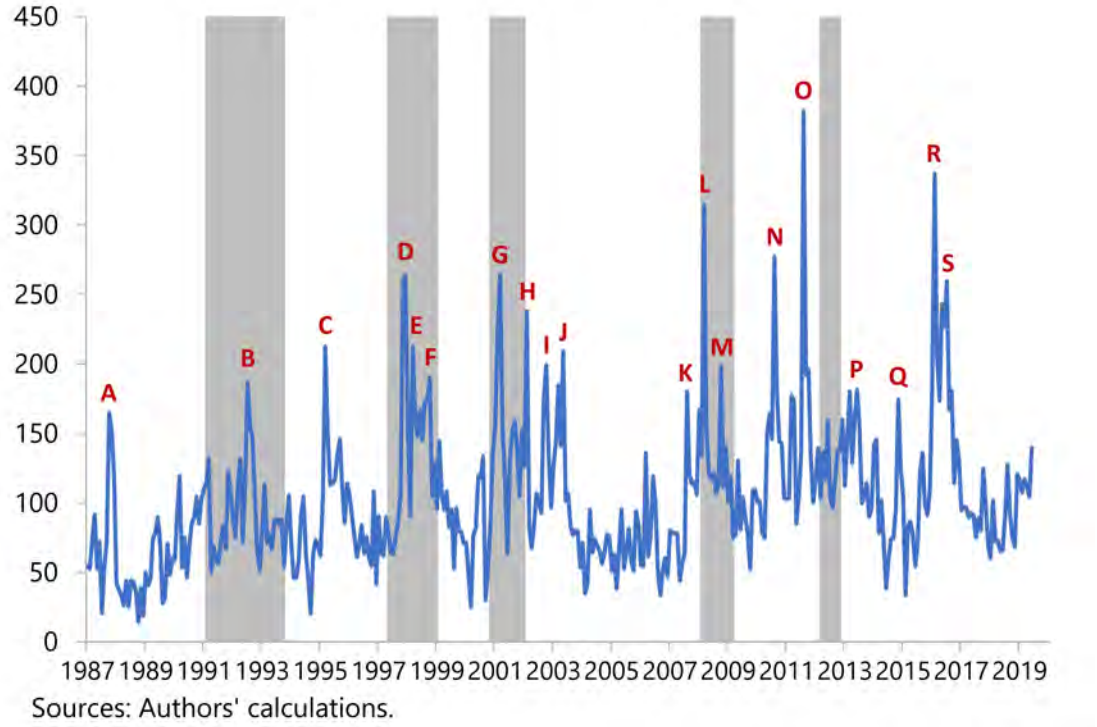
Figure 2. Fiscal Policy Uncertainty Index (1987M1-2019M6)



Sources: Authors' calculations.

A, October 1987: Black Monday. Takeshita becomes next LDP President. Budget conflicts between President Reagan and Congress. B, November-December 1997: Asian financial crisis and policy debates about fiscal consolidation. C, July 1998: LDP's defeat in Upper House election yields Twisted Diet. D, May 1999: Political conflict over pension reform and long-term care insurance system. E, June 2000: Lower House election. F, February-March 2001: Political confusion over PM Mori's resignation. G, July 2001: Upper House Election. H, October 2002: Debate over economic stimulus package. I, August 2005: Political conflict over the postal privatization bills. PM Koizumi dissolves the lower house. J, January 2008: Stimulus package conflicts between President Bush and Congress. Political conflict regarding extension of provisional gasoline and other taxes in the Diet. K, October 2008: Lehman Brothers failure and stimulus debate. L, August 2009: Lower House election, DPJ takes office. M, May-June 2010: Greek crisis. PM Hatoyama resigns. PM Kan takes office and installs new cabinet. N, August 2011: U.S. debt-ceiling crisis and concerns about European debt crisis. PM Kan resignation and DPJ leadership election. O, June 2012: Sovereign debt problems in Greece and Spain. Tri-party agreement on tax and social security reform. P, May-June 2016: Consumption tax hike delay. Brexit referendum.
Note: Shaded areas indicate recession periods.

Figure 3. Monetary Policy Uncertainty Index (1987M1-2019M6)



Sources: Authors' calculations.

A, October 1987: Black Monday. FX intervention. B, July 1992: BOJ cuts policy rate. C, March 1995: Japan banking crisis. Coordinated FX intervention. Debate about policy rate cut. D, November 1997: Asian financial crisis. Special BOJ loans to stabilize financial system after bankruptc of Hokkaido Takushoku Bank and Yamaichi Securities. E, March 1998: BOJ Governor Matsushita resigns. F, October 1998: Debate on further monetary easing amid mounting concern over the financial system. G, March 2001: Introduction of QE. H, February 2002: Debate on expansion of QE. I, September-October 2002: Debate on expansion of QE. J, May 2003: Concerns about SARS epidemic. Expansion of QE. BOJ's provision of special loans to Resona Bank. K, August 2007: Disarray in global financial markets with outbreak of U.S. subprime loan crisis. Injection of liquidity by central banks. Debate about policy rate cut in Japan and the U.S. L, March 2008: Concerns over vacancy of BOJ Governor. M, October 2008: Lehman Brothers failure. BOJ cuts policy rate. N, August 2010: Debate on QE enhancement amid sharp yen appreciation. O, August 2011: QE enhancement and the BOJ's FX intervention. P, June 2013: Concerns over FED QE tapering. Q, November 2014: Debate on the BOJ's QE program under PM Abe's decision to delay the consumption tax hike planned for October 2015. R, January-February 2016: Introduction of negative interest rates. S, May-July 2016: Debate on FX intervention amid surge in yen. Brexit referendum. Further monetary easing.
Note: Shaded areas indicate recession periods.

Figure 6 shows our Japan trade policy uncertainty index. It spikes in late 1993 amidst GATT deliberations and a relaxation of Japan's import barriers on rice and beef. Trade tensions with the U.S. leave clear marks on the index in 1987, 1988 and 1994. The index has fluctuated at much higher levels since 2010, often in reaction to developments related to the Trans Pacific Partnership (TPP) agreement: whether Japan would join the TPP talks, whether an agreement could be reached with all parties, and whether the agreement would be ratified. More recently, the June 2016 Brexit referendum and the 2016 U.S. elections brought a wave of uncertainty about Japan's future trade arrangements. President Trump's decision to withdraw the U.S. from the TPP in January 2017 pushed the index to nearly 700 – seven times its average level from

1987 to 2015. Intensifying trade tensions between the U.S. and its major trading partners – especially China, but including Japan – have again pushed our trade policy uncertainty index to extraordinarily high levels in 2018 and 2019.

Figure 7 shows our uncertainty index for exchange rate policy. Unlike our other indices, it displays no persistent swings. Instead, there are short-lived spikes near Ministry of Finance interventions in foreign exchange (FX) markets and during periods of high concern about large swings in the value of the yen. Notable episodes include the Asian financial crisis – when the yen depreciated sharply against the U.S. dollar, prompting both countries to intervene – a strong yen appreciation in 2010 that triggered intervention, and yen appreciation in August 2011 amidst uncertainty surrounding the U.S. debt-ceiling crisis. The index captures heightened uncertainty about exchange rate policy even when no FX intervention materialized. A good example is uncertainty related to sharp yen appreciation in 2016 and speculation about the possibilities for FX intervention.

Relationship to Other Economic Uncertainty Measures

As seen in Table 3, our overall Japan EPU index correlates at 0.49 with option-implied volatilities for the Japanese stock market and 0.55 with the yen-dollar exchange rate. Figure 8 reveals notable similarities between the EPU index and implied equity market volatility, especially during the global financial crisis. Each measure exhibits distinct dynamics as well. For example, implied equity market volatility falls rapidly after the global financial crisis, but the Japan EPU index does not. The EPU index reacts much more strongly to the Asian financial crisis and is also more highly elevated since 2015. The Japan EPU index also rises from December 2018 with the worsening of the U.S.-China trade relations, while the implied equity volatility measure does not.

Our Japan EPU indices also correlate positively with policy and economic uncertainty measures for other advanced economies and regions. This pattern points to common forces behind uncertainty movements in Japan and other major economies. The cross-country correlations are higher since the global financial crisis. For example, the correlation of our Japan EPU index and EPU indices for the U.S. and Europe are about 0.3 in the pre-2007 period and 0.6 for the 2007-2016 period.

Figure 9 compares our fiscal policy uncertainty index with Ito's measure of political uncertainty for Japan. The two measures reflect some of the same underlying developments. For example, both rose during 1997-98, peaking with the LDP's defeat in July 1998 and the resulting Twisted Diet. They rose again in the 2007-12 period characterized by frequent turnover of the Prime Minister. The two indices correlate at 0.33 in monthly data and about 0.47 at the annual frequency. In contrast, Ito's political uncertainty index correlates at only 0.08 with our uncertainty index for monetary policy. These results reassure us that our monetary and fiscal policy indices capture some distinct sources of uncertainty.

Figure 4. Fiscal Policy Uncertainty Indices for Japan and the United States (1987M1-2019M6)

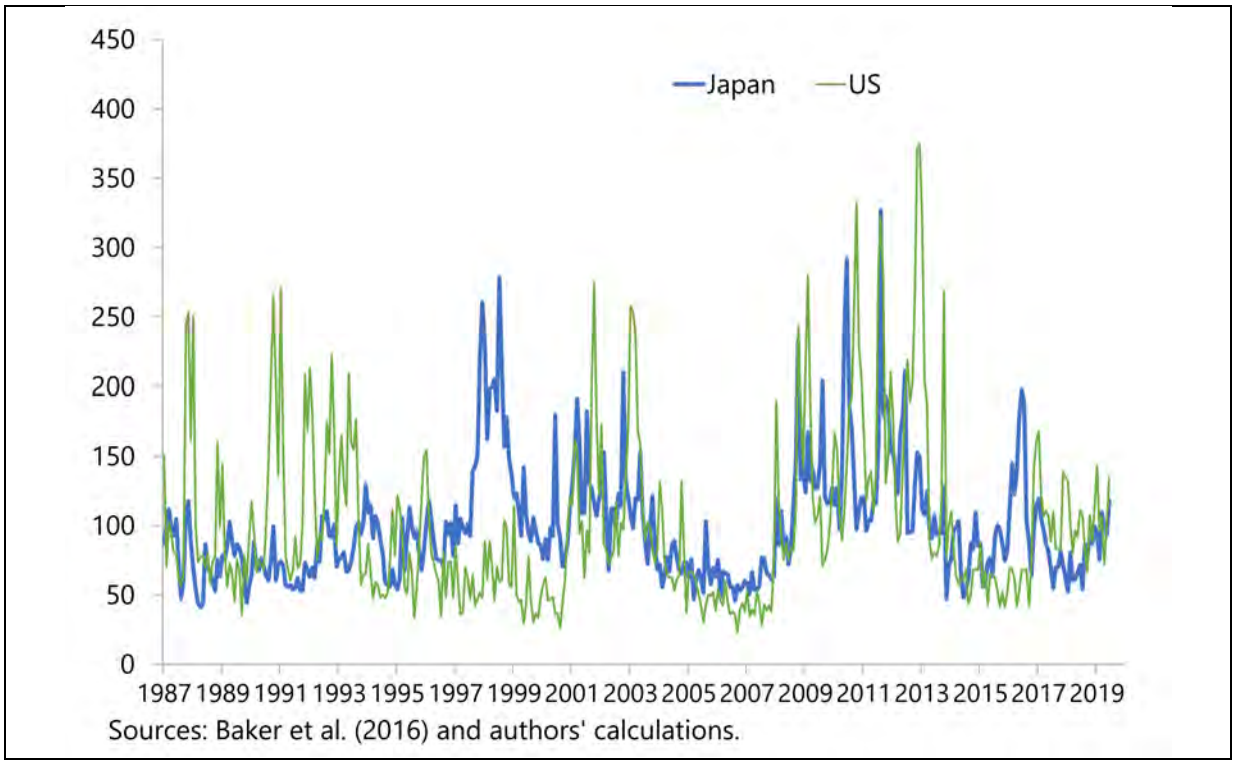


Figure 5. Monetary Policy Uncertainty Indices for Japan and the United States (1987M1-2019M6)

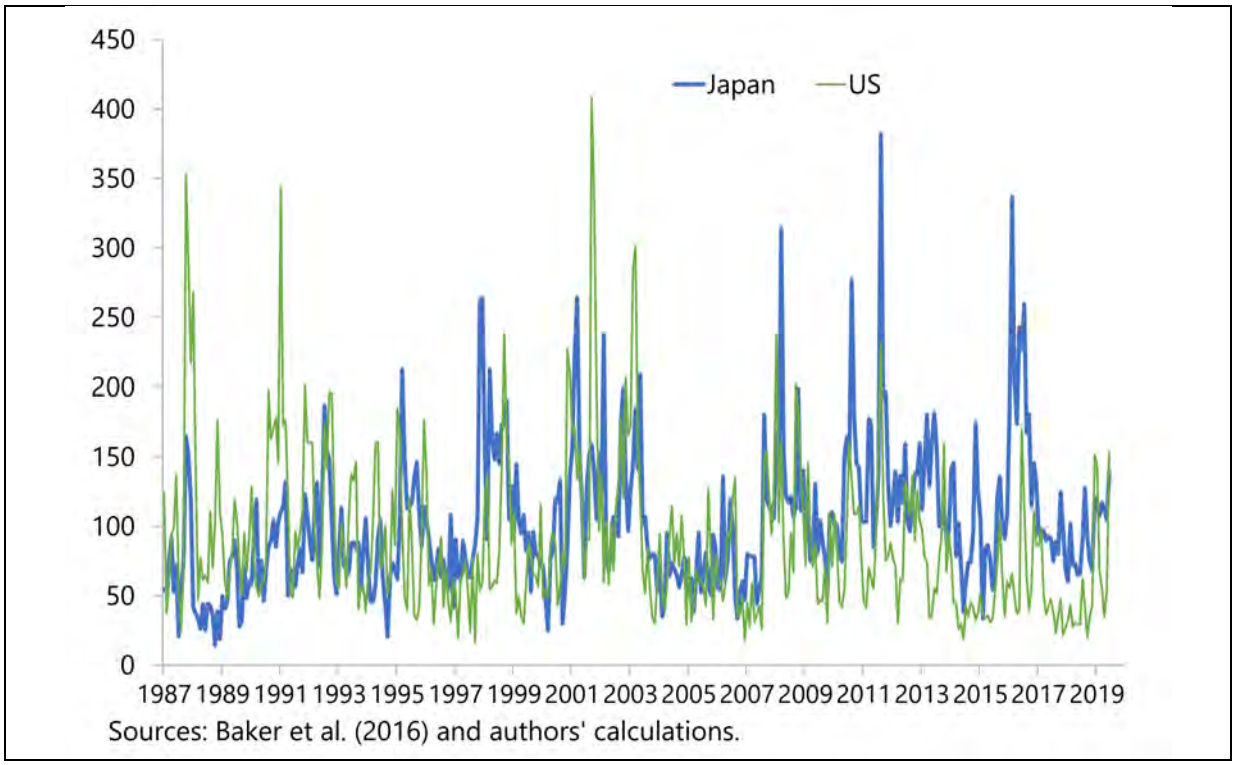
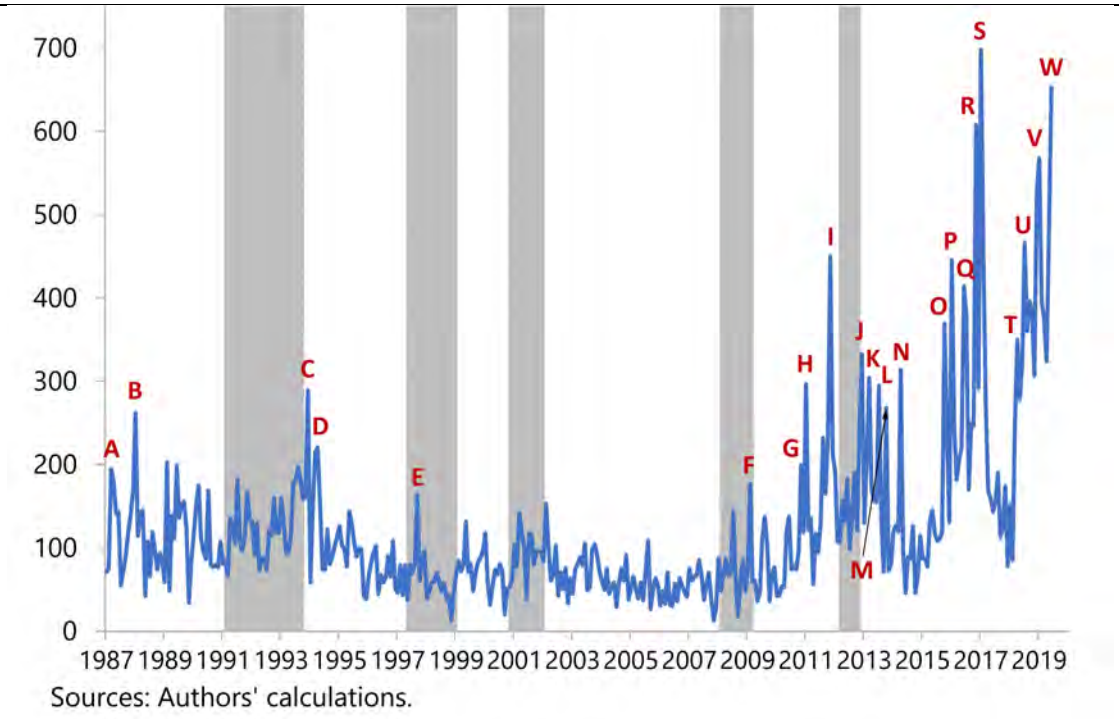


Figure 6. Trade Policy Uncertainty Index (1987M1-2019M6)

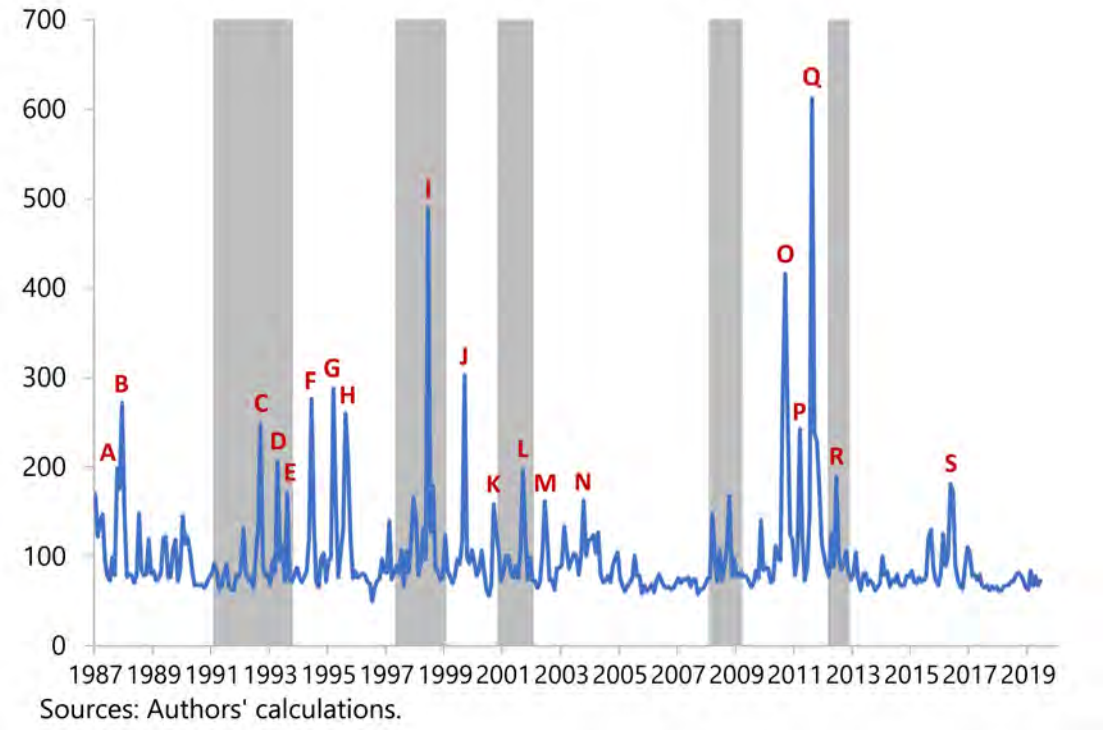


Sources: Authors' calculations.

A, March 1987: U.S. sanctions on Japanese semi-conductors. B, January 1988: Deliberation on Omnibus trade bill in U.S. Congress. C, December 1993: GATT Uruguay Round of multilateral trade talks. Partial opening of rice market and tariff cut on imported beef. D, March 1994: Revival of Super 301 provision in U.S. Omnibus Trade Act of 1988. E, September 1997: Asian financial crisis. F, February 2009: Deliberation on "Buy American" provision in U.S. Congress. G, November 2010: PM Kan announces, after political tensions, that Japan will begin consultations on participating in TPP talks. H, January 2011: PM Kan statement on TPP. Cabinet reshuffling. I, November 2011: Ongoing political conflicts over Japan's participation in TPP talks. J, November-December 2012: Uncertainty over Japan's participation in TPP talks. PM Noda decides not to announce participation and dissolves the Lower House. LDP returns to power, intensifying uncertainty around Japan's participation in TPP. K, March 2013: PM Abe announces Japan's participation in TPP talks. L, July 2013: Upper House election. M, October 2013: TPP summit ends without broad agreement. N, April 2014: Uncertainty about whether Japan and the U.S. would reach agreement on TPP, and concerns whether U.S. Congress would grant President Obama trade promotion authority. O, October 2015: Uncertainty over TPP ratification in Japan, Canada and the U.S. despite broad agreement at ministerial meeting. P, January 2016: Uncertainty over TPP ratification by U.S. amid upcoming presidential elections. Resignation of Minister Amari in charge of TPP negotiations due to corruption allegations. Q, June 2016: Brexit referendum. R, November 2016: U.S. Presidential election. S, January 2017: U.S. withdraws from TPP. T, March-April 2018: U.S. hikes tariffs on steel and aluminum imports, and China retaliates. U, July 2018: U.S. raises tariff rates to 25 percent on USD 50 billion of Chinese imports, and China retaliates. V, December 2018: After rising tensions, Presidents Trump and Xi Jinping agree to a 90-day truce on further tariff hikes. W, June 2019: U.S.-China trade tensions worsen.

Note: Shaded areas indicate recession periods.

Figure 7. Exchange Rate Policy Uncertainty Index (1987M1-2019M6)



Sources: Authors' calculations.

A, October 1987: Black Monday. Sharp yen appreciation against U.S. dollar and FX intervention. B, December 1987: FX intervention with the U.S. and Europe to stem yen appreciation. C, September 1992: European currency crisis with temporary suspension of ERM, and continued yen appreciation against the U.S. dollar amid uncertainty around U.S. presidential election. D, April 1993: Rapid yen appreciation, intervention by Japan and the U.S. E, August 1993: Continued yen appreciation, FX intervention, uncertainty about coordinated intervention with the U.S. F, June 1994: Excessive yen appreciation, Japan intervenes in the FX market, joint intervention together with the U.S. and Europe. G, March 1995: Japan, U.S. and Europe again intervene in effort to stem yen appreciation. H, August 1995: Japan, U.S. and Europe conduct joint dollar-buying intervention to support U.S. dollar. I, June 1998: Concerns about rapid yen depreciation and mounting concerns over the financial system, severe downturn in Japan and Asian financial crisis. Japan and U.S. intervene to support yen. J, September 1999: Rapid yen appreciation against U.S. dollar prompts intervention. K, September 2000: Large Euro depreciation triggers debate and uncertainty about coordinated intervention, L, September 2001: 9/11 attacks. M, June 2002: Yen appreciation and intervention. N, January 2003-March 2004: Large, sustained FX intervention through 2003. O, August-September 2010: Debate over yen appreciation and coordinated intervention. P, March 2011: Great East Japan earthquake triggers sharp yen appreciation and coordinated intervention with U.S. and Europe. Q, August 2011: Sharp yen appreciation, FX intervention, and U.S. debt-ceiling crisis. R, June 2012: European sovereign debt crisis and yen appreciation. S, May-June 2016: Rapid yen appreciation. Uncertainty over Brexit and FX intervention.
Note: Shaded areas indicate recession periods.

Table 3. Correlation of Japan EPU Indices with Other Uncertainty Measures

	Our Japan EPU Indices					
Different EU Indicators	Overall	Fiscal	Monetary	Trade	Exchange Rate	Sample
Equity Market Volatility	0.49	0.44	0.44	-0.11	0.18	1990M6-2019M6
Exchange Rate Volatility	0.55	0.44	0.36	-0.01	0.14	2003M1-2016M7
Interest Rate Volatility	0.21	0.04	0.25	-0.13	-0.03	2007M1-2016M7
Political Uncertainty	0.22	0.33	0.08	-0.19	0.22	1987M1-2019M6
EPU-Global (excluding Japan)	0.34	0.18	0.29	0.80	0.08	1997M1-2019M6
EPU-US	0.46	0.38	0.44	0.44	0.21	1987M1-2019M6
EPU-Japan (Old)	0.66	0.62	0.52	0.21	0.20	1988M6-2016M4
EPU-Europe	0.44	0.33	0.44	0.60	0.09	1987M1-2019M6
VIX - US	0.52	0.52	0.34	-0.16	0.19	1990M1-2019M6

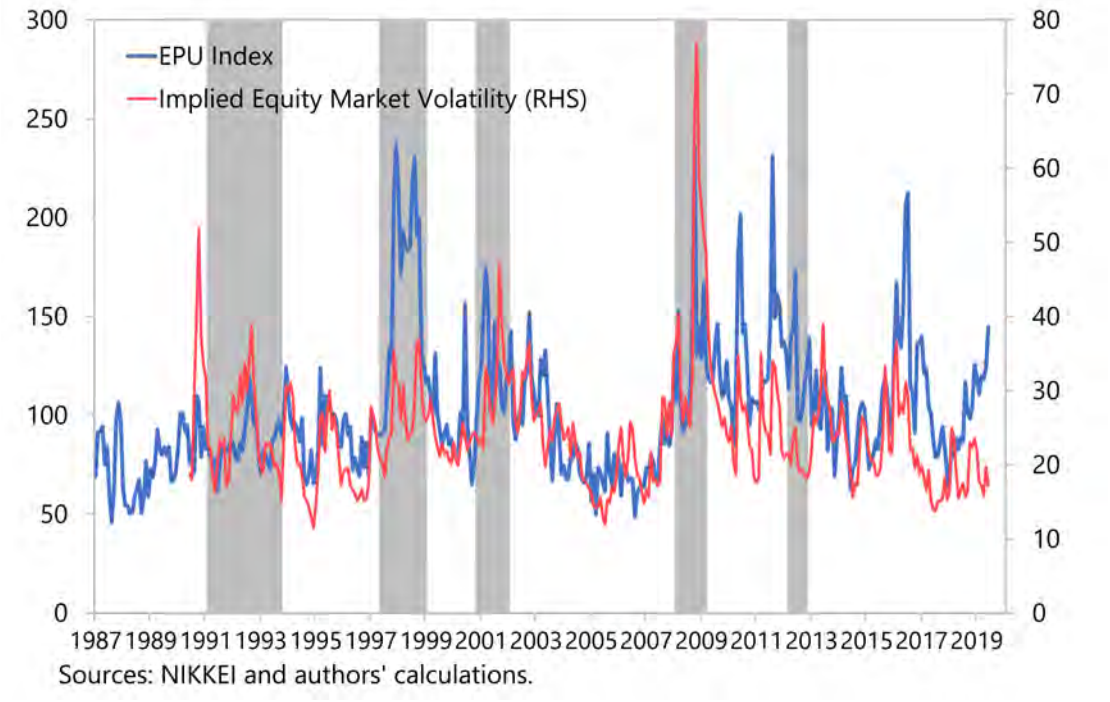
Note: Equity market volatility is the Nikkei Stock Average Volatility Index over one month calculated from Nikkei 225 futures and options. Exchange rate volatility is the option implied volatility over the next month for the USD-Japanese yen exchange rate. Interest rate volatility is the option-implied volatility over the next three months based on Japanese government bonds with 1-year tenor. The political uncertainty measure from Ito (2016) reflects the relative approval ratings of ruling and opposition parties. The Global EPU index from Davis (2016) is the GDP-weighted average of newspaper-based EPU indices for 21 countries. The EPU indices for the U.S., Japan and Europe are from Baker et al. (2016).

Proximate Sources of Economic Policy Uncertainty in Japan

Figure 10 provides information about the proximate sources of policy uncertainty, and how those sources vary through time. On average, 56 percent of EPU articles contain one or more of the fiscal policy terms in Table 2, 24 percent contain monetary policy terms, 9 percent contain trade policy terms, and only 2 percent refer to exchange rate policy terms.[13] These results strongly point to fiscal matters as the leading source of policy uncertainty in Japan. The fiscal policy share of EPU articles fell to relatively low levels in the early1990s and again in the 2006-07 period, before rising to high levels during and after the global financial crisis. The monetary policy share fluctuates around an upward drift and reaches its highest levels of about 33 percent in mid 2016. EPU articles that discuss currency and trade policy matters are relatively infrequent, but the trade policy account for a growing share of EPU articles since 2011. Since May 2018, trade policy matters have eclipsed monetary policy as a share of policy uncertainty discussions in Japanese newspapers. In June 2019, trade policy matters receive attention in 28 percent of Japan EPU articles, its highest share in the history of our sample.

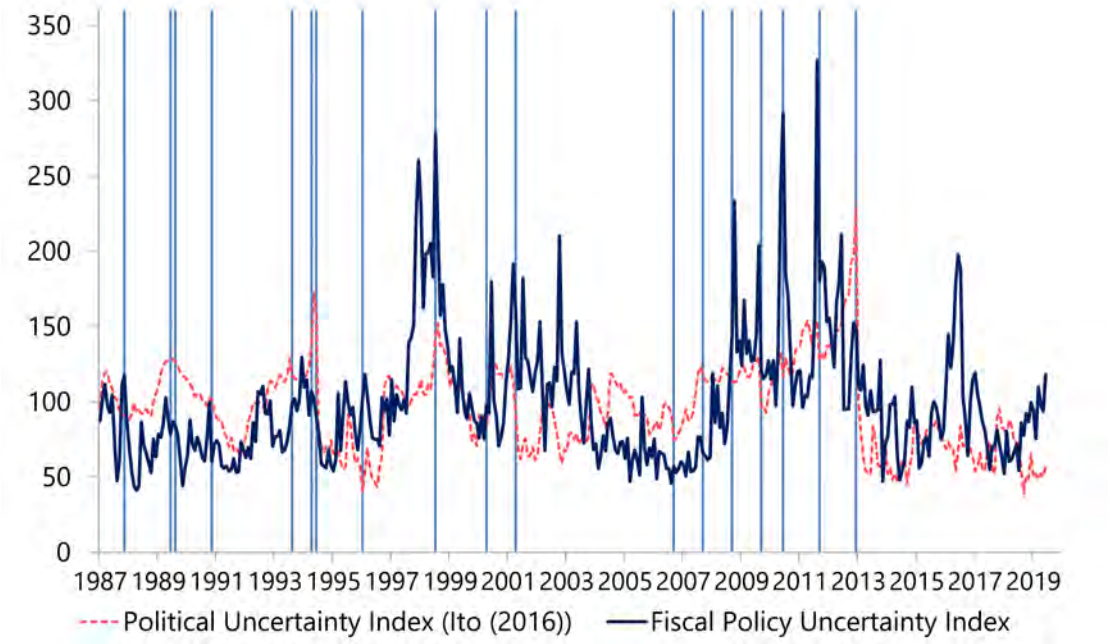
[13] An article that meets our E, P and U criteria may contain terms from zero, one or more of the category-specific term sets listed in Table 2. Thus, the shares displayed in Figure 10 can sum to more or less than 100 percent of all EPU articles in the month.

Figure 8. Japan EPU Index and Option-Implied Volatility of Nikkei Equity Index (1987M1-2019M6)



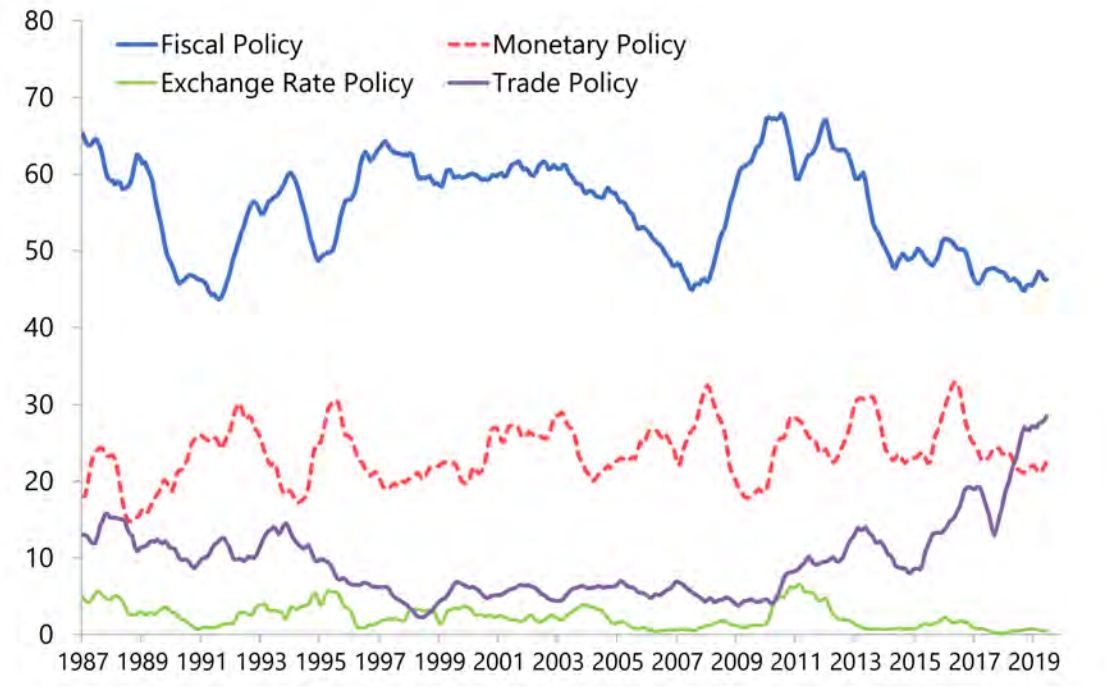
Sources: NIKKEI and authors' calculations.

Figure 9. Our Fiscal Policy Uncertainty Index Compared to Ito's Political Uncertainty Index (1987M1-2019M6)



Sources: Ito (2016) and authors' calculations.
Note: The blue lines indicate changes in Prime Minister.

Figure 10. Proximate Sources of Economic Policy Uncertainty
(Percent of Overall EPU Index, 12-month centered MA)



IV. The Interplay between Policy Uncertainty and Economic Performance

Political decision-making is often messy and fraught with uncertainty about outcomes and consequences. Recent examples include the U.S. debt-ceiling crisis in 2011, Brexit and its irresolution, and the sharp escalation of U.S.-China trade policy tensions since 2018. These examples illustrate the role of governments and political processes as sources of uncertainty.[14] That uncertainty weighs negatively on economic performance. At least in a proximate sense, causality run from policy uncertainty (or political processes) to aggregate economic performance in these examples.

In contrast, the global financial crisis (GFC) of 2007-09 arose from the workings of the economy. It confronted policymakers with extraordinary and complex challenges, especially in the immediate wake of the financial panic in September 2008. There was great uncertainty about how policymakers should and would respond, and what would be the economic consequences. In short, the crisis drove a rise in policy uncertainty. In turn, high policy uncertainty contributed to the severity of the crisis and the weakness of the ensuing recovery.

There is also evidence to support the proposition that major financial crises lead to higher levels of policy uncertainty for many years. Funke, Schularick and Trebesch (2016) draw on data for many countries over 140 years to document a pattern of rising political polarization in the years following systemic financial crises, contributing to higher levels of policy uncertainty. Mian, Sufi and Trebbi (2014) also find evidence that financial crises breed political polarization, which sometimes results in political gridlock and policy uncertainty.

[14] Davis (2016) highlights several other recent examples, drawn from countries around the world.

The potential for negative shocks to raise policy uncertainty depends on the underlying environment, which is partly shaped by past policy decisions.[15] Consider again the GFC. It was precipitated by a collapse in U.S. housing prices and mortgage-backed security values (Mian and Sufi, 2015). The shock was large, and many banks were highly exposed to it. The shock led to a systemic financial crisis, because banks were poorly capitalized and heavily dependent on flight-prone forms of debt to fund their investments. If policymakers had required banks to rely more heavily on run-proof funding, the crisis would have been less severe – or perhaps avoided altogether. In this and other respects, the pre-crisis regulatory regime set the stage for a major financial crisis (Admati and Hellwig, 2013 and Duffie, 2019) and the ensuing uncertainty.

As another example, there is less need for discretionary fiscal stimulus in response to negative shocks when robust automatic fiscal stabilizers are in place. In this way, automatic fiscal stabilizers lessen the political conflicts, decision delays, implementation lags and policy uncertainty that comes with efforts to deploy discretionary fiscal tools.

Policy uncertainty can also co-move with other hard-to-measure factors that influence, or are influenced by, economic performance. These factors include confidence about future economic performance, political polarization, and governance quality in the public sector.

The complex interplay between policy uncertainty and economic performance is evident in the behavior of our indices for Japan. Contested elections, major political transitions and Twisted Diet outcomes are often associated with higher levels of overall policy uncertainty and fiscal policy uncertainty (Figures 1 and 2). Prime Minister Abe's election at the end of 2012 brought greater political stability, a clearer policy direction, and several years of declining or low policy uncertainty (Figure 1). In turn, low and declining policy uncertainty contributed to a positive outlook and a favorable economic performance. A similar circle of reinforcing positive effects held during the long tenure of Prime Minister Koizumi (Figure 1). Political stability during these periods moderated policy uncertainty, which helped support an optimistic outlook and good economic performance.

Leadership transitions and policy shifts at the Bank of Japan sometimes brought spikes in monetary policy uncertainty (Figure 3). While leadership changes are inevitable and major developments may require policy shifts, their impact on economic uncertainty depends on previously established institutions and policy frameworks. Clear communications about the objectives of monetary policy, backed by strong analytical and empirical underpinnings, are likely to bring more continuity in the conduct of monetary policy, less anxiety and uncertainty about its future direction, and greater confidence about economic performance.

To appreciate how the past conduct of monetary policy shapes the current policy environment – and the scope for negative shocks to trigger a rise in policy uncertainty – consider recent proposals to raise the target rate of inflation (e.g., Blanchard et al., 2010 and Ball, 2014). The logic behind these proposals is straightforward: Raising the underlying rate of inflation reduces the likelihood that monetary policy becomes constrained by the zero lower bound on nominal interest rates during future downturns. In this way, a higher target rate enlarges the scope for using traditional monetary policy tools to stabilize economic activity and lessens the need for

[15] The effects of policy uncertainty also depend on the environment. For example, Basu and Bundick (2017) and Nakata (2017) examine uncertainty shocks in New Keynesian models. Both papers conclude that higher uncertainty has a larger negative effect on output when the monetary authority's policy rate is closer to the zero bound. Caggiano et al. (2017) find empirical support for this prediction.

quantitative easing, forward guidance, direct credit market interventions and discretionary fiscal stimulus. Because less is known about the impact of unconventional policy tools, their use involves greater uncertainty about effects. Heavy reliance on unconventional tools may also erode political support for the central bank, undermining sound monetary policy in the future.

Several episodes in recent decades illustrate the potential for negative economic shocks to create high levels of economic uncertainty. Examples include the Asian financial crisis, the downturn of 2001-02 and the global financial crisis of 2008-09, all of which led to spikes in our measures of fiscal and monetary policy uncertainty (Figures 2 and 3). Experiences during the Asian financial crisis also illustrate how past policy decisions shape the current response of policy uncertainty to negative shocks. The build-up of financial excesses in the 1990s, funded through large dollar-denominated debts in the banking system and the private sector, made some Asian economies highly vulnerable to exchange rate adjustments. This vulnerability accentuated policy uncertainty during the Asian financial crisis. In contrast, stronger policy frameworks, better financial supervision and larger reserve buffers helped many Asian economies weather the global financial crisis under much better terms. See Davis (2017) for a broader discussion of how sound regulatory design can temper policy uncertainty.

V. Policy Uncertainty and Aggregate Economic Performance

We now consider VAR models that yield output, employment, consumption, and investment responses to Cholesky-identified EPU innovations. Our baseline monthly VAR model contains our Japan EPU index, log employment, log industrial production index, and a linear trend. We also consider alternative monthly specifications that replace industrial production with various indicators of consumption and investment activity (one at a time). Our baseline quarterly VAR model contains our Japan EPU index, the log Nikkei stock price index, log GDP, log gross private capital formation, and a linear trend. Our sample runs from 1987M1 to 2019M5 for monthly data and from 1987Q1 to 2019Q1 for quarterly data. We selected lag lengths based on the Akaike and Schwarz information criteria, which yielded four lags in our monthly model and two in our quarterly model. We rely on standard Cholesky decompositions to identify shocks, with Japan EPU ordered first unless noted otherwise.[16]

We report impulse responses to a 50-point upward innovation in the Japan EPU index, which is the same size as the actual EPU change from its average 2014 value to its average 2016 value. Recall from Figure 1 that the Japan EPU index reached a local trough in June 2014 and rose rapidly in 2016 following the introduction of negative interest rates by the Bank of Japan, Prime Minister Abe's decision to postpone a consumption tax hike, the June 2016 Brexit referendum, and the U.S. Presidential election in November 2016.

According to our baseline monthly results in Figure 11, an upward EPU innovation foreshadows statistically significant declines in output, employment and industrial production. The dashed lines show 95% confidence intervals. A 50-point upward EPU innovation yields a peak estimated fall in industrial production of 2 percent after about one year. The employment response is smaller, more delayed, and highly persistent.

[16] Granger causality tests fail to reject the hypothesis that economic indicators such as real GDP and industrial production have zero predictive power for our EPU index. The reverse is not true.

Figure 12 shows impulse response functions for various indicators of investment and consumption activity when we insert them into our baseline monthly VAR specification in place of log industrial production. As expected, the EPU innovations have larger effects on investment activity than on consumption activity. Depending on the measure, investment activity falls by 1.0 to 3.9 percent in response to a 50-point Japan EPU innovation. We find larger estimated industrial production responses in sectors that produce investment goods as compared to those that produce consumption goods.

Figure 13 displays estimated industrial production responses to EPU innovations for alternative specifications. The basic pattern whereby upward EPU innovations foreshadow future activity declines is robust to alternative Cholesky orderings, the inclusion of a range of control variables such as the equity price index, option-implied equity price volatility, the VIX, the Global EPU index from Davis (2016), and alternative lag and time trend specifications. These modifications to the VAR model and identification assumptions lead to roughly similar responses of industrial production to a Japan EPU innovation. When we include the VIX index in the VAR system and order it first, we find a smaller 1.3 percent peak fall in industrial production that remain statistically significant at the 95 percent confidence level.

Figure 14 shows the impulse responses under our baseline specification for different sample periods. Discarding data after 2006 yields somewhat smaller responses. If we instead restrict attention to the post-1995 period when the BOJ was up against the zero lower bound, we obtain slightly larger responses, consistent with our priors and theoretical predictions.

The quarterly VAR results in Figure 15 also show that upward EPU innovations foreshadow weaker aggregate performance. Specifically, a 50-point upward EPU innovation foreshadows a peak fall in real GDP of about 0.75 percent after one year. The investment response peaks at an estimated 3 percent. Figure 16 shows the historical contribution of EPU shocks to fluctuations in real GDP and investment. EPU shocks account for sizable movements in both variables—with peak investment and GDP swings of about 12 and 3 percent, respectively. EPU-induced movements are most pronounced in 1997-1999, 2001-2002, 2008-2012 and 2016-2018.

Broadly speaking, we see three ways to interpret our VAR-based evidence. Under the first interpretation, an upward EPU innovation corresponds to an unforeseen policy uncertainty shock that causes the worsening of macroeconomic performance through real options effects, cost-of-capital effects or other mechanisms. Under the second interpretation, an upward EPU innovation captures bad news about the economic outlook that is not (fully) captured by the other variables in the VAR system, *and* that bad news triggers a rise in EPU that has harmful effects on the economy. Under this interpretation, EPU amplifies and propagates a causal impulse that originates elsewhere. Third, EPU has no role as either an impulse or a propagation mechanism; instead, it simply acts as a useful summary statistic for information missing from the other variables in our system. This third interpretation is hard to fully reconcile with the evidence of policy uncertainty effects in studies that use micro data, which allows for more compelling identification strategies. See, for example, Handley and Limao (2015), Baker et al. (2016), Gulen and Ion (2016), and Hassan et al. (2019).

Figure 11. Impulse Responses to an increase in Japan EPU Index, Monthly Data

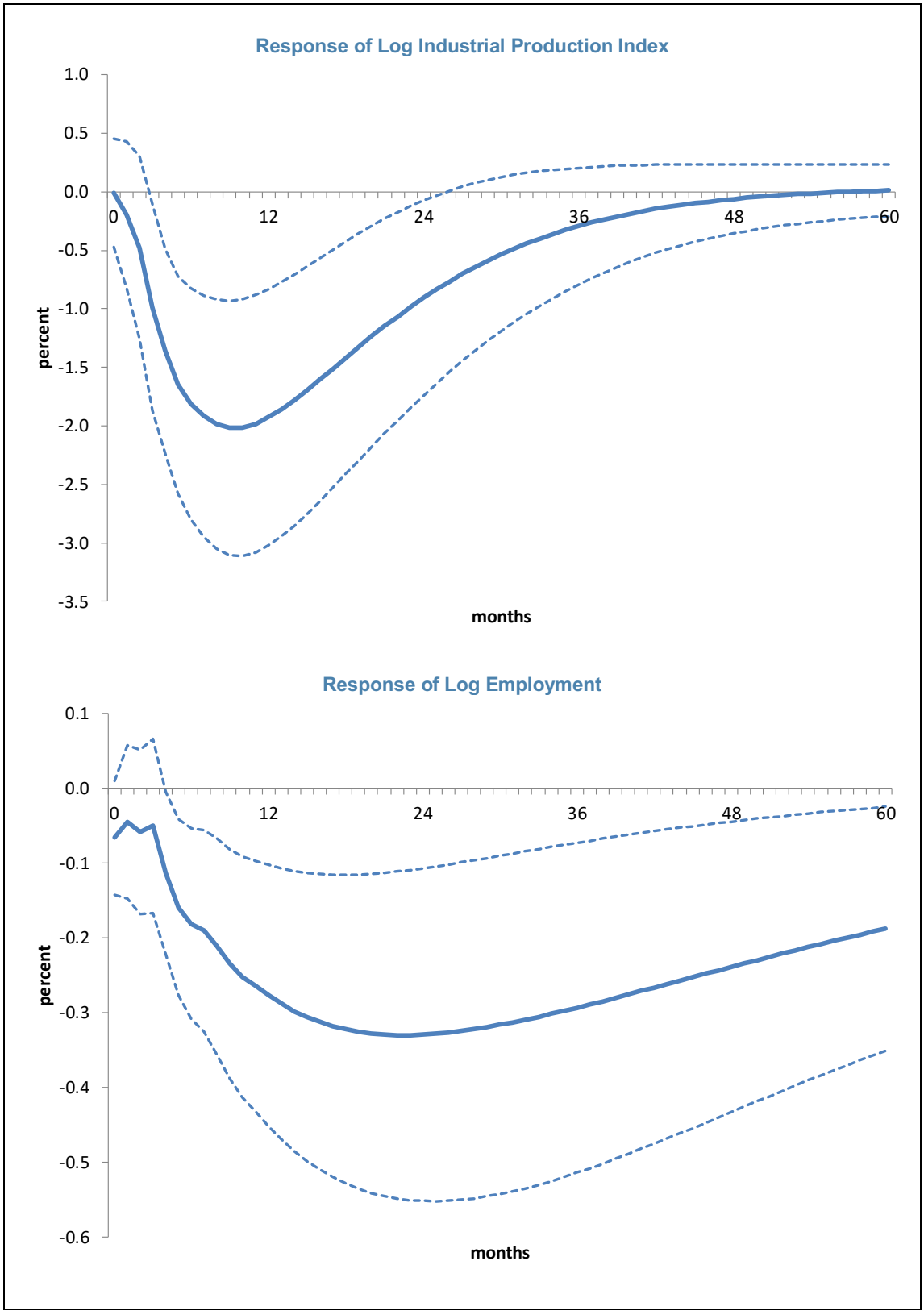


Figure 12. Impulse Responses to an increase in Japan EPU Index, Monthly Data

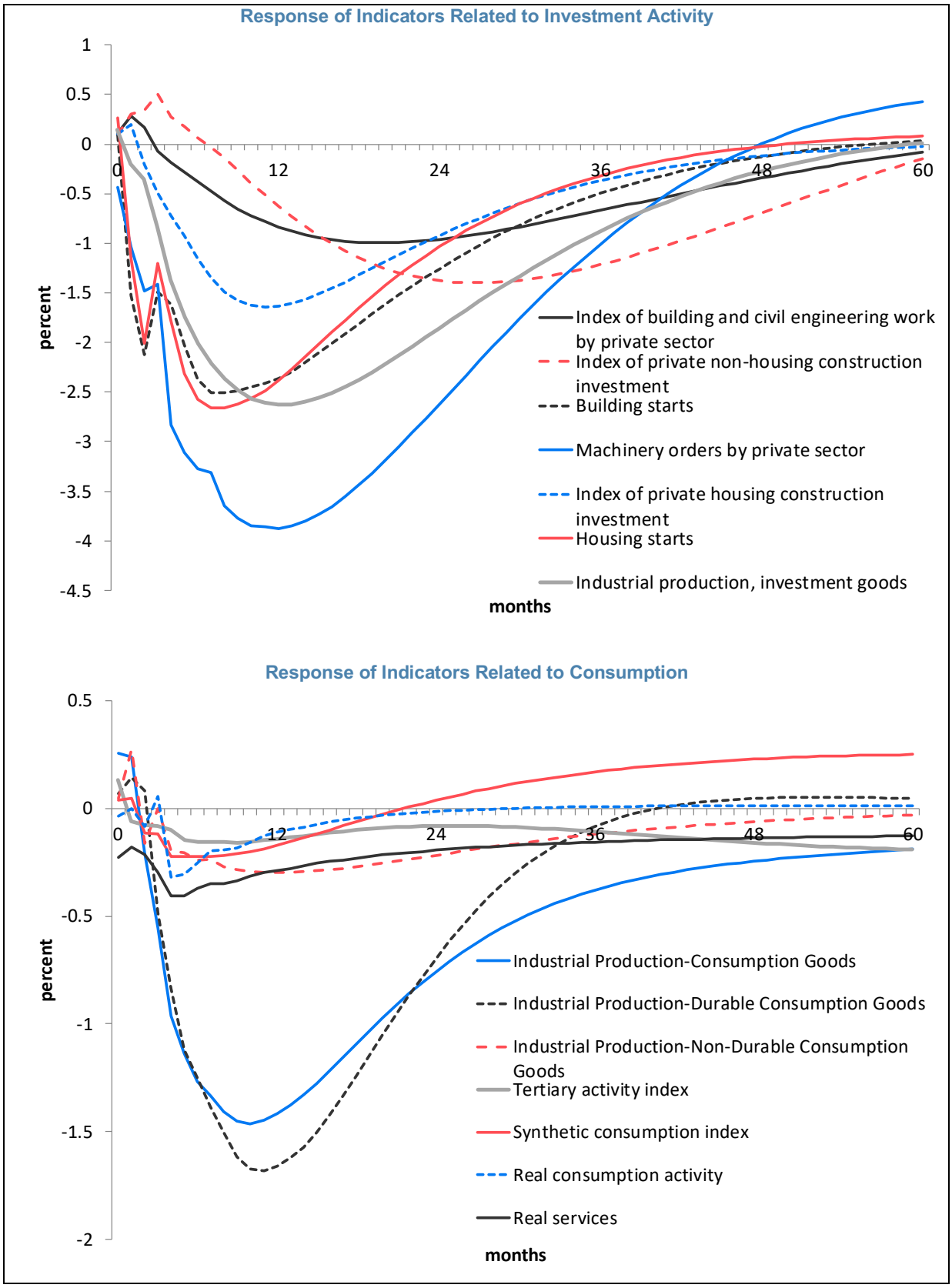


Figure 13. Impulse Responses to an increase in Japan EPU Index, Alternative specifications, Monthly Data

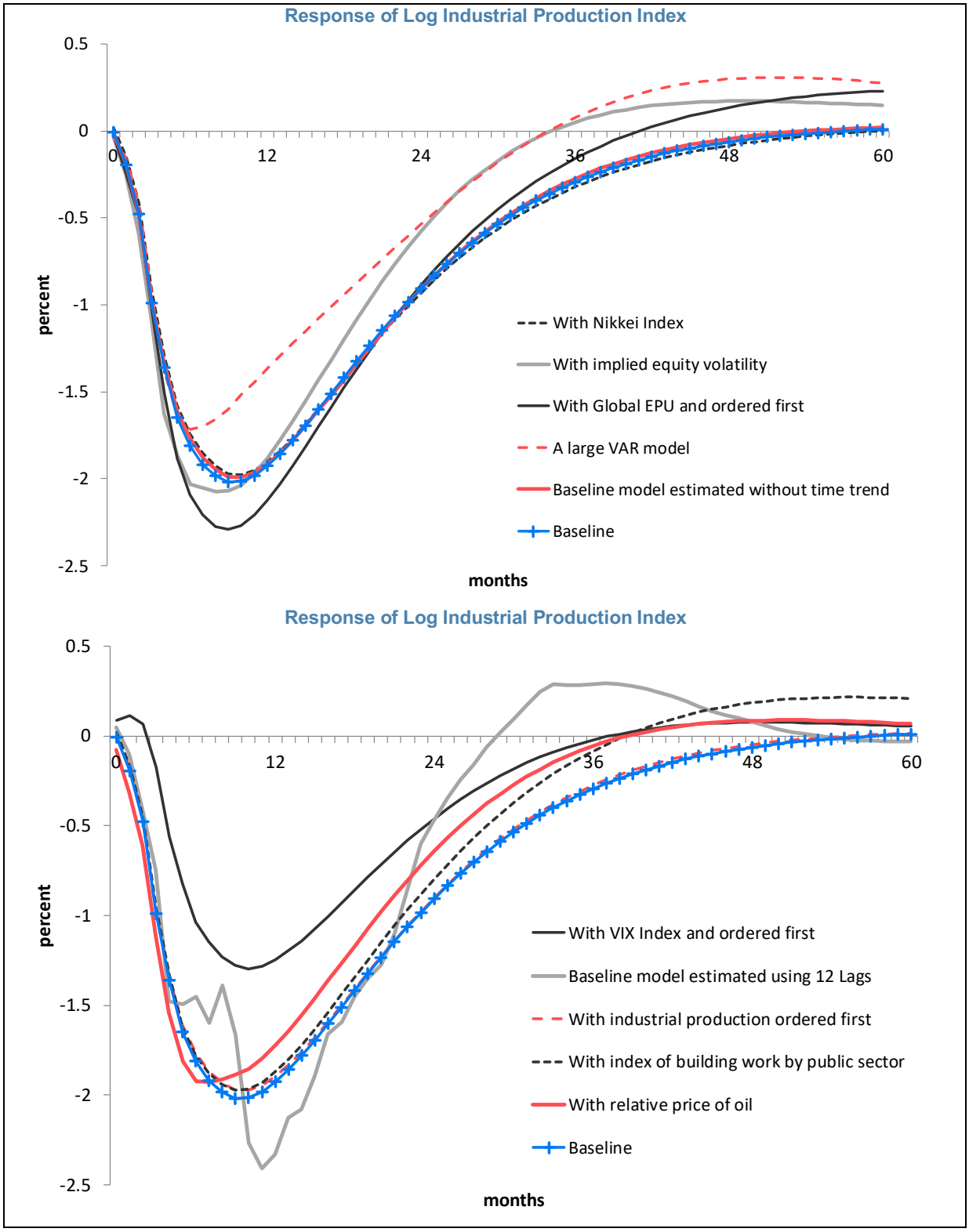


Figure 14. Impulse Responses to an increase in Japan EPU Index, Alternative samples, Monthly Data

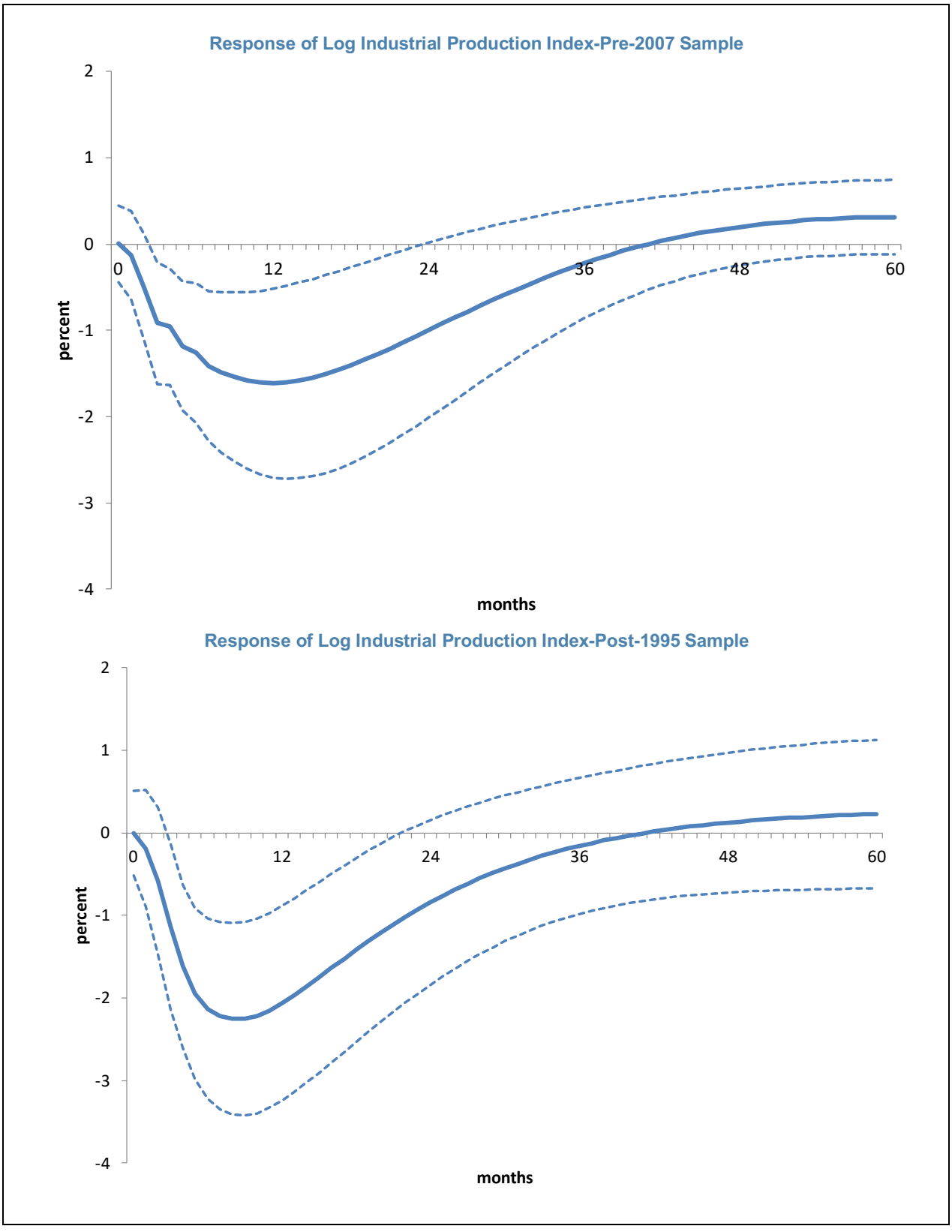


Figure 15. Impulse Responses to an increase in Japan EPU Index, Quarterly Data

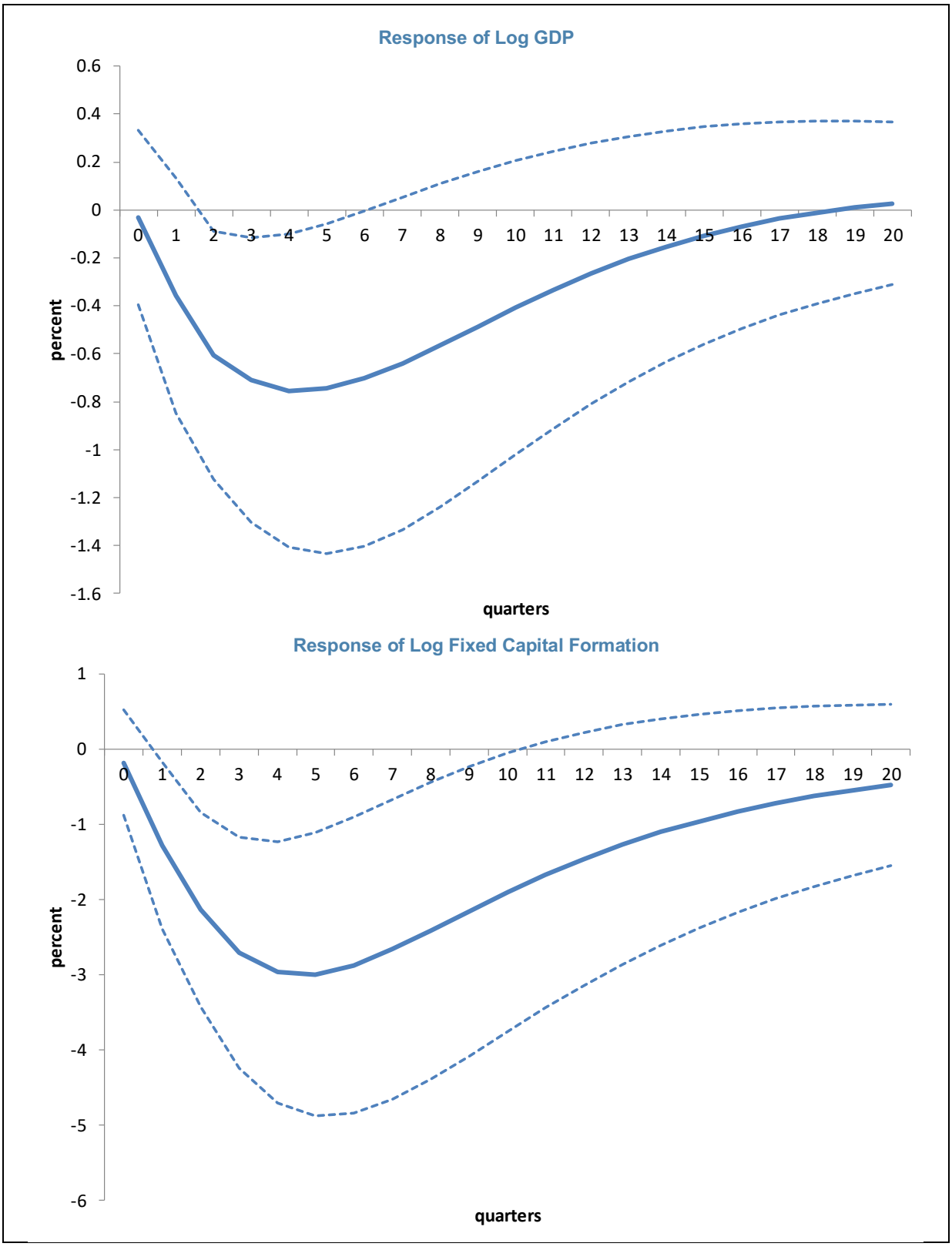
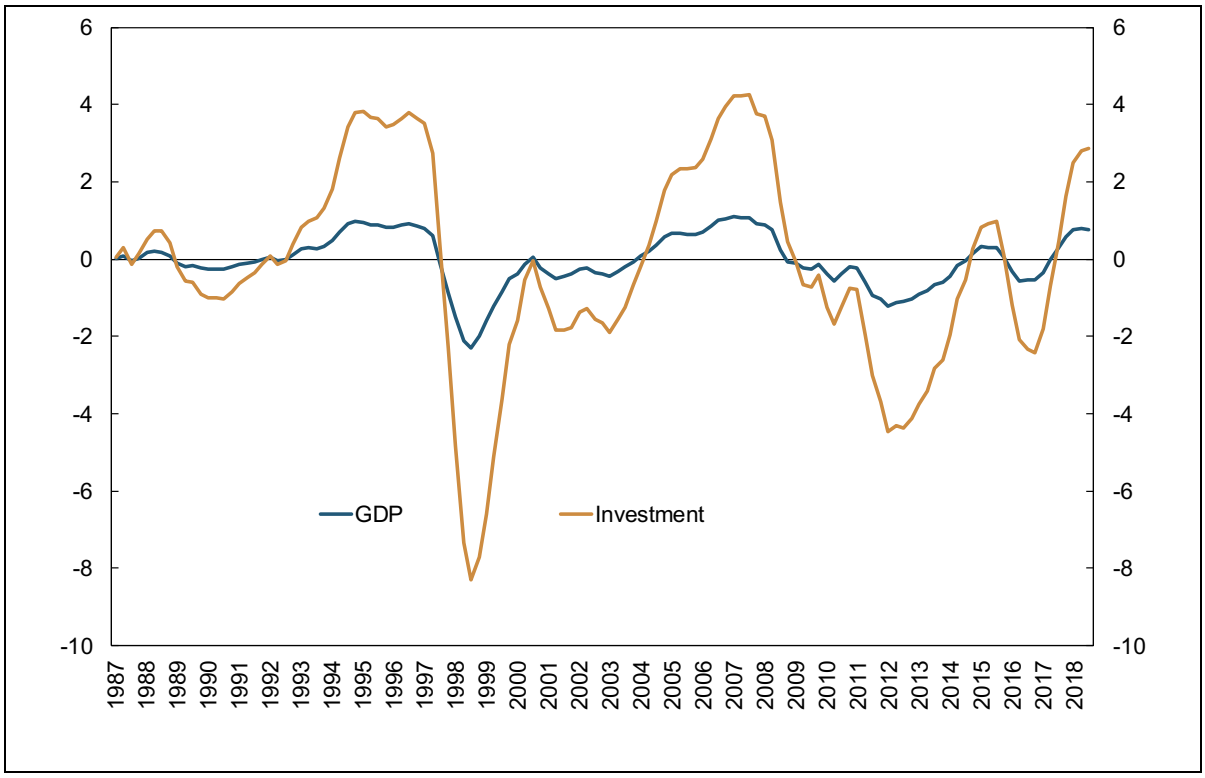


Figure 16. Historical Contribution of Japan EPU Shocks to GDP and Investment Fluctuations, Quarterly Data



VI. Concluding Remarks

We construct several new measures of economic policy uncertainty for Japan. Our measures reflect frequency counts of articles in major Japanese newspapers that contain specific terms related to the economy, policy matters and uncertainty.

Our overall EPU index co-varies positively with implied volatilities for Japanese equities, exchange rates and interest rates, and with a survey-based measure of political uncertainty. Our Japan EPU index rises around contested national elections and major leadership transitions. It peaks during the Asian financial crisis and in reaction to the Lehman Brothers failure, U.S. debt-ceiling fight in 2011, Brexit referendum, and Japan's recent consumption tax-hike deferral. Terms related to fiscal policy appear in about 56 percent of all articles that meet our EPU criteria. Terms related to monetary policy appear in about 24 percent, while terms related to trade and exchange rate policy appear less often. These results point to fiscal policy concerns as the most important proximate source of policy uncertainty in Japan. From mid-2018, trade policy matters became the second-most mentioned source, reaching 28 percent of all EPU articles in our Japanese newspapers as of June 2019.

In VAR investigations, upward EPU innovations foreshadow declines in aggregate employment, output, consumption and investment. Investment responds much more than

consumption expenditures, and output responds more in sectors that produce capital goods. These results survive when we include option-implied equity price volatility in the VAR system. When we include a Global EPU measure, both Japan EPU and Global EPU shocks yield material, statistically significant output and investment responses. This result suggests the effects of policy uncertainty shocks spill across national borders, in line with other evidence in Colombo (2013), International Monetary Fund (2013), Klössner and Sekkel (2014), Julio and Yook (2016), and Costantinescu (2017).

While it is hard to establish causal effects, we see our results as favoring the view that high policy uncertainty undermines macroeconomic performance. It may do so by acting as an impulse behind fluctuations, as a mechanism for amplifying and propagating causal impulses that originate elsewhere, or both. We also stress that past policy decisions and institutions shape the policy uncertainty response to contemporaneous economic shocks. In particular, well-designed policy institutions and rules can limit the scope for negative shocks to trigger large jumps in policy uncertainty.

Our evidence and discussion suggest that credible policy plans and strong policy frameworks can favorably influence macroeconomic performance by, in part, reducing policy uncertainty. In the Japanese context, credible plans to follow through on trade reforms would promote trade-creating investments. Credible medium-term budget plans would foster confidence about Japan's fiscal trajectory. Further efforts to improve the BOJ's communications framework would lessen uncertainty about the direction of monetary policy.

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APPENDIX

Additional Information about Our Japan Economic Policy Uncertainty Indices

We used Nikkei Telecom[17] as the main interface to access the archives of the four Japanese-language newspapers. We used Kikuzo II to obtain data on the total number of newspaper articles and the number of articles meeting the E, P, and U criteria each month for the Asahi Shimbun. We also used MAISAKU for the Mainichi Shimbun and Yomidas Rekishikan for the Yomiuri Shimbun. As the first step in constructing the EPU index, we conducted an extensive analysis of the archives for the four newspapers to ensure that potential changes in their coverage do not distort our results, and to ensure consistent uncertainty measures over time. For example, the inclusion of a new section on arts and fashion can lead to a spurious index movement by raising the total number of articles used to scale the number of EPU articles. For each newspaper, we identified the reasons behind large movements in total article counts and potential changes in seasonality. Based on our investigations, we decided to exclude local editions of national papers, because they had little content related to policy and economic matters at the national level and their inclusion raised the volatility of total article counts. Archive availability and coverage dictated the start of our sample and our choice of papers.

We identified our term sets in several steps using small-scale audits. We first used the English-language versions of the newspapers to search for articles that contain the keywords for economic uncertainty in Baker et al. (2016).[18] We then randomly selected articles every year and went to the Japanese version of the same article to make a list of potential keywords in Japanese. We identified two keywords, "経済" and "景気," as Japanese terms for "economy" or "economic" and six keywords, "不透明," "不安," "微妙," "不確実," "不安定," and "不確定" for "uncertainty" or "uncertain." We then conducted a small-scale audit to narrow down our set of "uncertainty" or "uncertain" terms, drawing randomly selected articles in Japanese that contain both "経済" and one of the six keywords. For each keyword, we determined whether the context was indeed related to "uncertainty" or "uncertain." This exercise led us to narrow down our keywords for "uncertainty" or "uncertain" to four words in Japanese, "不透明," "不安," "不確実" and "不確定."

As a check on our "economic" and "uncertainty" keywords, we constructed an "economic uncertainty" index and confirmed that it had the expected correlation with the economic cycle and other measures of economic uncertainty (such as stock market volatility indices). As expected, the economic uncertainty and economic policy uncertainty indices are highly correlated. About 65 percent of articles that contain the "economy" and "uncertainty" keywords also contain one of our "policy" terms. There is, however, meaningful variation over time in this ratio—with a minimum of 0.45 and a maximum of 0.8.

We identified the "policy" keywords using a similar approach. We started with a broad group of potential keywords informed by our priors, reading through numerous articles and similar newspaper-based indices constructed for the U.S. and Japan in Baker et al. (2016). Using this initial set of terms, we conducted another round of audits using the English versions of Nikkei

[17] Nikkei Telecom covers leading Japanese newspapers, magazines and journals.
[18] These are "uncertain" or "uncertainty" and "economic" or "economy."

and Yomiuri to identify the Japanese words that best capture the corresponding English-language words. In choosing the keywords for different policy categories (Table 2), we started with a comprehensive set of potential words informed by our priors and our reading of newspaper articles and the government's Annual Report on the Japanese Economy and Public Finance (Economic and Fiscal Policy Whitepaper) since 1987. At the second stage, we eliminated terms likely to trigger many false positives such as "interest rate" for monetary policy or "public works" for fiscal policy.[19]

Description of Seasonal Adjustment

We use the X-11 seasonal adjustment module in X-13ARIMA-SEATS to obtain seasonally adjusted series for each newspaper's relative frequency count of EPU articles. Some newspapers exhibit different seasonality patterns for the monthly count of all articles over the post-January 1987 sample period. For these papers, we divide the period into sub-samples and then adjust for seasonality in each sub-sample period. Seasonal adjustment is re-calculated every month when the latest data becomes available.

The sub-sample periods for conducting seasonal adjustment for each newspaper are as follows:
-- Asahi: January 1987 onwards.
-- Mainichi: January 1987 to April 2006 and from May 2006 onwards.
-- Nikkei: January 1987 to September 2000 and from October 2000 onwards.
-- Yomiuri: January 1987 to July 1996 and from August 1996 onwards.

Detailed Description of Episodes with Heightened Economic Policy Uncertainty

In this section, we provide more details about episodes when our EPU index either reached high levels or increased significantly in any given month, both defined as movements exceeding 1.64 standard deviations from their average levels. We review these episodes in chronological order below.

October 1987*:* Several events were associated with heightened policy uncertainty during this period. On October 20th, ***Prime Minister Nakasone officially announced his nomination of Noboru Takeshita*** as the next LDP President. PM Nakasone held the position for two consecutive terms and could not run a third time. Other candidates were Shintaro Abe and Kiichi Miyazawa. Second, on the 19th of October, stock markets around the world collapsed—an event also known as ***Black Monday***. Asian markets including the Nikkei tumbled with the opening of markets on Tuesday. Heightened volatility in the Tokyo Stock Exchange led the BOJ to inject liquidity. Yen appreciated sharply and was followed by ***FX intervention*** by the Ministry of Finance.

March 1995: With the bursting of the asset price boom in early 1990s, Japan's financial institutions had faced considerable pressure resulting in the failure of several credit institutions.

[19] Baker et al. (2016) conduct an extensive human audit of articles to assess their U.S. EPU index and to optimize their choice of policy terms. Our interface for accessing the digital archives of Japanese papers does not allow automated searches. Since we cannot conduct automated searches, we cannot optimize over tens of thousands of possible term set combinations in the same manner as Baker et al. (2016).

In March, ***the failures of two credit cooperatives, Toyo Kyowa and Anzen,*** were handled by establishing a new bank, Tokyo Kyodo Bank. The new bank received an infusion of capital contributions from the BOJ. This rescue plan was heavily criticized and received opposition in the metropolitan congress given that the management of the bank had been involved in fraudulent activity. The use of government funds to rescue an institution that had failed because of fraud was questioned, even though management was purged and prosecuted. At the same time the ***Japanese yen surged*** reflecting interest rate differentials, despite coordinated FX intervention with Germany and the U.S.

November-December 1997*:* This period coincides with the intensification of the Asian financial crisis. In November 1997, ***Korea was struck with a currency and banking crisis***. On the domestic front, PM Hashimoto's fiscal consolidation plan faced headwinds due to bankruptcy of financial institutions. Policy debate intensified whether to interrupt the fiscal consolidation process due to the economic downturn. PM Hashimoto decided to provide a tax break of JPY 2 trillion (financed by JGB issuance) but to continue with fiscal consolidation.

July-August 1998*:* Mr. Obuchi replaced Mr. Hashimoto as PM on July 30 as their ruling party lost many seats in the Upper House elections on July 12. The resulting ***Twisted Diet*** heightened political uncertainty when restoring the health of the financial sector was still a priority. PM Obuchi submitted ***Finance Revitalization Bill***—a legislation that overhauled financial regulation in Japan, establishing the Financial Reconstruction Commission to manage and dispose nationalized assets—but faced objections at the Twisted Diet (the Bill passed in October 1998). Ruling and opposition parties clashed on the ***public bailout of Long-Term Credit Bank*** (LTCB was nationalized in October 1998). On the international front, the ***Russian financial crisis*** erupted in August, raising uncertainty and weakening the global economic outlook.

June 2000*:* The ruling parties took a big loss at the ***Lower House elections*** (reduction in their share from 66 to 56 percent; the LDP lost the majority) due to PM Mori's unpopularity, but they maintained the government.

February-March 2001*:* The BOJ cut the policy rate by 10 bps from 0.25 to 0.15 percent on February 28. Discussion intensified on quantitative easing as the policy rate neared the zero lower bound. On March 19, the ***BOJ introduced QE*** (switching the monetary policy target from the overnight call rate to the current account balance). ***PM Mori's approval rate*** had been on the decline and went below 10 percent partly because he mishandled a maritime accident in February. He was reported in March to resign soon (Mr. Koizumi replaced him after winning the LDP presidency in April).

July 2001*:* PM Koizumi won the ***Upper House election***. PM Koizumi's administrative reform triggered debate between fiscal consolidation and fiscal expansion. PM Koizumi was transforming traditional decision-making process. One key pillar was his heavy usage of the Council on Economic and Fiscal Policy (CEFP) to discuss big-picture policy issues. The CEFP produced its first annual report, *Honebuto-no-Hoshin* (big-boned principles), on June 26.

October 2002: Conflict intensified between Koizumi administration and LDP regarding NPL issues. PM Koizumi dismissed the Minister of State for Financial Services, Hakuo Yanagisawa, and appointed Heizo Takenaka. Minister Takenaka submitted the Financial Revitalization Plan

(known as the ***Takenaka Plan***), which forced banks to apply a stricter approach for asset evaluation, to raise banks reserves and to compress deferred tax assets. If banks were evaluated as insolvent, public money was injected (e.g. Resona Bank and Ashikaga Bank). This plan was regarded as a hard landing scenario for the financial sector, and was opposed by LDP and the banking industry. The ***BOJ eased monetary policy*** by increasing the current account balances from JPY 10-15 trillion to 15-20 trillion, and by raising long-term JGB purchases from JPY 1 trillion to 1.2 trillion per month.

March 2008*:* ***The Twisted Diet*** produced two large uncertainties. First, the government was trying to pass a tax law on gasoline before the end of the fiscal year (March), but eventually failed. Second, the ***nomination of the BOJ Governor*** was rejected a few times. Deputy Governor Masaaki Shirakawa became Acting Governor on March 20 and then Governor on April 9.

September-October 2008*:* The global financial crisis "started" with the bankruptcy of the ***Lehman Brothers*** in September 2008. The Japanese economy shrank by 12.4 and 15.4 percent (saar) in the fourth quarter of 2008 and the first quarter of 2009, respectively. The Nikkei plummeted to below 7,000 from around 12,000 before the bankruptcy; the yen appreciated from around 120 in 2007 to 93 per dollar by end-2009. The global economy collectively and individually responded: the first G20 Summit took place in November 2008 in Washington, D.C. The Japanese government formulated two supplementary budgets in October 2008 and January 2009. The BOJ reduced the policy rate twice in October and December 2008.

February 2009*:* The government published its estimate of growth of the fourth quarter of 2008 at negative 12.4 percent, the largest decline in about 35 years. The yen depreciated by around 10 percent. The U.S. formulated a stimulus package, the American Recovery and Reinvestment Act of 2009, after long discussions in the Congress. The rise in uncertainty seems to reflect concerns over the ***delay in the passage of the stimulus package in the U.S.***

May-June 2010*:* The ***European sovereign debt crisis***, which had been brewed since the fiscal deficit of Greece was found much larger than previously published, accelerated in May 2010, when the first plan to rescue Greece was announced. The Nikkei lost more than 10 percent in May. The yen-dollar rate briefly went below 90. Also domestically, ***PM Hatoyama resigned*** in June less than a year after his party took power for the first time. ***Anticipation of a Twisted Diet as a result of the July Upper House elections*** seems to have contributed to the rise in economic policy uncertainty.

August 2011*:* A law to allow deficit-financing bonds, which was always passed by the end of the previous fiscal year, finally got the Diet's approval for fiscal year 2011 (starting in April) in August posing risk of a ***Japanese "fiscal cliff***." The delay was due to a Twisted Diet caused by the ruling parties' loss of the majority in the Upper House in the July 2010 election. In Europe, in addition to Greece, Ireland and Portugal had started receiving financial support from the troika, but interest rates on their debt were on the rise leading to the intensification of the ***European debt crisis***. The yen had been below 80 against the dollar since mid-July. S&P announced in July that it was putting ***U.S. sovereign debt*** rating on negative watch which was later followed up with a ***downgrade*** in August. The ***U.S. debt ceiling conflict*** was only recently resolved (at the end of July) but the solution to the conflict did not raise confidence in the future course of U.S. fiscal policy and left open the possibility of the use of the debt ceiling in

future budgetary conflicts. Responding to appreciation which resumed after the March 2011 earthquake, the Japanese government ***intervened in the foreign exchange market***.

June 2012*:* The three major parties including the ruling DPJ and the largest opposition party, LDP, accelerated discussions on a comprehensive reform of tax and social security systems in June. They reached an agreement on the 21st, which included a two-step consumption tax increase in April 2014 and October 2015. Leading up to the agreement, policy uncertainty was elevated reflecting ***conflicts within DPJ*** on tax and social security reform.

January-February 2016: The ***BOJ announced negative interest rates*** on 29 January . Leading up to the announcement, there was much speculation about the BOJ's next policy move amid declining inflation, rising risks from emerging markets and yen appreciation. The decision came as a surprise to market participants, because Governor Kuroda had ruled out negative rates earlier. The negative rate decision lowered the yield curve and initially led to yen depreciation. However, the exchange rate effect was short-lived and inflation expectations continued to decline. There were concerns about the implications of negative rates on the banking sector, which also contributed to the perception of limited policy space and effectiveness. The policy move was highly unpopular within the general public and led to concerns about the implications for returns earned on bank deposits.

May-June 2016*: During* May-June 2016 there were rising concerns globally and in Japan about a potential ***exit of Great Britain from the EU***. The yen appreciated substantially as a result. The Brexit referendum outcome on June 23rd shocked markets, and the yen appreciated further. The BOJ noted the heightened global economic uncertainty in its July meeting and doubled its purchase of ETFs and expanded its U.S. dollar lending program to ensure smooth funding conditions. There was also rising uncertainty about whether PM Abe would ***postpone the consumption tax hike*** scheduled for April 2017. There were mixed reports and speculation leading up to the decision on June 1st. On the one hand, there was significant pressure to reinforce fiscal sustainability and credibility. With the consumption tax hike being delayed earlier in 2015 and the 2017 tax hike legislated to take place without explicit escape clauses, the political hurdle to postpone the tax hike was perceived as high. On the other hand, upcoming Upper House elections and a weak economic outlook were seen as reasons for delaying the tax hike. PM Abe had earlier said that they would go ahead with the tax hike, unless there was a shock comparable to the 2008 global financial crisis or the 2011 Great East Japan Earthquake. While the postponement of the tax hike was received well by the public, it also led to significant uncertainty about the feasibility of achieving the government's primary budget balance goal by 2020.

November 2016-January 2017*:* Leading up to the ***elections in the U.S.*** in November, policy uncertainty picked up reflecting the significant role of the U.S. as a major trading partner and the potential implications of the election for the ratification of TPP. The election of Donald Trump came as a surprise and generated further uncertainty about the U.S. fiscal, trade and other policies. President Trump pulled the U.S. out of TPP on January 23rd, 2017.

January 2018*:* The Trump administration starts raising tariffs on Chinese products, including with imported solar cells and certain washing machines.

***March 2018**:* The U.S. authorizes tariff rates of 25 percent on steel and 10 percent on aluminum imports.

***April 2018**:* China retaliates against the metal tariffs on about USD 3 billion U.S. imports. China files WTO dispute against the U.S. solar panel tariffs.

***June-July 2018**:* The U.S. announces a 25 percent tariff on USD 50 billion imports from China, and President trump cites "China's theft of intellectual property and technology and its other unfair trade practices." China retaliates with tariff on USD 50 billion US products.

***September 2018**:* The U.S. announces 10 percent tariffs on USD 200 billion in Chinese goods, with a plan to hike the rate to 25 percent at the start of 2019. President Trump threatens additional tariffs on USD 267 billion if China retaliates. China raises tariffs on USD 60 billion in U.S. products.

***December 2018**:* Presidents Trump and Xi Jinping agree to a 90-day truce at the G-20 Summit in Argentina.

***May 2019**:* After failed trade talks and rising U.S.-China tensions, the U.S. announces plans to ban Huawei products and raises tariffs from 10 percent to 25 percent on USD 200 billion of Chinese goods. President Trump delays a decision on auto tariff hikes.

***June 2019**:* China raises tariff rate on US exports, covering USD 36 billion of the USD 60 billion list issued in September 2018. After failed trade talks and tensions increase on the planned sales ban on Huawei products, the U.S. raises tariff rate tariffs from 10 percent to 25 percent on USD 200 billion of Chinese goods.

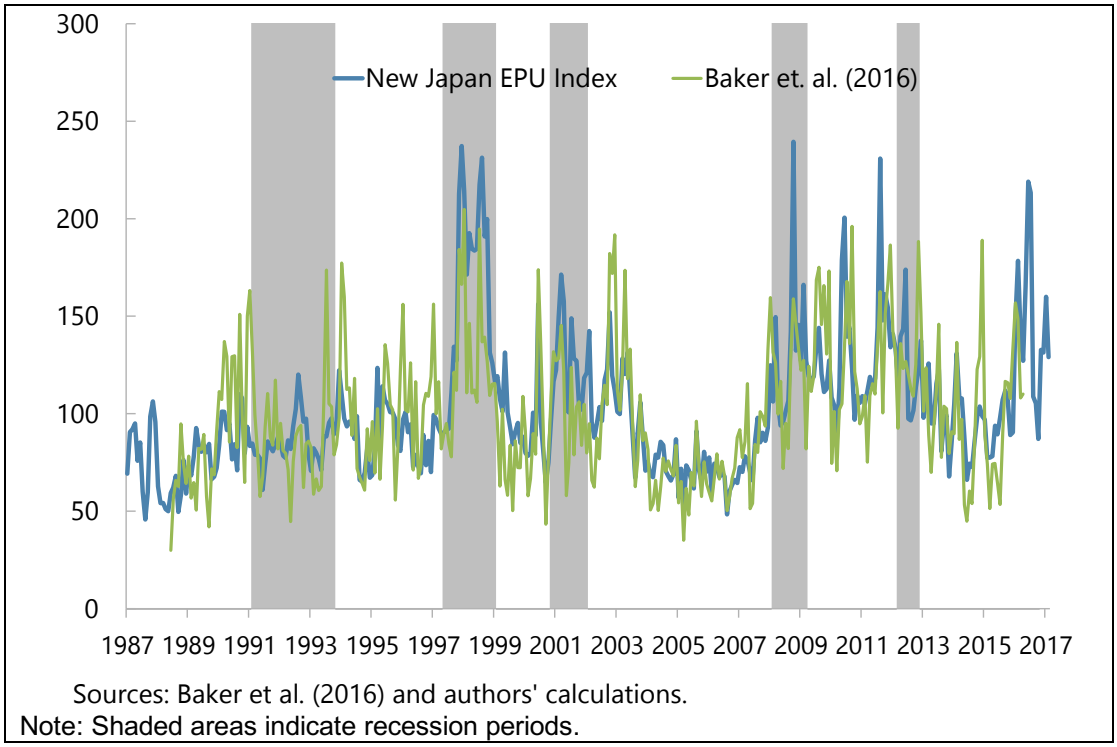
Table A.1. Correlation Between EPU Indices (1987M1-2019M6)

	Overall	*Fiscal*	*Monetary*	*Trade*	*Exchange Rate*
Overall	1				
Fiscal	0.92	1			
Monetary	0.76	0.67	1		
Trade	0.23	0.10	0.18	1	
Exchange Rate	0.34	0.38	0.42	0.004	1

Table A.2. Data Sources and Macroeconomic Variable Definitions

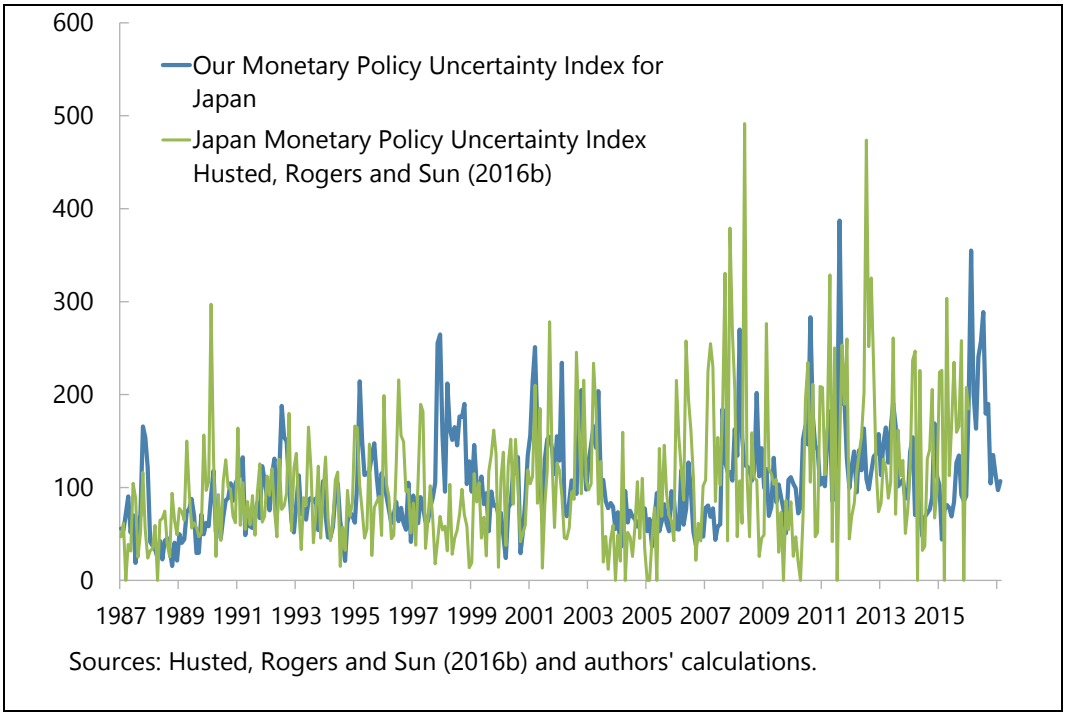
Variable	Notes	Frequency	Data Source
Real GDP - Japan		Q	Cabinet Office, Japan
Real Private Consumption - Japan		Q	Cabinet Office, Japan
Real Private Gross Investment - Japan		Q	Cabinet Office, Japan
Employment - Japan		M	Japan Labor Force Survey
Interest Rate- 2 year JGB yield		M	Haver
Nikkei Index		M	Haver
Industrial Production index: overall, consumption and investment goods sub-components		M	Ministry of Economy, Trade and Industry, Japan
Synthetic Consumption Index - Japan		M	Cabinet Office, Japan
Tertiary Activity Index		M	Ministry of Economy, Trade and Industry, Japan
VIX		M	Haver
Implied Nikkei Index Volatility	Option price implied volatilites with 1-month (Nikkei index and exchange rate) and 3-month (for interest rate) maturity	M	NIKKEI
Implied Interest Rate Volatility		M	Bloomberg
Implied USD/JPN Yen Exchange Rate Volatility		M	Bloomberg

Figure A.1. Our Japan EPU Index Compared to the One in Baker et al. (2016)



Sources: Baker et al. (2016) and authors' calculations.
Note: Shaded areas indicate recession periods.

Figure A.2. Our Japan Monetary Policy Uncertainty Index Compared to the One in Husted, Rogers and Sun (2019)



Sources: Husted, Rogers and Sun (2016b) and authors' calculations.

Figure A.3. EPU Innovations in Baseline VAR Specifications