Economic Policy Uncertainty in China Since 1949: The View from Mainland Newspapers

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Overview

1. Construct monthly indices of Economic Policy Uncertainty (EPU) & Trade Policy Uncertainty (TPU) for China:
   - Follow BBD approach, but use NLP methods to select P terms
   - Use two leading mainland Chinese newspapers, *Renmin Daily* and *Guangming Daily,* from 1949 onwards
2. Display and discuss indices
   - Historic context, info content, comparison to other China EPU
3. Recent role of trade policy as source of uncertainty
4. Use indices to estimate dynamic relationship of policy uncertainty to output, employment, and investment.
5. In progress: TPU and firm-level equity returns in China

What Do Our Policy Uncertainty Measures Seek to Capture?

<u>All of the following:</u>

- Uncertainty about *who* will make economic policy decisions – e.g., who will win the next election?
- Uncertainty about *what* economic policy actions decision makers will undertake, and *when*.
- Uncertainty about the economic *effects* of policy actions – past, present and future actions
- Economic uncertainty induced by policy inaction
- Uncertain economic ramifications of national security and other policy matters that may not be mainly economic in character

Selecting Term Sets and Quantifying EPU

- Like BBD, use scaled frequency counts of newspaper articles that contain selected terms about Economics, Policy and Uncertainty.
- Like BBD, we rely on a combination of expert judgment and informal auditing to select the Economy and Uncertainty terms.
- We differ in our approach to the selection of Policy terms.
  - BBD rely on human readings of 12,000 randomly sampled articles to populate a list of candidate Policy terms. They select the permutation of candidate terms to minimize (false positives + false negatives) in computer-automated classifications compared to human classifications.
  - We use NLP tools to select our Policy terms. The NLP approach is much less labor intensive than the BBD approach.

How We Select Policy Terms, 1

We extract Policy terms from the *Annual Government Work Reports* (政府工作报告), which are available for 50 individual years: 1954-1960, 1964, 1975, 1978-2018.

- Delivered by the Premier of China to the public.
- Reviews economic policy and its impact in past year and discusses outlook for economic and social development in the coming year.
- See http://english.gov.cn/govtworkreport2019/ for more information about these reports.

How We Select Policy Terms, 2

1. Segment Chinese character strings in the *Annual Reports* into individual words, phrases and names.

In written Chinese, the smallest text unit is a character that typically represents one syllable of a spoken word or a whole word. Chinese sentences are written as a continuous stream of such characters. (In contrast, the smallest text unit in English and other Latin languages is an alphabet letter, letters are strung together to form words, and words in a sentence are separated by spaces.) New words and named entities (organizations, persons, locations, and so on) are formed by particular character sequences. There can be more than one way to render a particular sequence of Chinese characters into specific words, phrases and entities. To deal with this matter, we first slice the Chinese-language document into words and multi-word names and phrases following the algorithm of Sun, Wang and Li (2012). We tried two Chinese word segmentation packages in Python, *jieba* and *pkuseg*, which yielded very similar results.

How We Select Policy Terms, 3

2. After word segmentation, we apply a standard NLP algorithm to identify highly relevant terms.
   - Apply *TextRank* algorithm of Mihalcea and Tarau (2004) to identify policy-relevant words and phrases (hereafter, "terms"). *TextRank* is related to the Brin and Page (1998) algorithm for ranking webpages. It assigns a value to each term based on its overall correlation with other terms in the same underlying document or library.
   - Using this algorithm, we identified highly relevant sets of terms in each *Annual Report.* We then took the union of these term sets.
3. We judgmentally pruned this list of terms to remove non-policy terms and terms with high potential for false positives.

How We Select Policy Terms, 4

We are exploring three modifications and alternatives to our current approach for selecting terms in the **P** set:

1. We plan to experiment with allowing the **P** set to vary across the three eras described above.
2. We are working with other NLP algorithms for term set selection.
3. As a robustness check, we plan to construct an expert-driven choice of **P** terms by consulting authoritative books and articles that discuss economic policy developments in China.

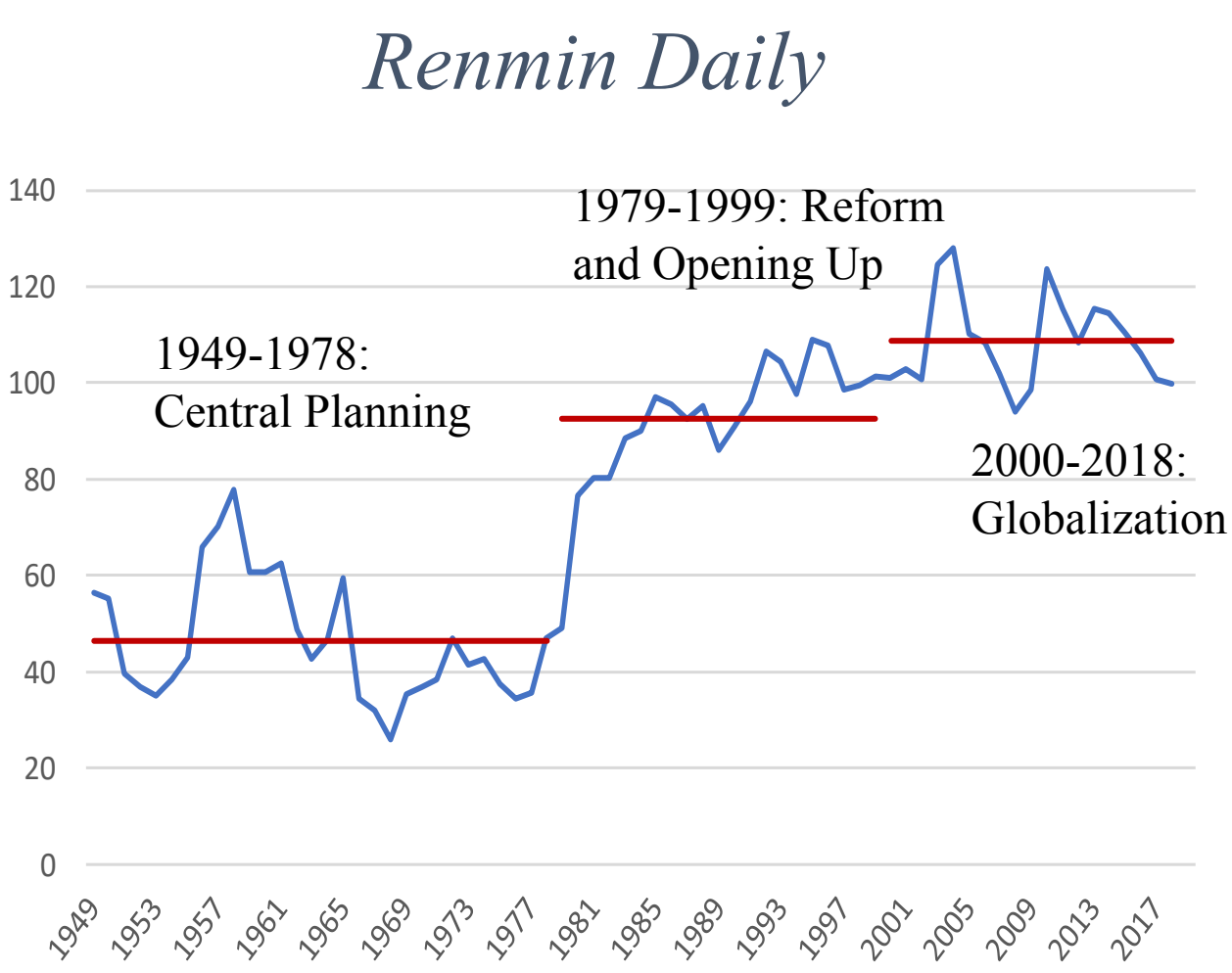
Table 1. Term Sets for Economic Policy Uncertainty in China

Category	English Terms	In Chinese Characters
Uncertainty	uncertain/uncertainty/ not certain/unsure/ not sure/hard to tell/ unpredictable/unknown	不确定/不明确/不明朗/未明/ 难料/难以预计/难以估计/难以预测/难以预料/未知
Economics	economy/business	经济/商业
Policy	fiscal/monetary/ China Securities Regulatory Commission/ China Banking Regulatory Commission/ Ministry of Finance/ The People's Bank of China/ National Development and Reform Commission / Opening-up/ Reform/ Ministry of Commerce/legislation/tax/ national bonds/government debt/ central bank/ Ministry of Commerce/ tariff/governmental deficit	财政/货币/证监会/银监会/财政部/人民银行/国家发改委/ 开放/改革 /商务部/法律/法规/税收/国债/政府债务/央行/外经贸部/关税/政府赤字

Table 2. Term Sets for Trade Policy Uncertainty in China

Category	English Terms	In Chinese Characters
Uncertainty	uncertain/uncertainty/ not certain/unsure/ not sure/hard to tell/ unpredictable/unknown	不确定/不明确/不明朗/未明/ 难料/难以预计/难以估计/ 难以预测/难以预料/未知
Economics	economy/business	经济/商业
Trade Policy	import tariffs/ import duty/ import barrier/ WTO/ world trade organization (2)/ trade treaty/ trade agreement/ trade policy/ trade act/ Doha round/ Uruguay round/ GATT/ General Agreement on Tariffs and Trade/ dumping/ protectionism/trade barrier/ export subsidies	进口关税/进口税/进口壁垒/ WTO/世界贸易组织/世贸组织/ 贸易条约/贸易协定/贸易政策/ 贸易法/多哈回合/乌拉圭回合 /GATT/关贸总协定/倾销/ 保护主义/贸易壁垒/出口补贴

Figure A.1. Articles Per Day by Newspaper and Year



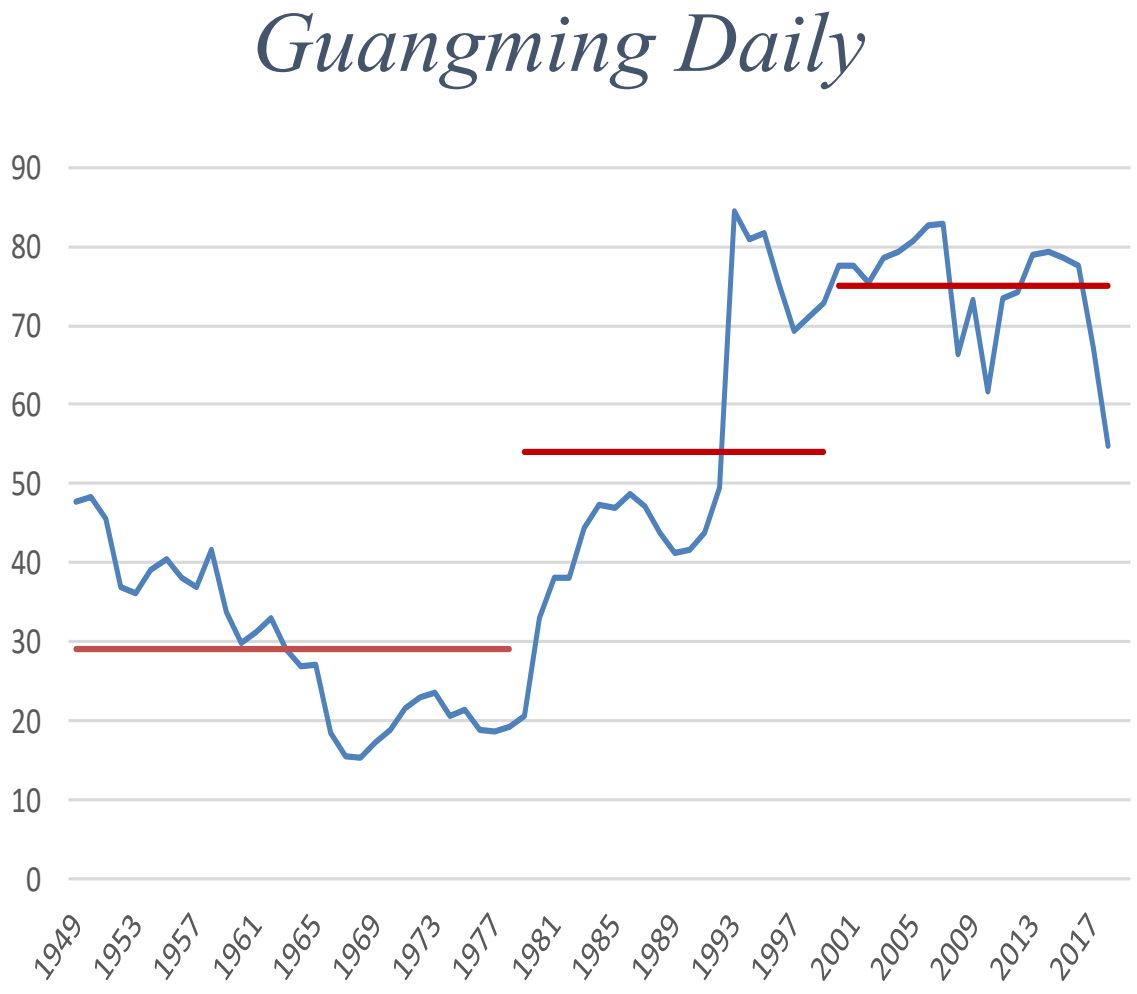


Table 3. Articles by Newspaper and Era

	1949-1978: Central Planning		1979-1999: Reform and Opening Up		2000-2018: Globalization	
	Renmin	Guangming	Renmin	Guangming	Renmin	Guangming
(a) Articles Per Day	46	29	93	54	109	75
(b) Percent that contains a term in E	21.70%	16.75%	34.56%	23.18%	34.17%	30.47%
(c) Percent of E articles that contain a term in U	0.86%	0.93%	0.46%	0.84%	2.27%	3.06%
(d) Percent of E articles that contain a term in U and a term in P	0.36%	0.43%	0.41%	0.57%	1.92%	2.36%

Mechanics of EPU Index Construction

1. Flag articles in each paper that contain at least one term in each of the E, P and U term sets.
2. Get raw monthly counts of these EPU articles.
3. For each newspaper and month, scale the raw EPU article count by the count of all articles.
4. Standardize each newspaper's series of scaled EPU counts to the same variability over time.
5. Average over papers by month to get EPU index.
6. Multiplicatively normalize the EPU index to 100. Do so separately in three periods: 1949-1978, 1979-1999, 2000-2018

Figure 1. Economic Policy Uncertainty in China: Centrally Planned Economy (1949-1978)

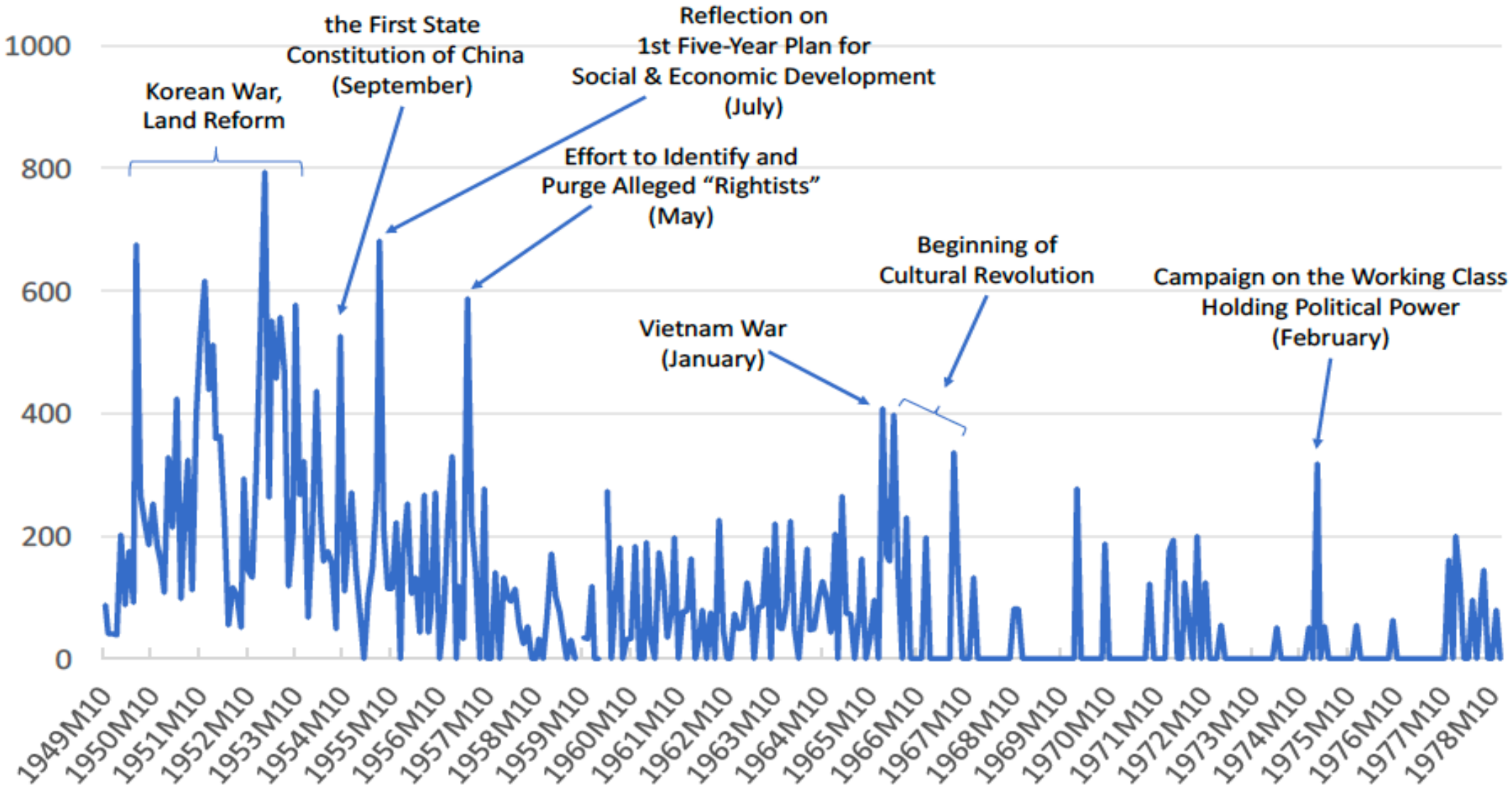


Figure 2. Economic Policy Uncertainty in China: Reform and Opening-up (1979-1999)

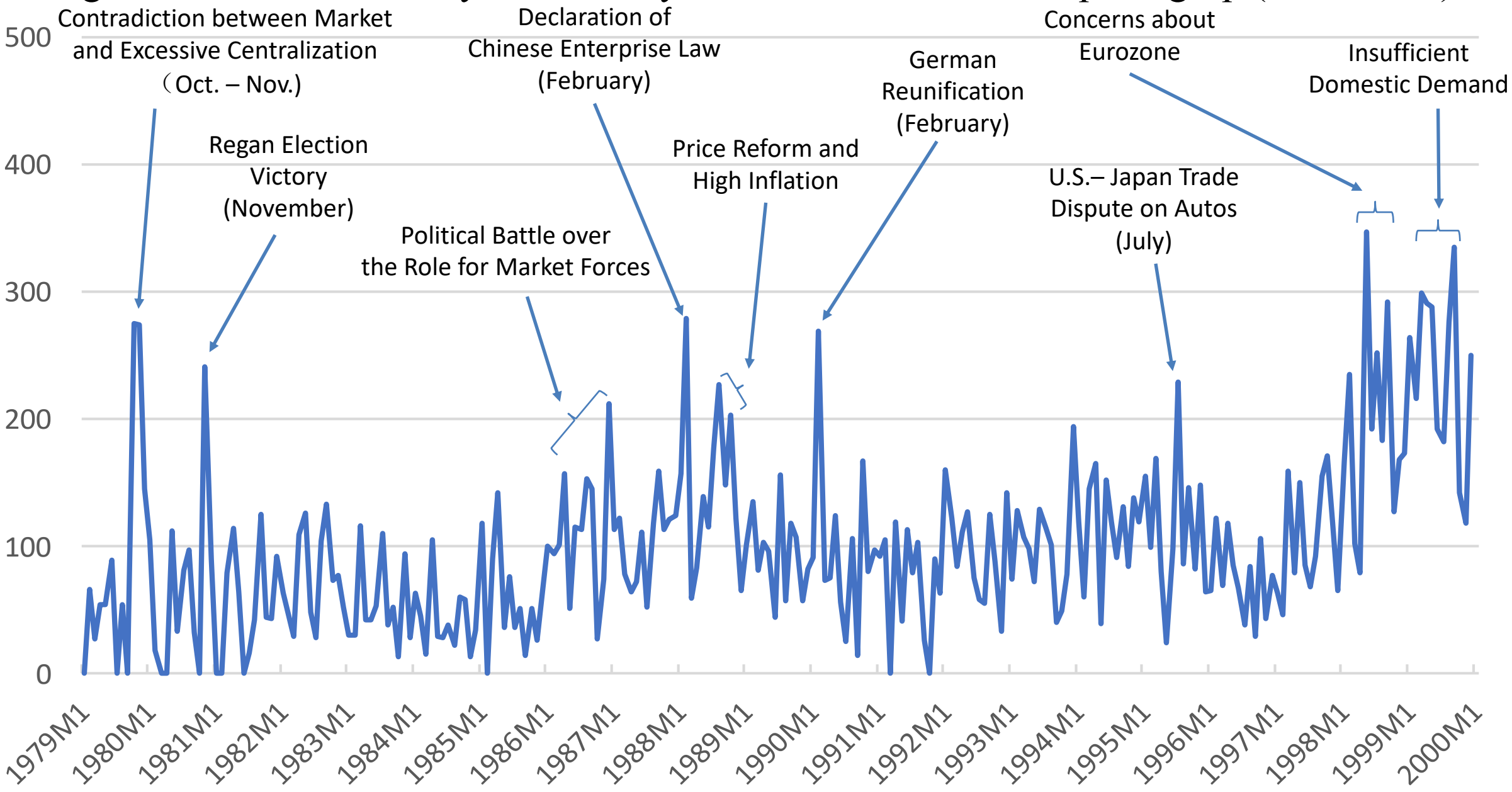


Figure 3. Economic Policy Uncertainty in China: Globalization Era, January 2000 to July 2019

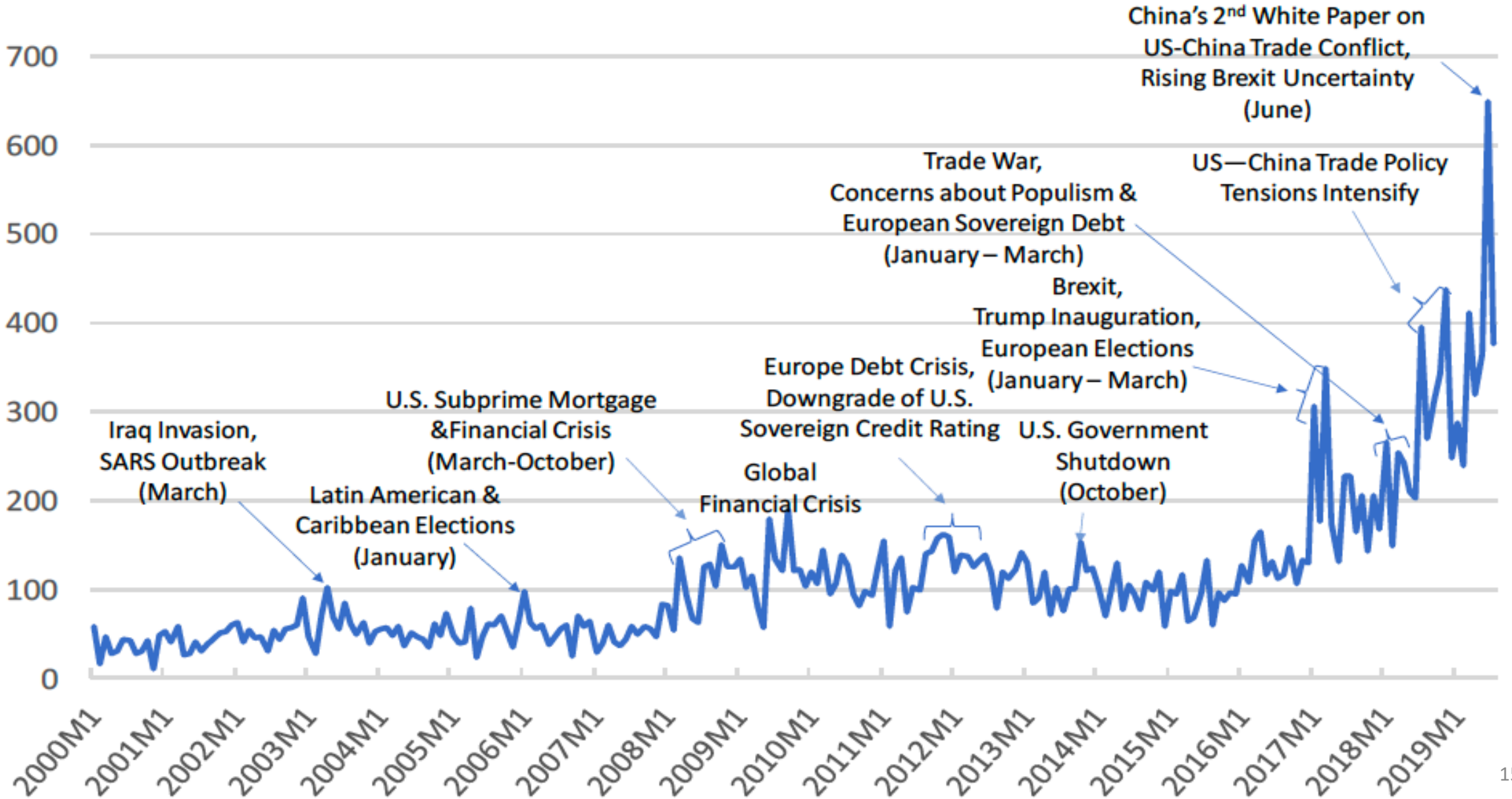


Figure 4. Comparison of China EPU Indexes

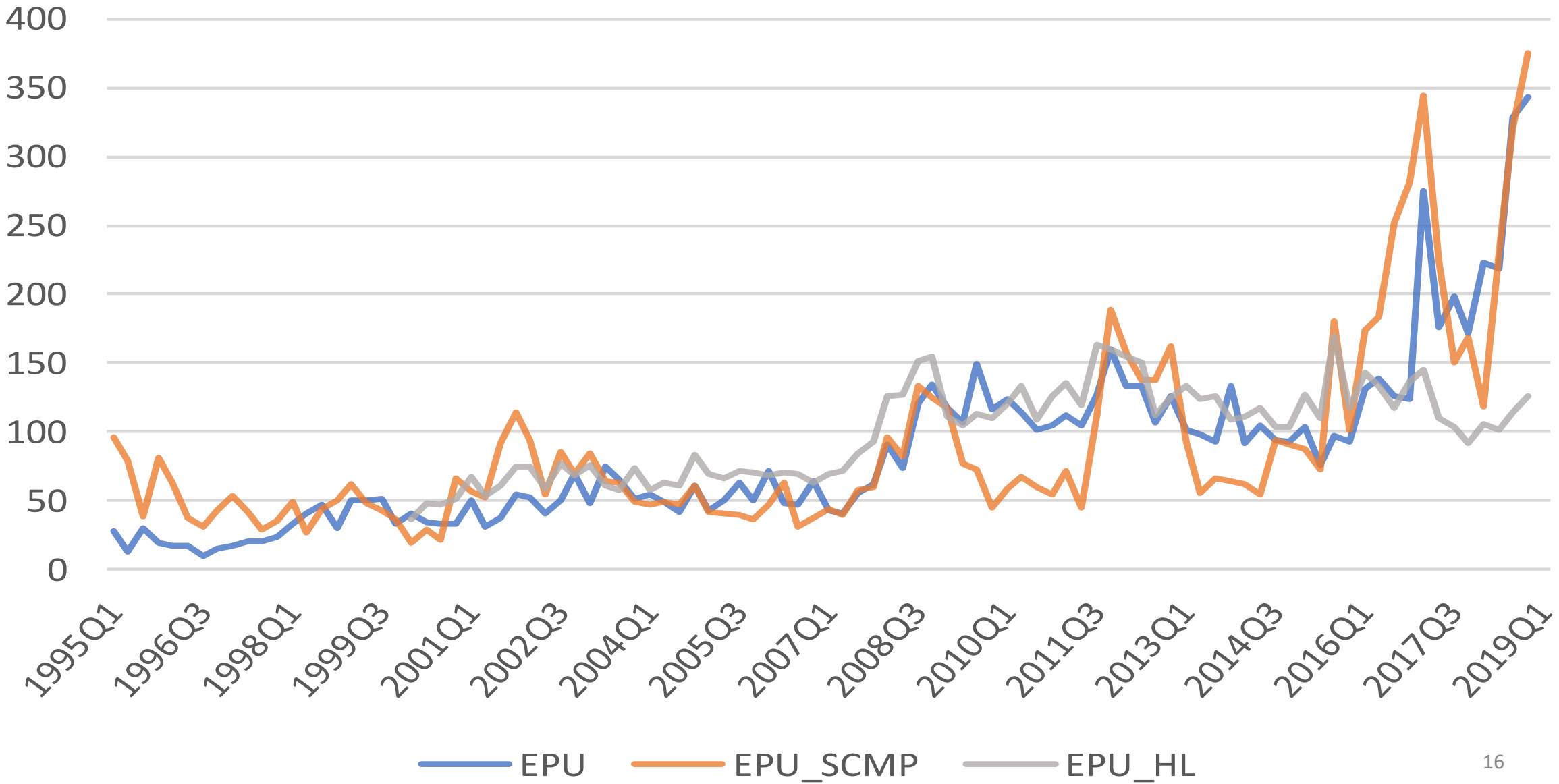


Figure 5.A. China Trade Policy Uncertainty Index, January 2000 to July 2019

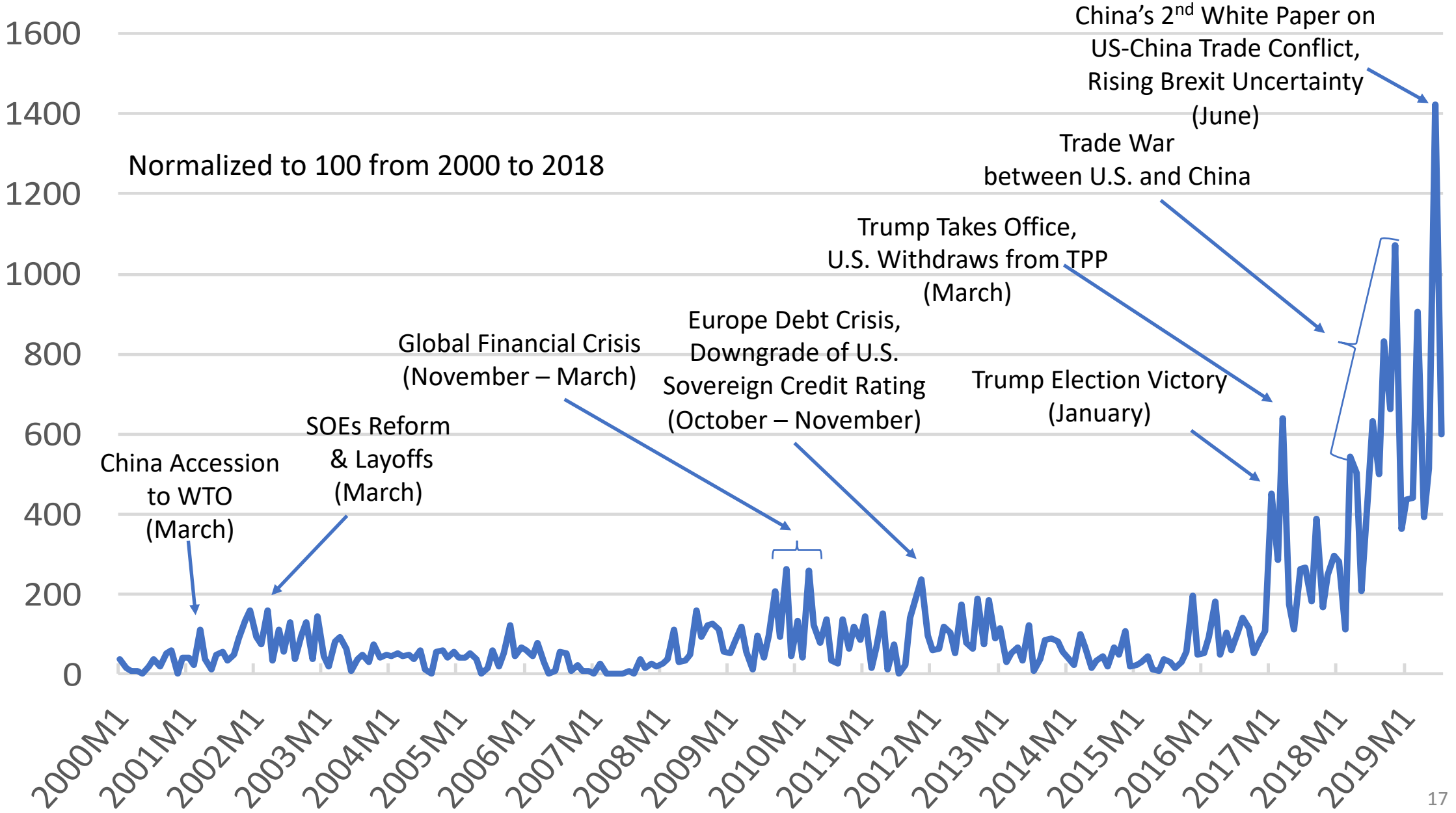
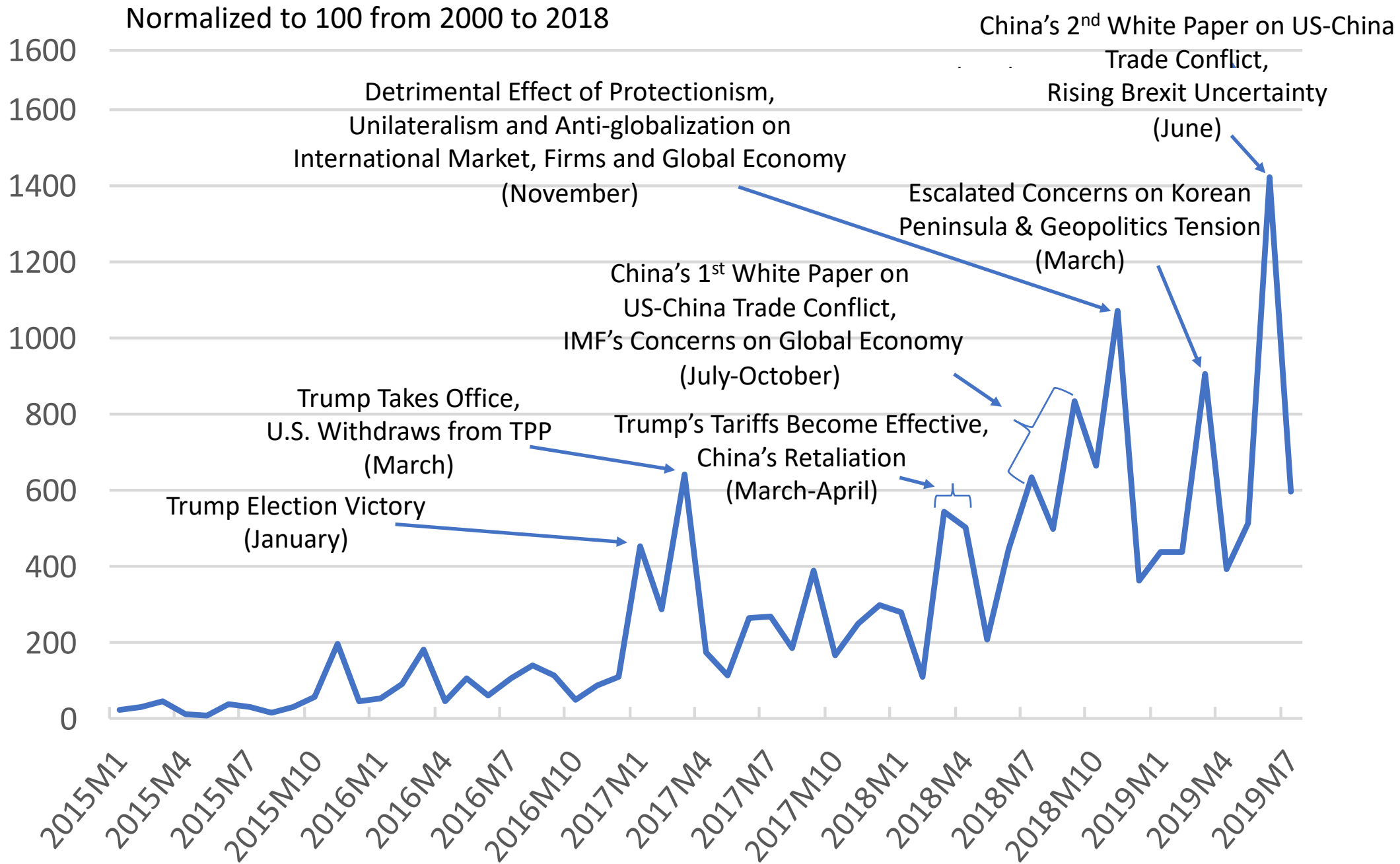
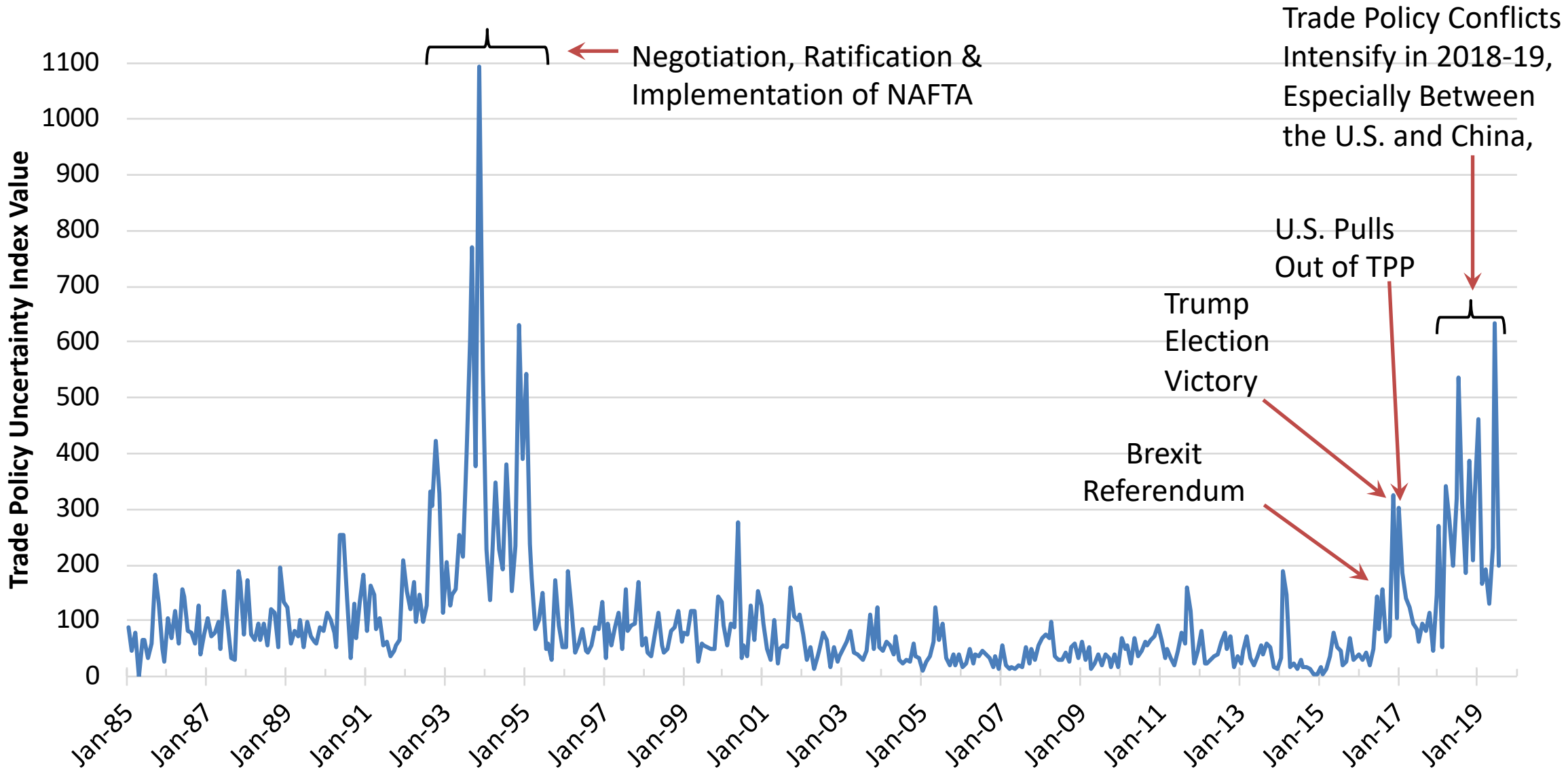


Figure 5.B. China Trade Policy Uncertainty Index, January 2015 to July 2019



U.S. Trade Policy Uncertainty Index, January 1985 to July 2019



Source: "Measuring Economic Policy Uncertainty" by Scott R. Baker, Nicholas Bloom and Steven J. Davis, as updated at www.policyuncertainty.com. Monthly data normalized to 100 from 1985 to 2009.

Table 4. Trade Policy Share of EPU Articles, Selected Times Periods for Three Major Economies

Time Period	United States	Japan	China
1987-2015	4	8	16
2000-2015	2	7	20
NAFTA: January 1992 to June 1995	11	11	10
China WTO Accession: Jan 2000 to Dec 2002	3	5	36
November 2016 to December 2018	9	20	39
March-December 2018	15	27	48
January-July 2019	12	29	42

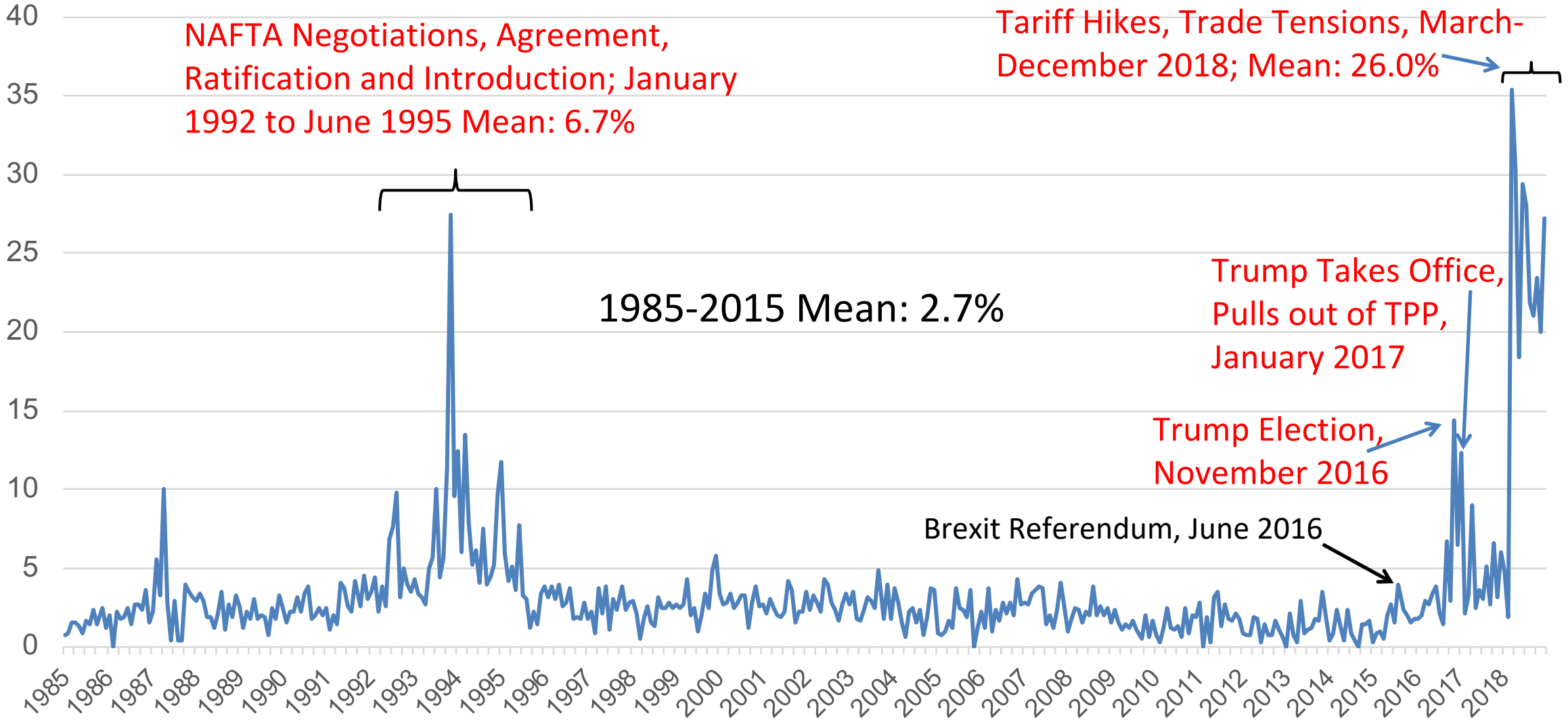
Note: Table entries report the percent of articles about Economic Policy Uncertainty that discuss trade policy matters in leading newspapers for the indicated countries. They are tabulated from data developed by Baker et al. (2016) for the United States, Arbatli et al. (2019) for China and Davis et al. (2019) for China.

Trade Policy Jolted the U.S. Stock Market in 2018 and 2019

	Number of Daily Stock Market Jumps Greater than |2.5%|	Number Attributed to Trade Policy News	Percent
1900 to 2017	1,103	7	0.6%
2018 to August 2019	13	5	38.5%

Note: This table is a tabulation of results in Baker, Bloom, Davis and Sammon (2019), who consider all daily jumps in the U.S. stock market greater than 2.5%, up or down, since 1900. They classify the reason for each jump into 16 categories based on human readings of next-day (or same evening) accounts in the *Wall Street Journal*. The table reports the number of jumps and the number attributed primarily to news about trade policy. The five jump dates in the recent period attributed primarily to trade policy, and the corresponding value-weighted returns on the S&P 500, are 22 March 2018, -2.52%; 26 March 2018, 2.72%; 4 December 2018, -3.24%; 5 August 2019, -2.98%; and 23 August 2019, -2.59. All but one of the earlier jumps attributed primarily to trade policy occurred in the 1930s.

Percent of Articles about Equity Market Volatility in Leading U.S. Newspapers that Discuss Trade Policy Matters, 1985 to 2018



Note: Computed from automated readings of newspaper articles about Equity Market Volatility and (Equity Market Volatility + Trade Policy) in 11 major U.S. newspapers. **Source:** Baker, Bloom, Davis and Kost (2019).

Policy Uncertainty Shocks and Economic Activity

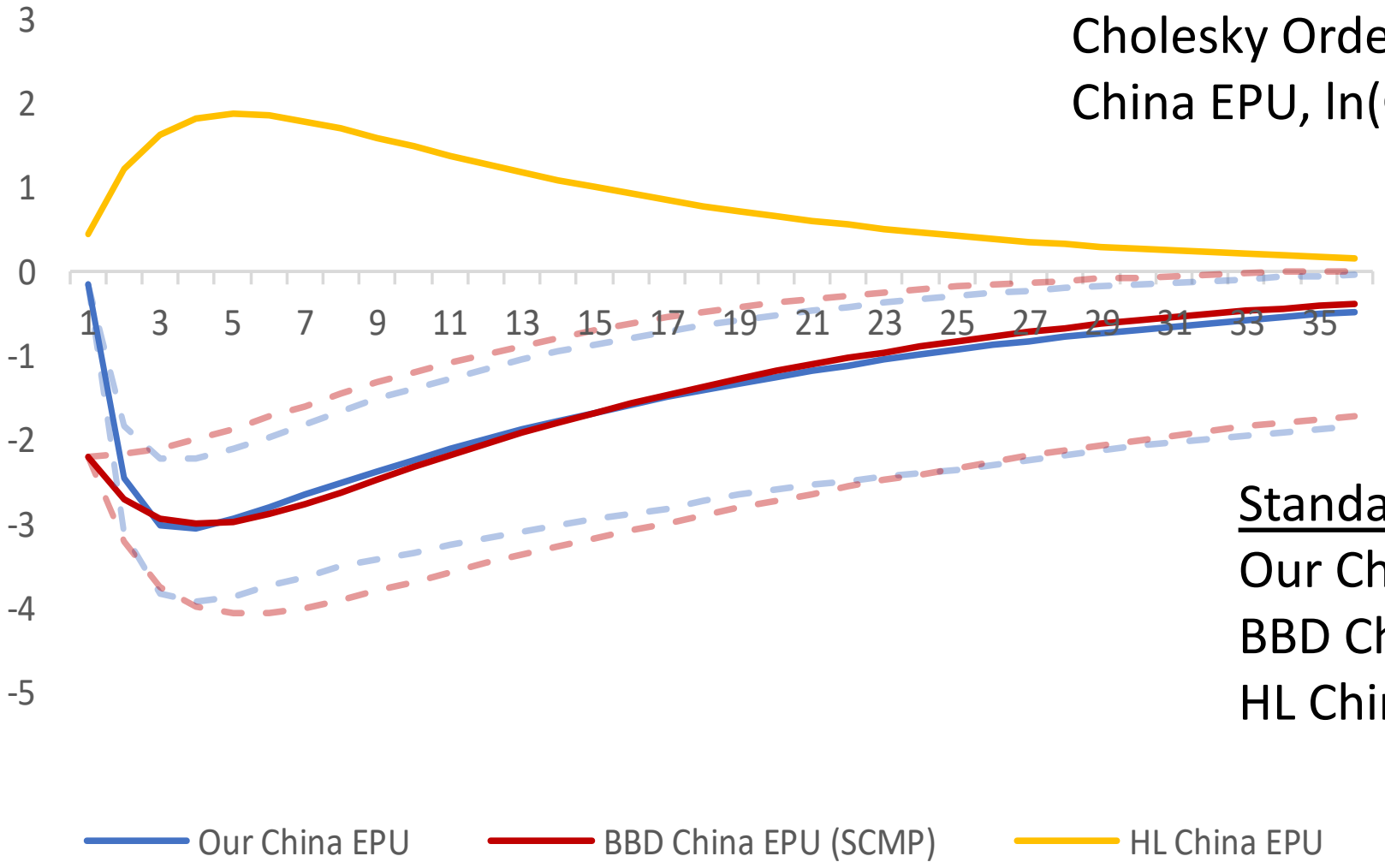
- Fit VAR models to monthly and quarterly data for China to obtain dynamic responses of real investment, output, etc. to innovations in China EPU or China TPU.
  - 2000M1 to 2019M3 for monthly data
  - 2000Q1 to 2019Q1 for quarterly data
  - Select lag lengths based on Schwarz information criteria
  - All VAR systems include linear trends
- Shocks identified by Cholesky decompositions
  - We report estimated IRFs to unit standard deviation innovations and 85% confidence intervals

Variables Considered in Monthly VAR Systems

Variable	Transformation	Mean	Standard Deviation
Real Investment	$100 * ln(\frac{\text{Nominal Gross Investment}}{\text{Investment Deflator}})$	702.93	98.64
Real Exports	$100 * \ln(\frac{\text{Nominal Export}}{\text{GDP Deflator}})$	651.44	47.10
Shanghai Stock Market Index	$100 * \ln(SSE)$	773.10	36.21
Our China EPU	Our China EPU	100	68.74
BBD EPU (SCMP)	BBD EPU	100	86.83
HL EPU	HL EPU	100	34.79
Our TPU	Our TPU	100	140.92

Figure 1. Percent Responses of Real Investment to Alternative China EPU Innovations, Monthly Data

One lag of each variable in VAR system



Cholesky Ordering: ln(Shanghai Stock Index), China EPU, ln(Gross Real Investment)

<u>Standard deviation of innovations</u>

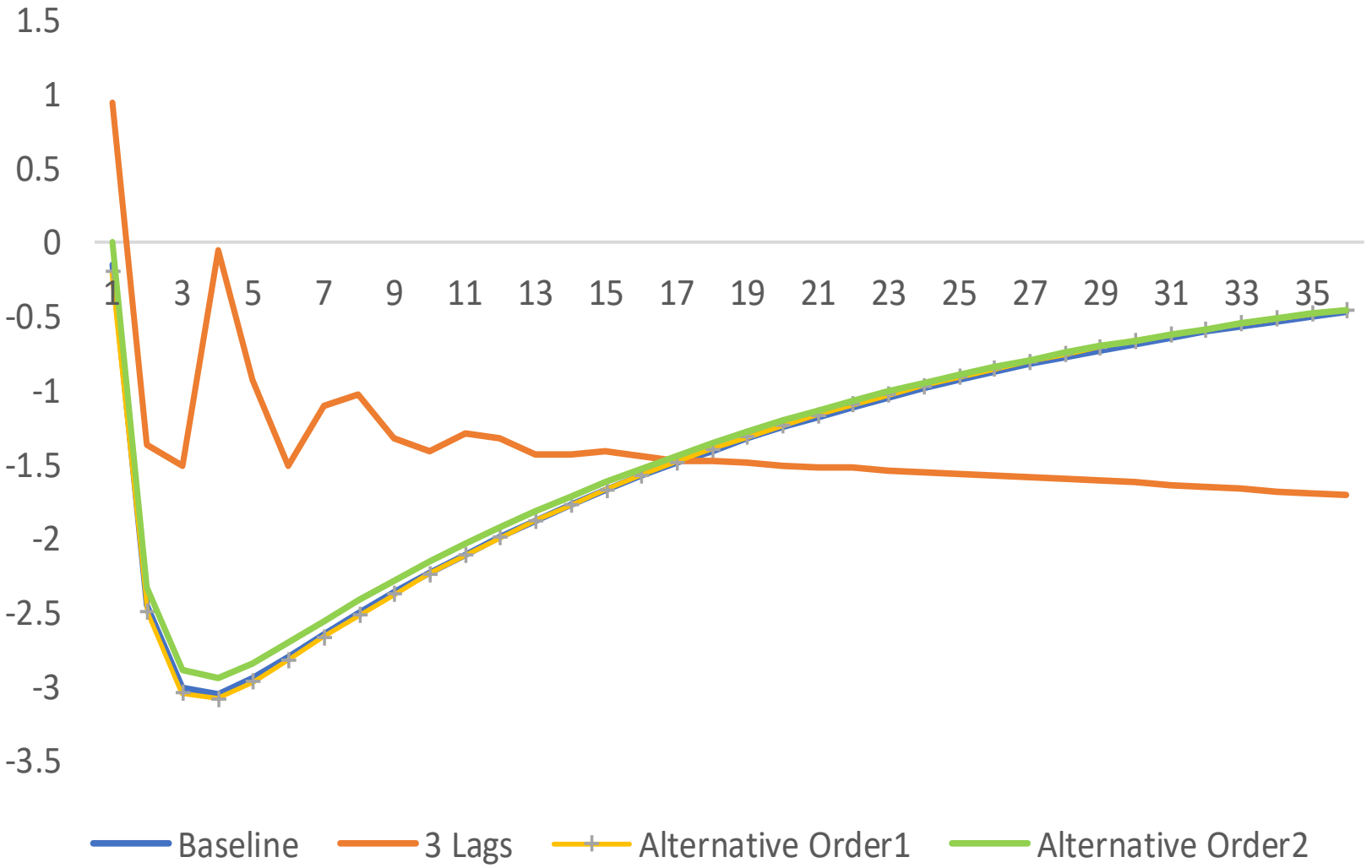
Our China EPU: 37.31

BBD China EPU: 40.37

HL China EPU: 17.10

Figure 2. Percent Responses of Real Investment to Innovations in Our China EPU Measure

Baseline specification and Cholesky ordering follow Figure 1

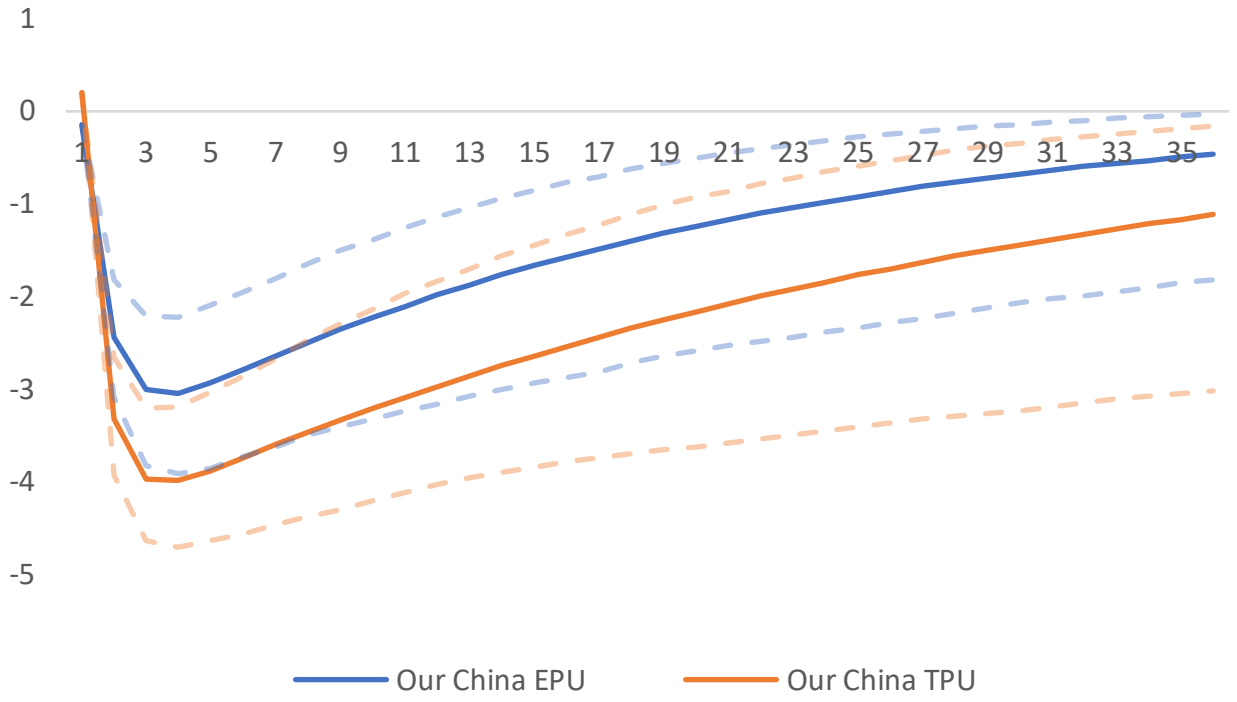


"Alternative Order 1" is China EPU, ln(Shanghai Stock Index), ln(Gross Real Investment)

"Alternative Order 2" is ln(Shanghai Stock Index), ln(Gross Real Investment), China EPU

Figure 3. Percent Responses of Real Investment to Our China EPU and Our China TPU Innovations Compared, Monthly Data

One lag of each variable in VAR system



Cholesky Ordering: ln(Shanghai Stock Index), China EPU, ln(Gross Real Investment)

<u>Standard deviation of innovations</u>

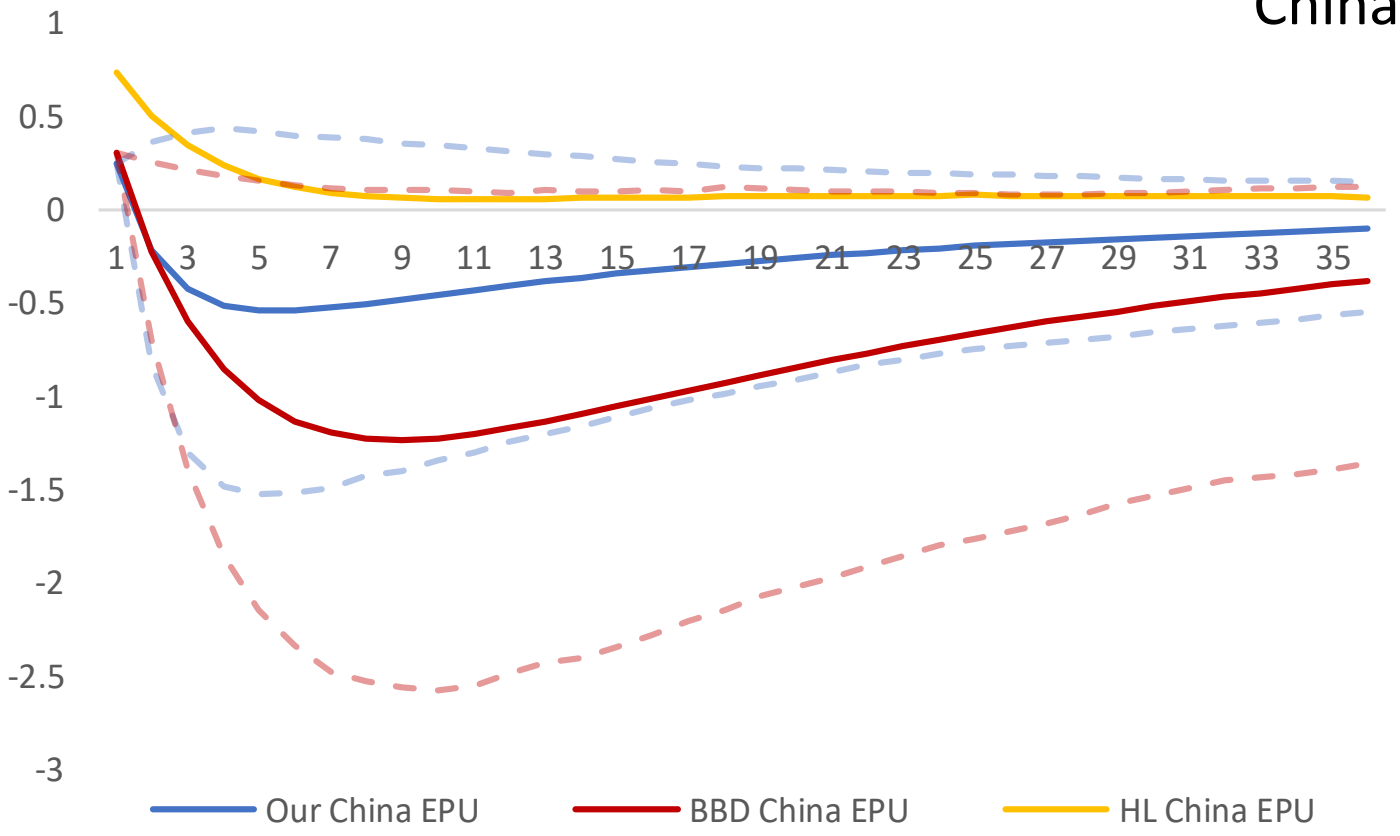
Our China EPU: 37.31

Our China TPU: 88.71

Figure 4. Percent Responses of Real Exports to Alternative China EPU Innovations, Monthly Data

One lag of each variable in VAR system

Cholesky Ordering: ln(Shanghai Stock Index), China EPU, ln(Real Exports)



<u>Standard deviation of innovations</u>

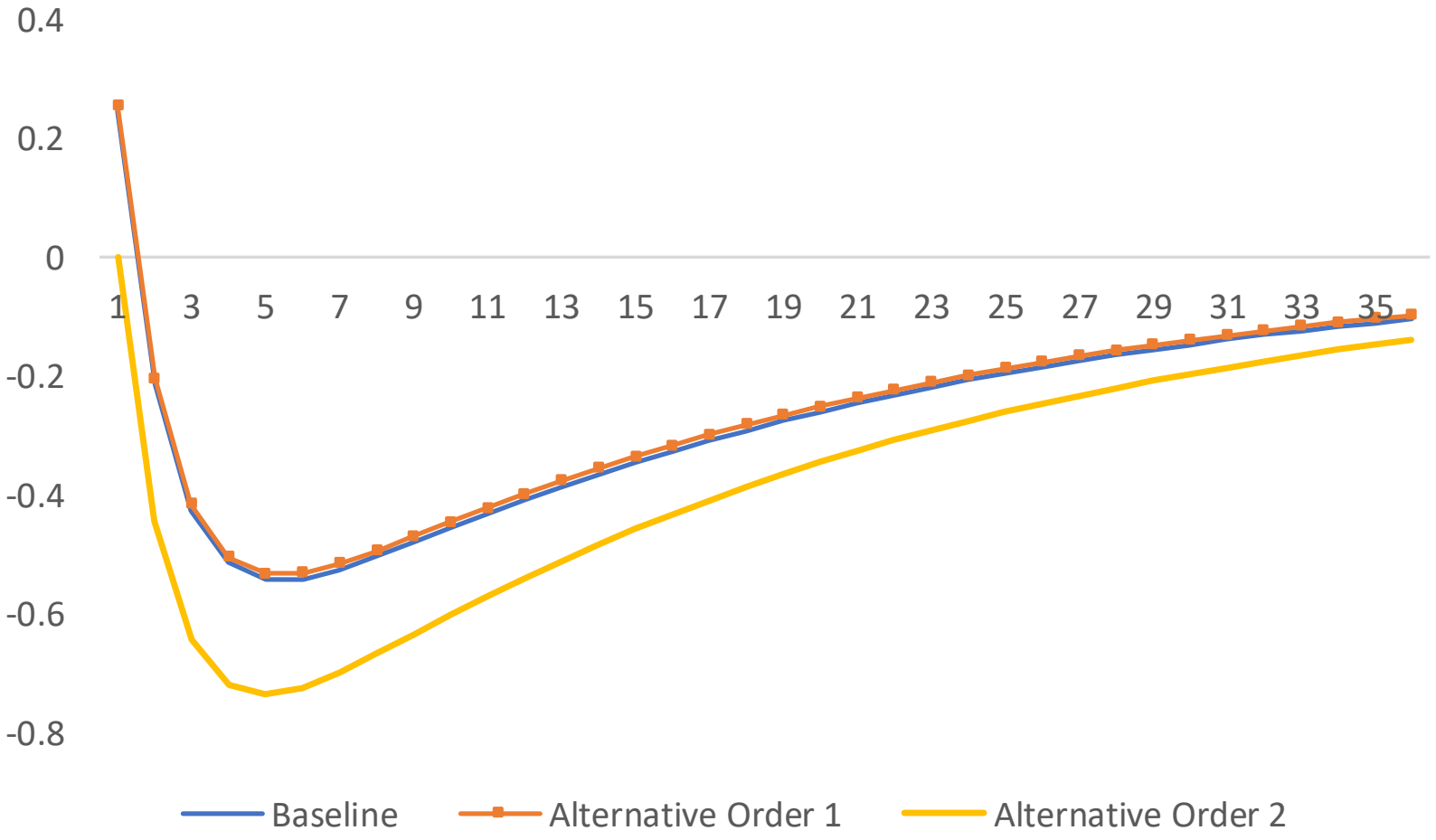
Our China EPU: 38.91

BBD China EPU: 40.86

HL China EPU: 17.26

Figure 5. Percent Responses of Real Exports to Innovations in Our China EPU Measure

Baseline specification and Cholesky ordering follow Figure 4



"Alternative Order 1" is China EPU, ln(Shanghai Stock Index), ln(Real Exports)

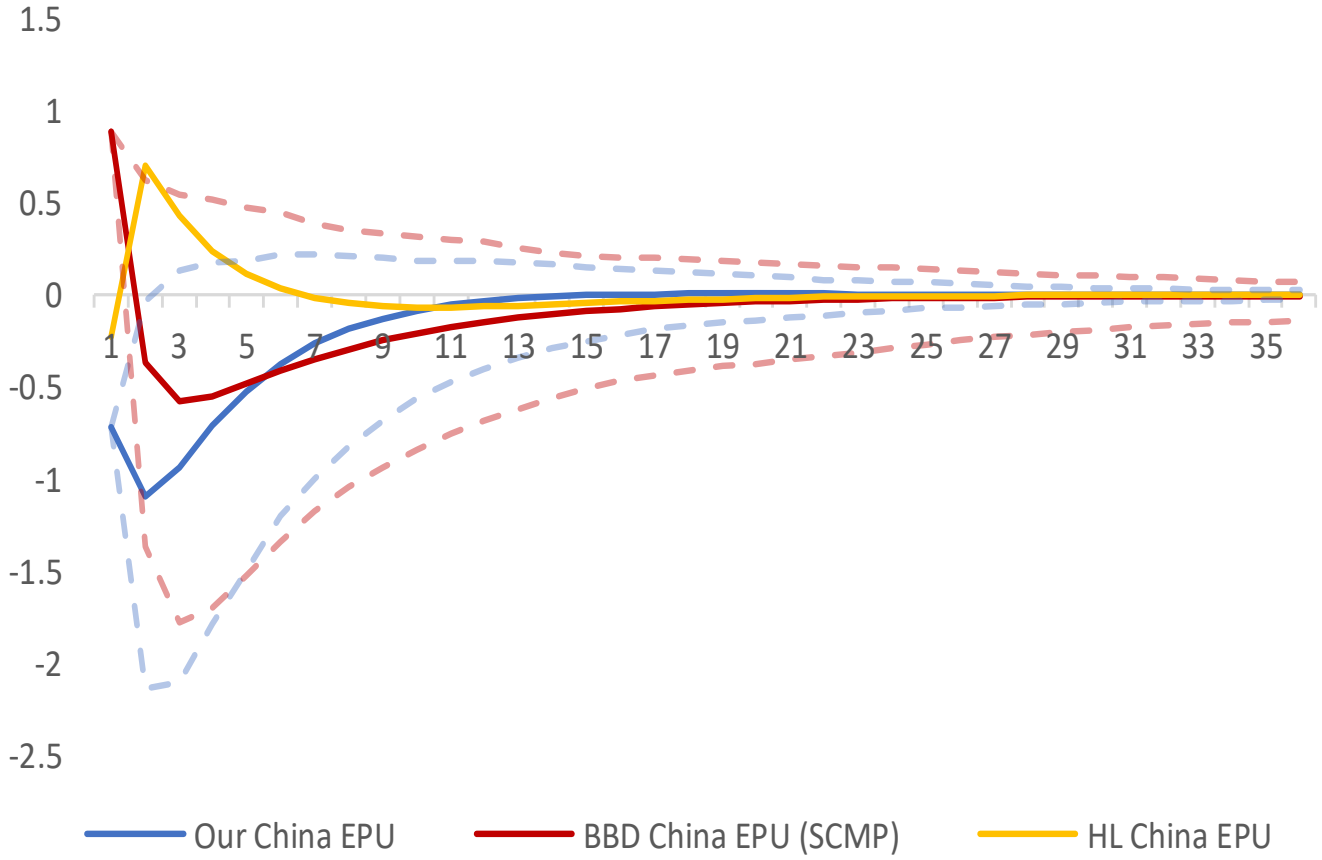
"Alternative Order 2" is ln(Shanghai Stock Index), ln(Real Exports), China EPU

Variables Considered in Quarterly VAR Systems

Variable	Transformation	Mean	Standard Deviation
Real GDP	$100 * ln(real\ GDP\ )$	1128.36	63.64
M2 Growth Rate Shocks from Atlanta Fed based on Higgins and Zha (2015)	M2 Growth Rate Shocks	0	0.01
Shanghai Stock Market Index	100*ln (SSE)	336	16
Our China EPU	Our China EPU	100	64.91
BBD EPU (SCMP)	BBD EPU	100	82.96
HL EPU	HL EPU	100	33.02
Our TPU	Our TPU	106	135.98

Figure 6. Percent Responses of Real GDP to Alternative China EPU Innovations, Quarterly Data

One lag of each variable in VAR system



Cholesky Ordering: China EPU, ln(Shanghai Stock Index), Exogenous M2 Growth Rate, ln(Real GDP)

<u>Standard deviation of innovations</u>

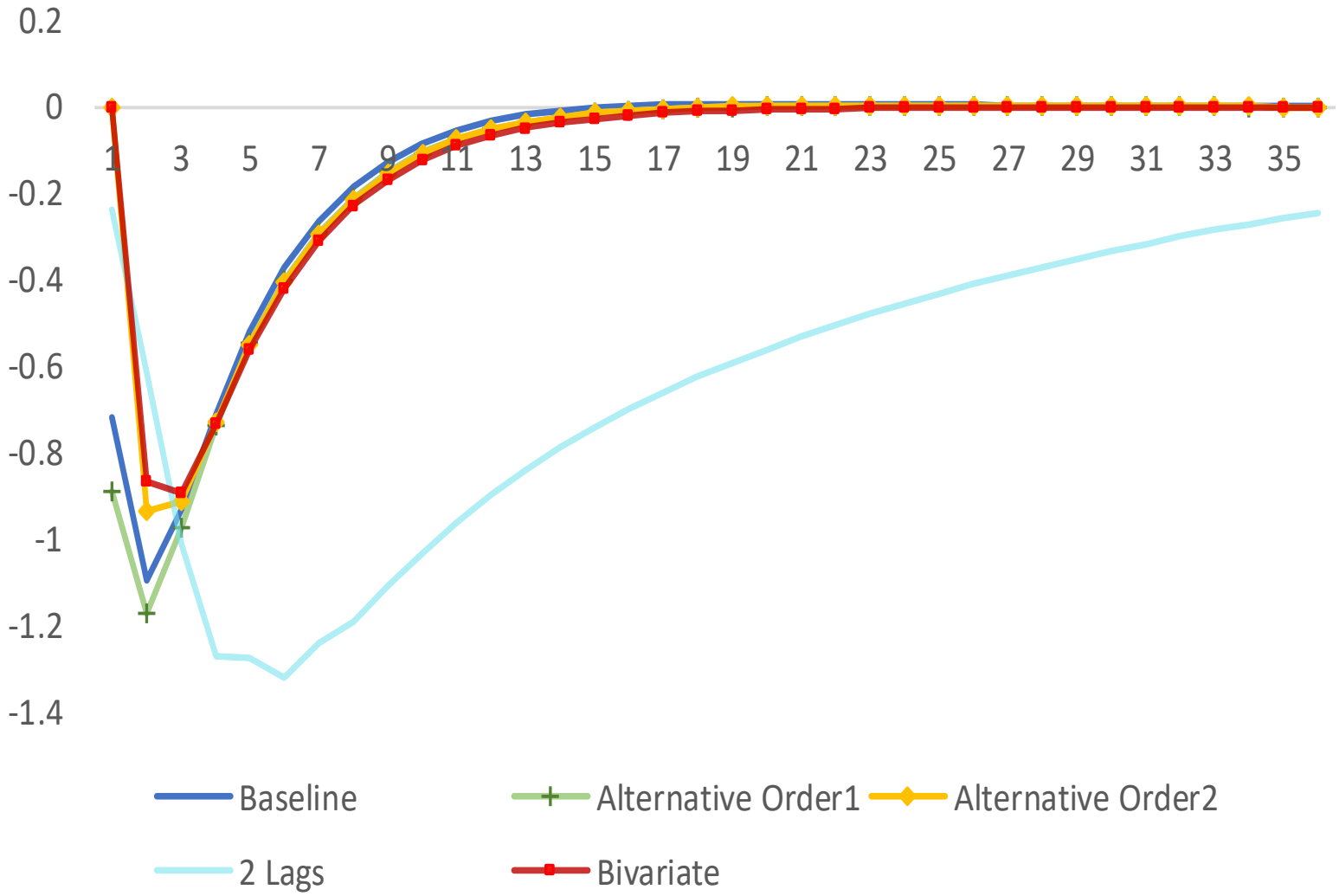
Our China EPU: 28.29

BBD China EPU: 37.83

HL China EPU: 14.55

Figure 7. Percent Responses of Real GDP to Innovations in Our China EPU Measure

Baseline specification and Cholesky ordering follow Figure 6



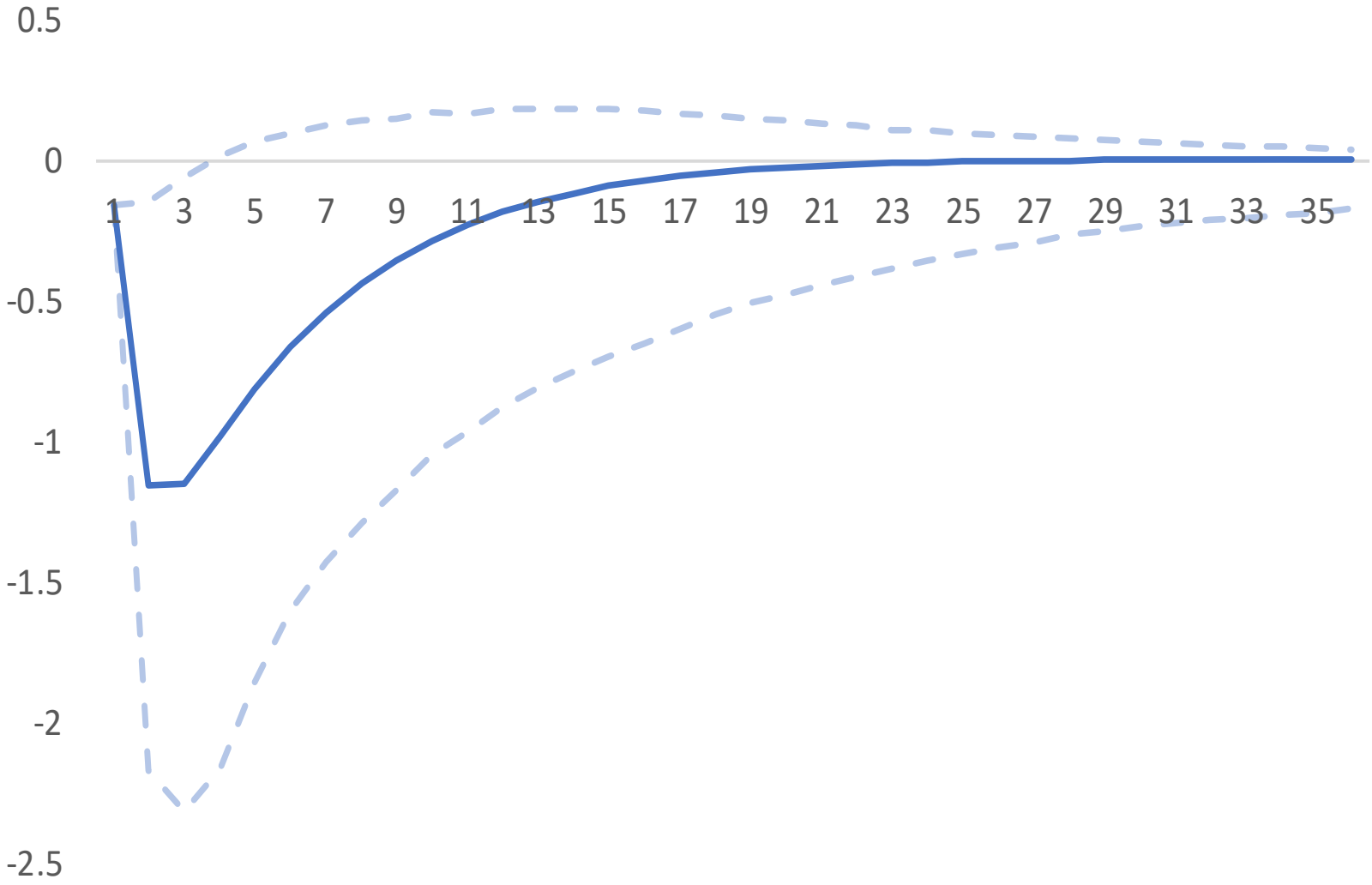
Alternative Ordering 1: ln(SSE), China EPU, M2 variable, ln(Real GDP)

Alternative ordering 2: ln(SSE), M2 variable, ln(Real GDP), China EPU

Bivariate VAR orders ln(Real GDP) first

Figure 8. Percent Responses of Real GDP to Our China TPU Innovations, Quarterly Data

One lag of each variable in VAR system



Cholesky Ordering: China TPU, ln(Shanghai Stock Index), Exogenous M2 Growth Rate, ln(Real GDP)

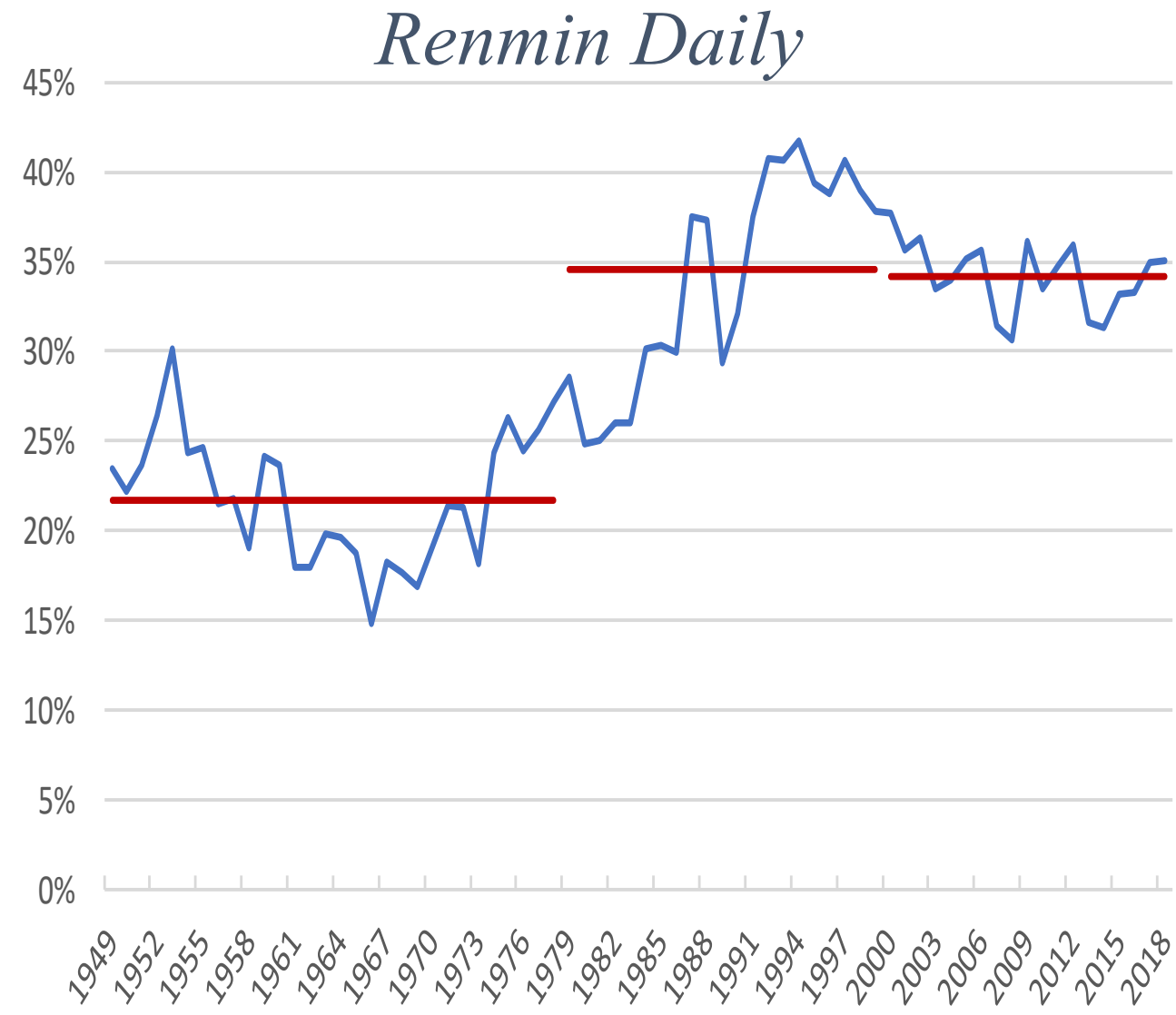
Trade Policy Uncertainty and the Stock Return Behavior of Chinese Firms

In Progress

We are investigating the impact of trade policy news events and trade policy uncertainty on equity returns and their volatility for listed Chinese firms as a function of their exposure to U.S. trade and other factors.

Extra Slides

Figure A.2. Percent of Articles that Contain a Term in E



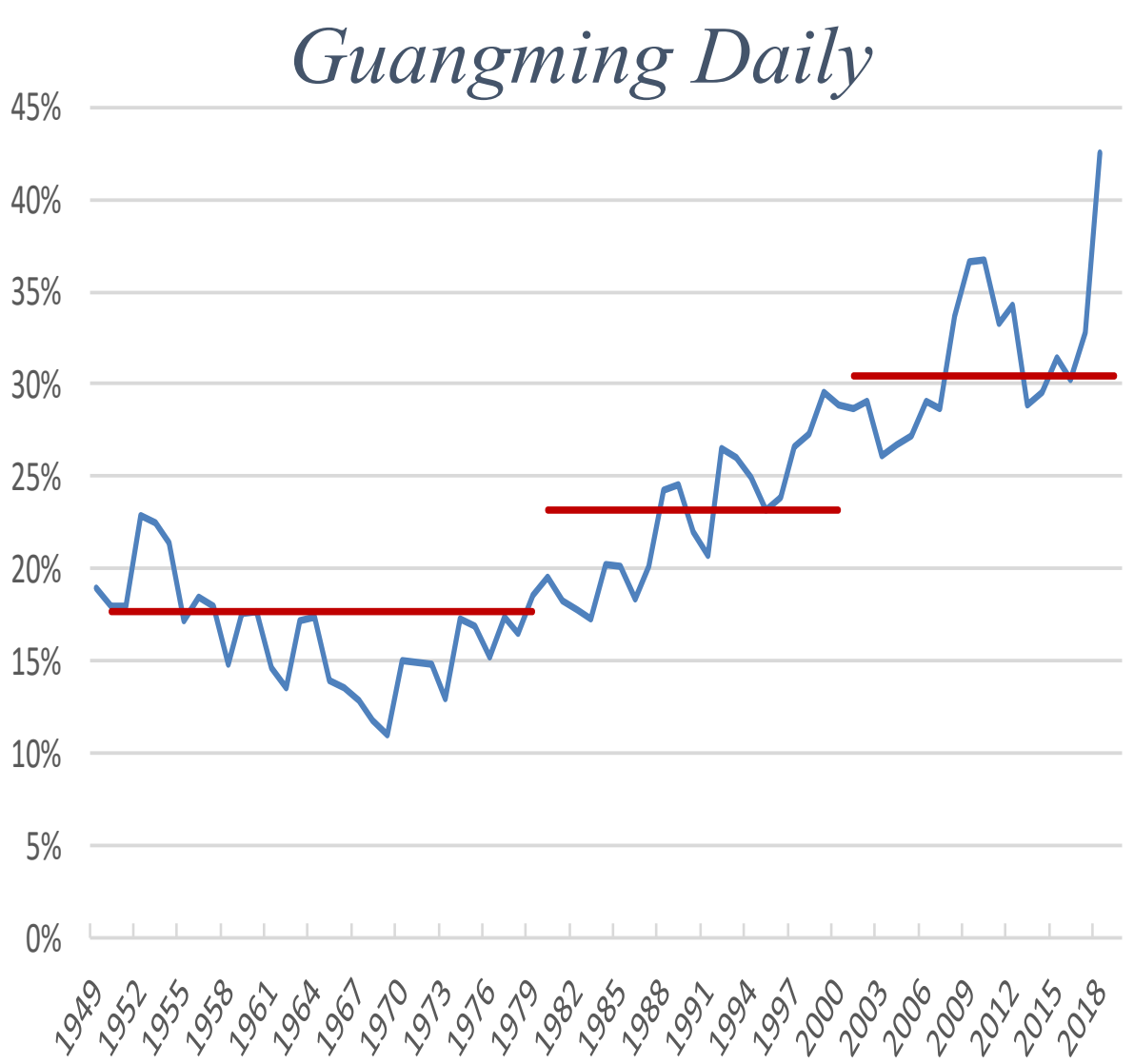
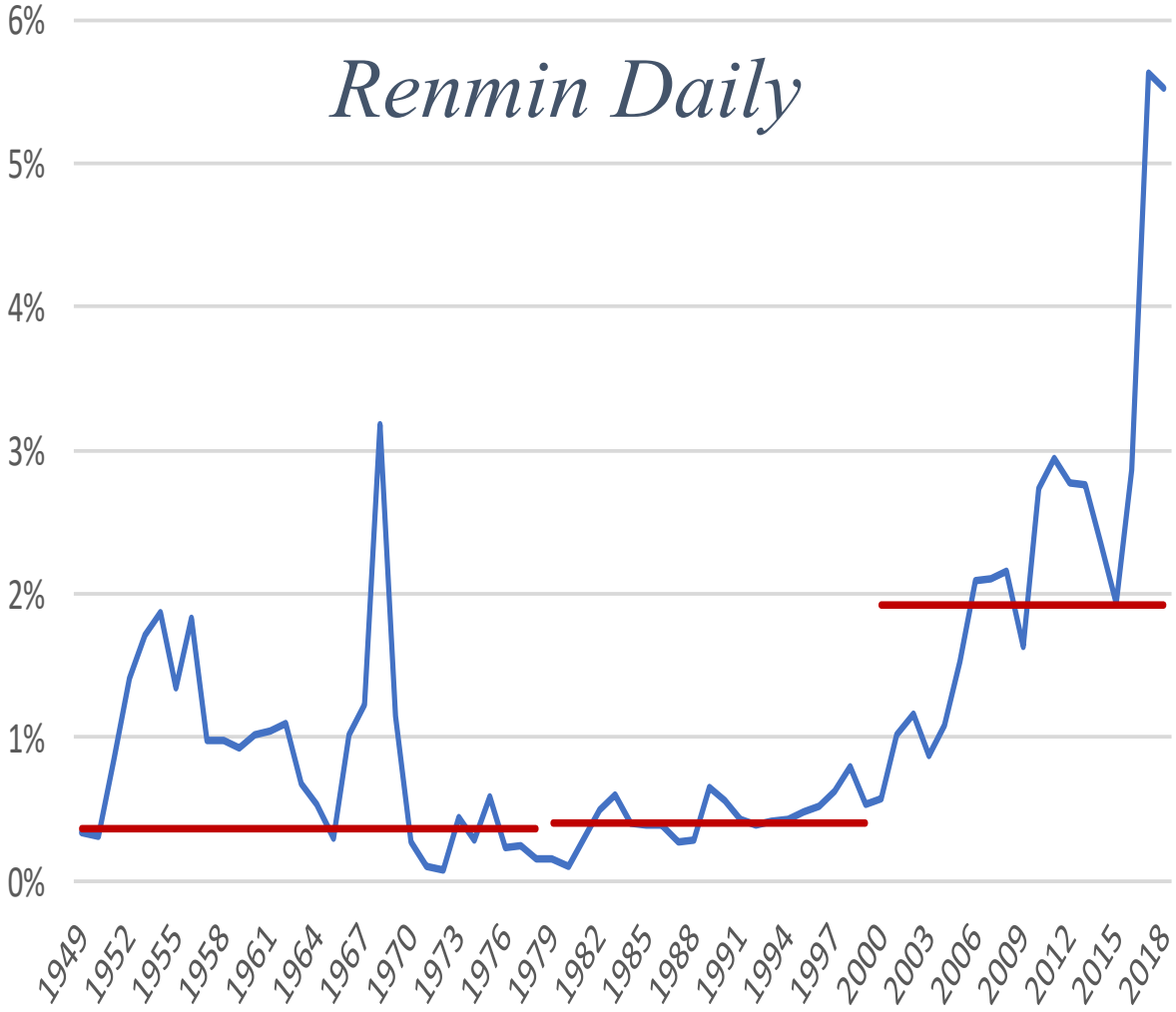


Figure A.3. Percent of E Articles that Contain a Term in U and a term in P



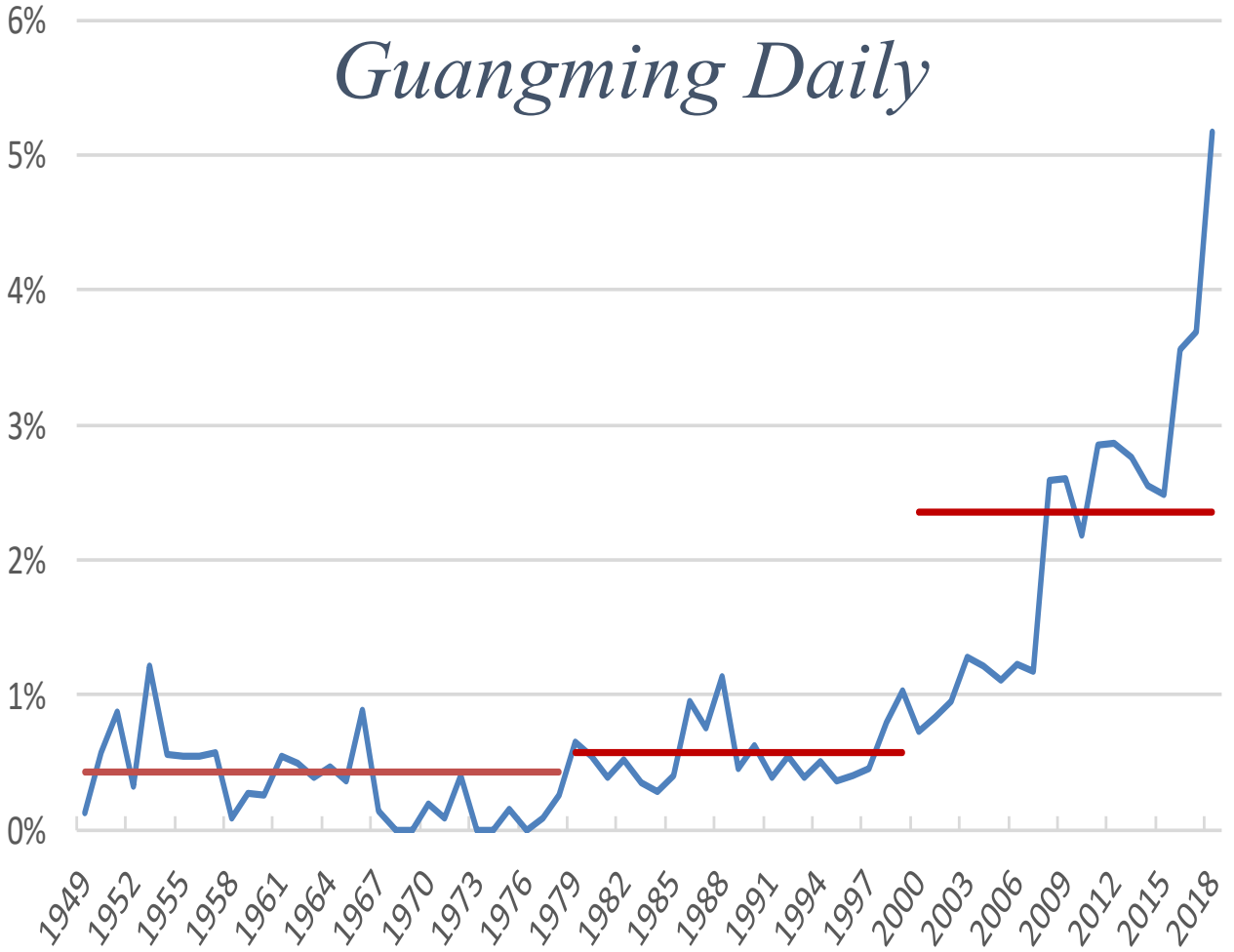
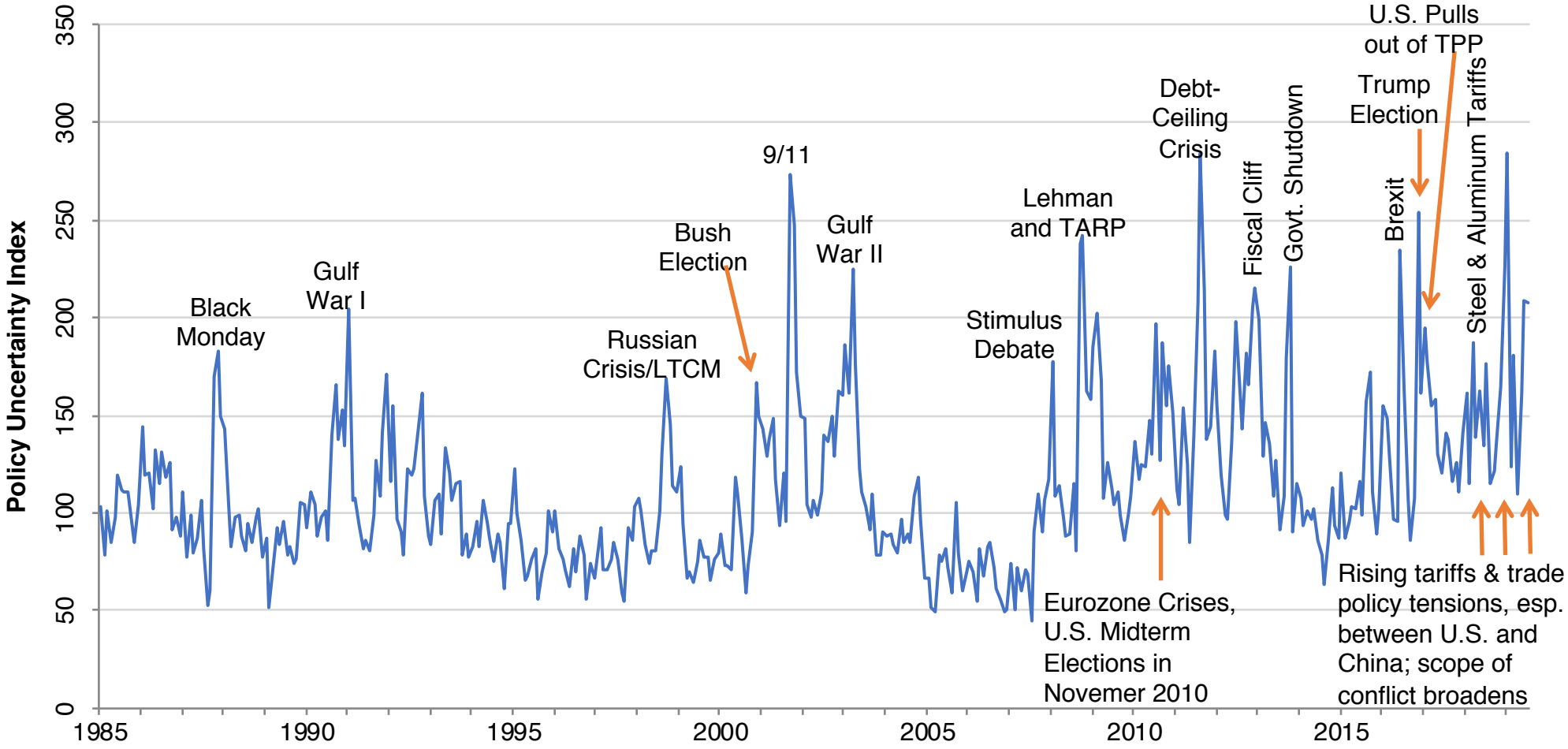
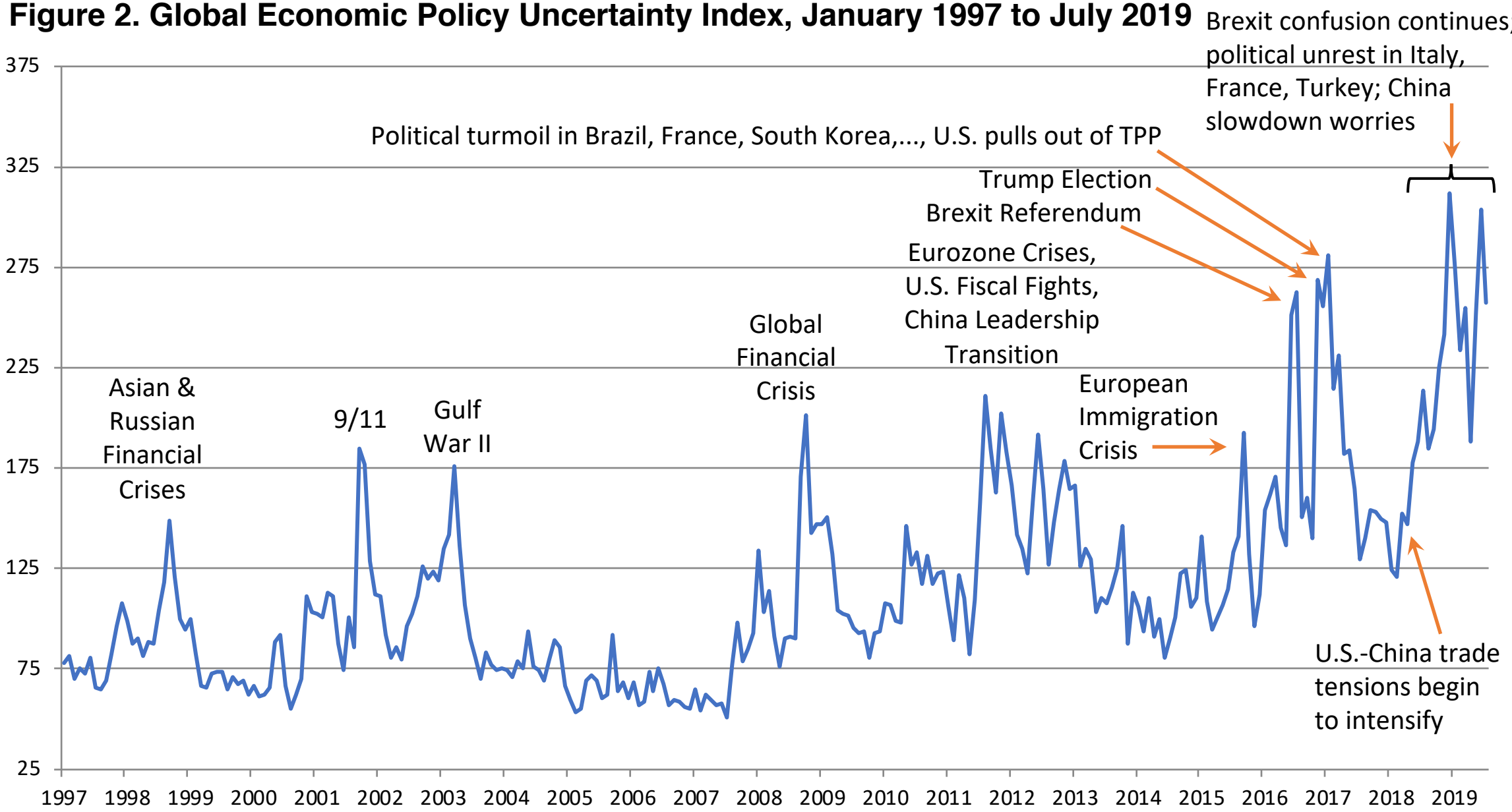


Figure 1. US Economic Policy Uncertainty Index, 1985 to July 2019



Source: "Measuring Economic Policy Uncertainty" by Scott R. Baker, Nicholas Bloom and Steven J. Davis, as updated at www.policyuncertainty.com. Monthly data normalized to 100 from 1985 to 2009.

Figure 2. Global Economic Policy Uncertainty Index, January 1997 to July 2019



Notes: Using data for 21 countries that account for 80% of global GDP at current prices. Normalized to 100 from 1997 to 2015. Sources: Baker, Bloom and Davis (2016), Davis (2016) and PolicyUncertainty.com.