Discussion: Caldera *et al.*, 'The Economic Effects of Trade Policy Uncertainty'

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First...

The views expressed in this presentation are mine and do not necessarily reflect those of the Federal Reserve Bank of New York or the Federal Reserve System.

Nice Paper

- Across 3 measures of trade policy uncertainty (TPU): TPU increased in 2018 to levels not seen since the 1970s.
- Quantifies both empirically and theoretically the macroeconomic impact of higher TPU.
- Theoretically 2 potential channels are considered, conditional on nominal rigidities:
  - Higher expected tariffs $\rightarrow$ higher expected import costs $\rightarrow$ more expensive investment and consumption $\rightarrow$ lower investment and consumption.
  - Higher uncertainty future tariffs $\rightarrow$ precautionary markups and savings increase $\rightarrow$ lower investment and consumption.

- 2 Empirical approaches.
  - Micro firm level data $\rightarrow$ export-oriented firms cut investment spending relatively more when TPU $\uparrow$.
  - Structural VAR on macro data $\rightarrow$ investment spending contract similarly as in theoretical analysis when TPU $\uparrow$.

I will focus on the robustness of the VAR-based empirical evidence.

VAR Specification

$$\underbrace{Y_t}_{k\times 1} = \underbrace{D_0}_{k\times 1} + \sum_{i=1}^{p} D_i \underbrace{Y_{t-i}}_{k\times 1} + \underbrace{\varepsilon_t}_{k\times 1}; \quad \varepsilon_t \sim iid\left(\mathbf{0}, \Omega^{\varepsilon}\right),$$

with $p = 2$ and

$$\underbrace{Y_t}_{7\times 1} = \begin{pmatrix} \text{TPU}_t \\ \text{INVpc}_t \\ \text{Tariffs}_t \\ \text{GDPpc}_t \\ \text{MacroUnc}_t \\ \text{RDOL}_t \\ \text{CapTax}_t \end{pmatrix}$$

for a quarterly 1960 - 2019 sample.

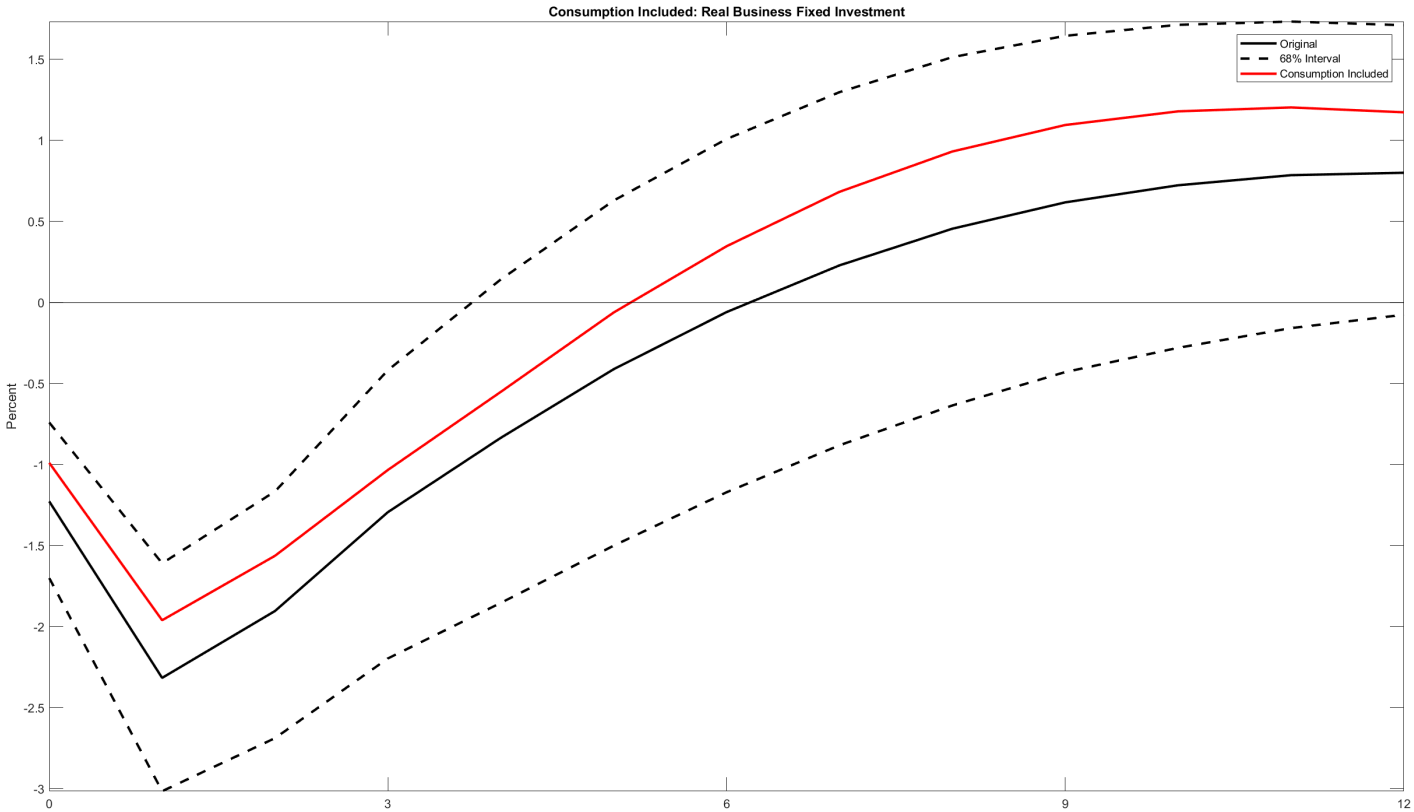
Outline

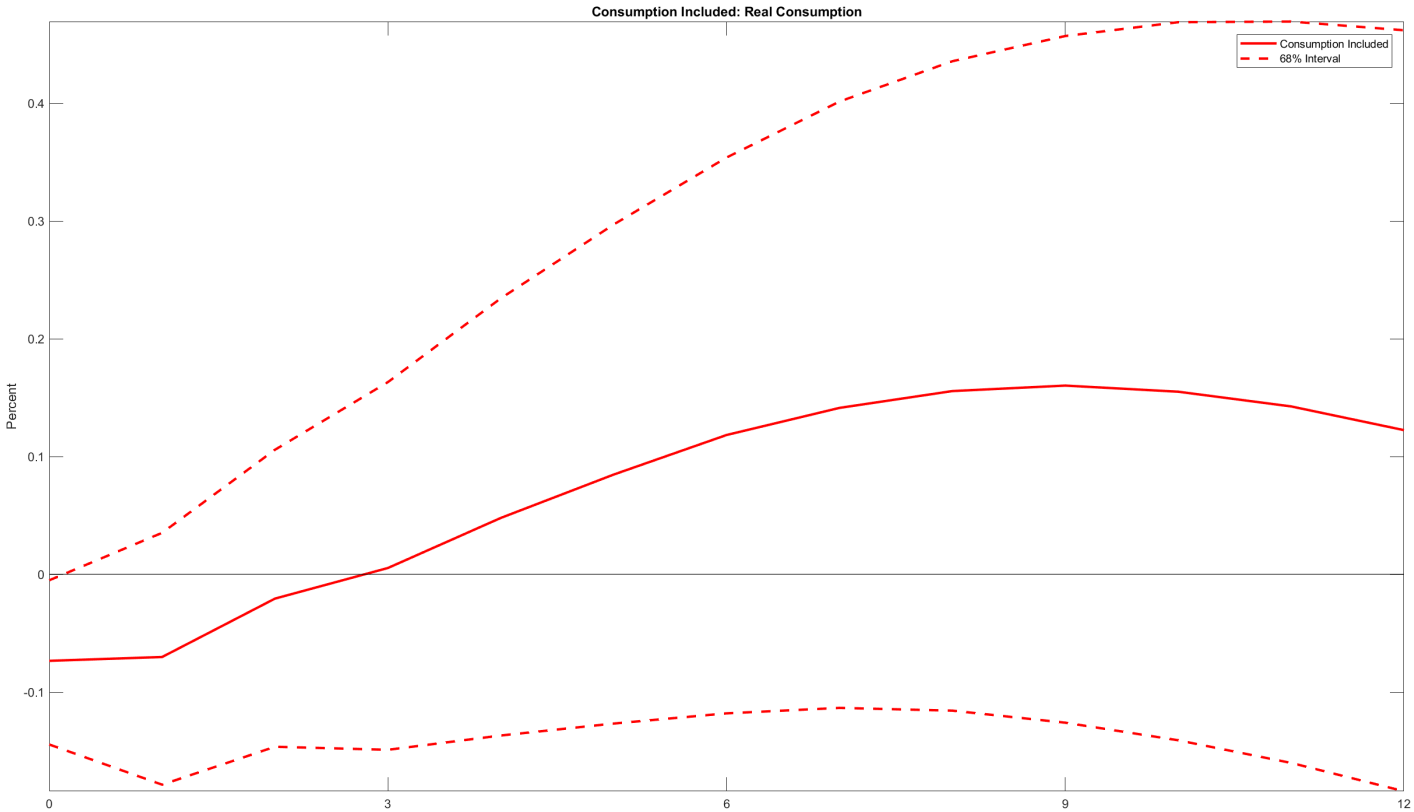
Why Exclude Consumption?

Theoretically, Caldara *et al.* show consumption should slow down substantially when tariffs and tariff uncertainty go up.

$$\underbrace{Y_t}_{9\times 1} = \begin{pmatrix} \text{TPU}_t \\ \text{RINVpc}_t \\ \text{RPCEpc}_t \\ \text{Tariffs}_t \\ \text{GDPpc}_t \\ \text{MacroUnc}_t \\ \text{RDOL}_t \\ \text{ConsTax}_t \\ \text{CapTax}_t \end{pmatrix}$$

with ConsTax_t is Fernandez-Villaverde *et al.* (2015, *AER*) average tax rate on consumption (incl. tariffs).


Consumption Included: Real Business Fixed Investment
Original
68% Interval
Consumption Included
Percent
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
3
6
9
12


Consumption Included: Real Consumption
Consumption Included
68% Interval
Percent
0.4
0.3
0.2
0.1
0
-0.1
0
3
6
9
12

The TPU shock is identified by means of a lower triangular Cholesky decomposition $SS' = \Omega^{\varepsilon}$

$$S^{-1}(I - \sum_{i=1}^{p} D_i) Y_t = S^{-1}\varepsilon_t = \eta.$$

Implies a specific recursive ordering for the Caldera *et al.* VAR:

TPU responds with lag to other shocks.	Other series respond immediately to TPU shock

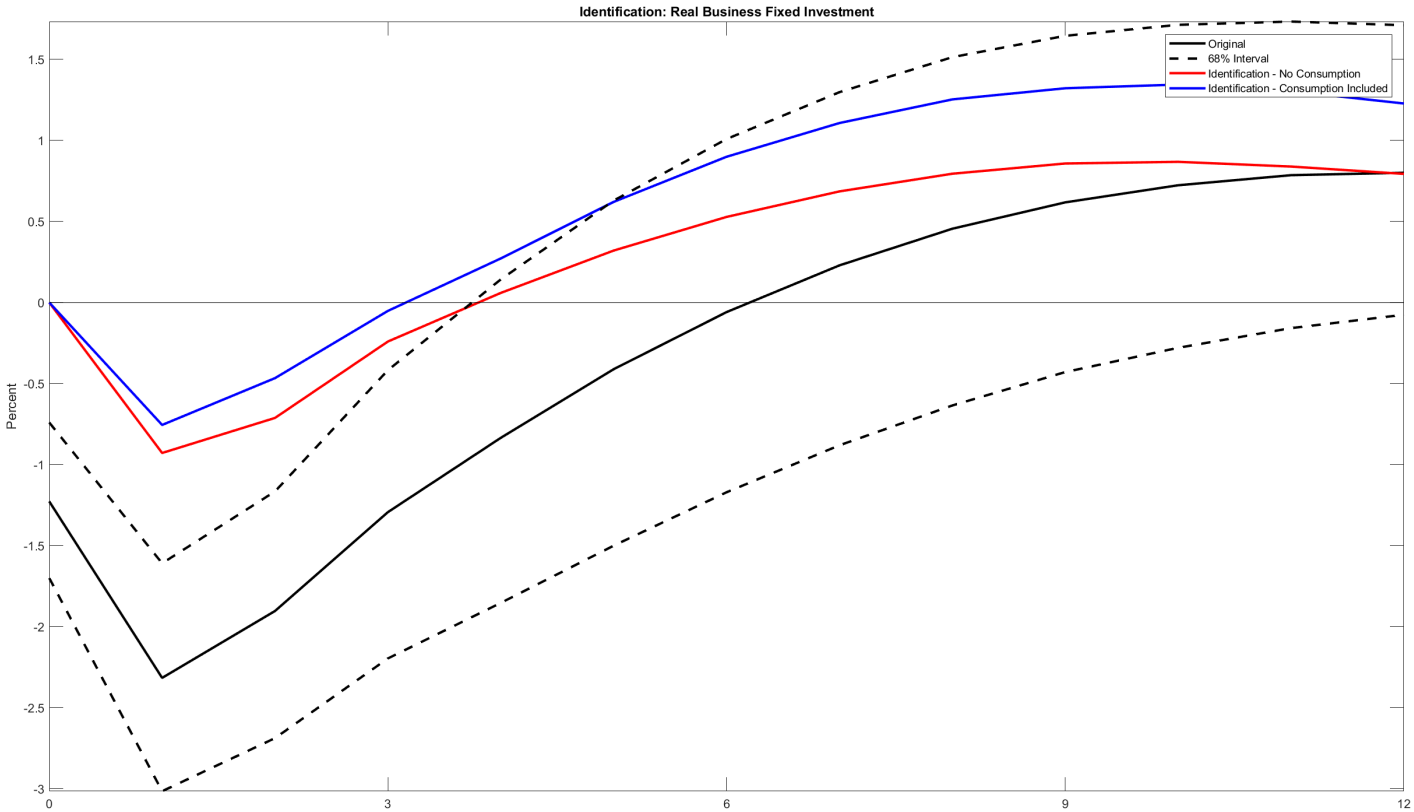
$$\Downarrow \quad Y_t = \begin{pmatrix} \text{TPU}_t \\ \text{INVpc}_t \\ \text{Tariffs}_t \\ \text{GDPpc}_t \\ \text{MacroUnc}_t \\ \text{RDOL}_t \\ \text{CapTax}_t \end{pmatrix}$$

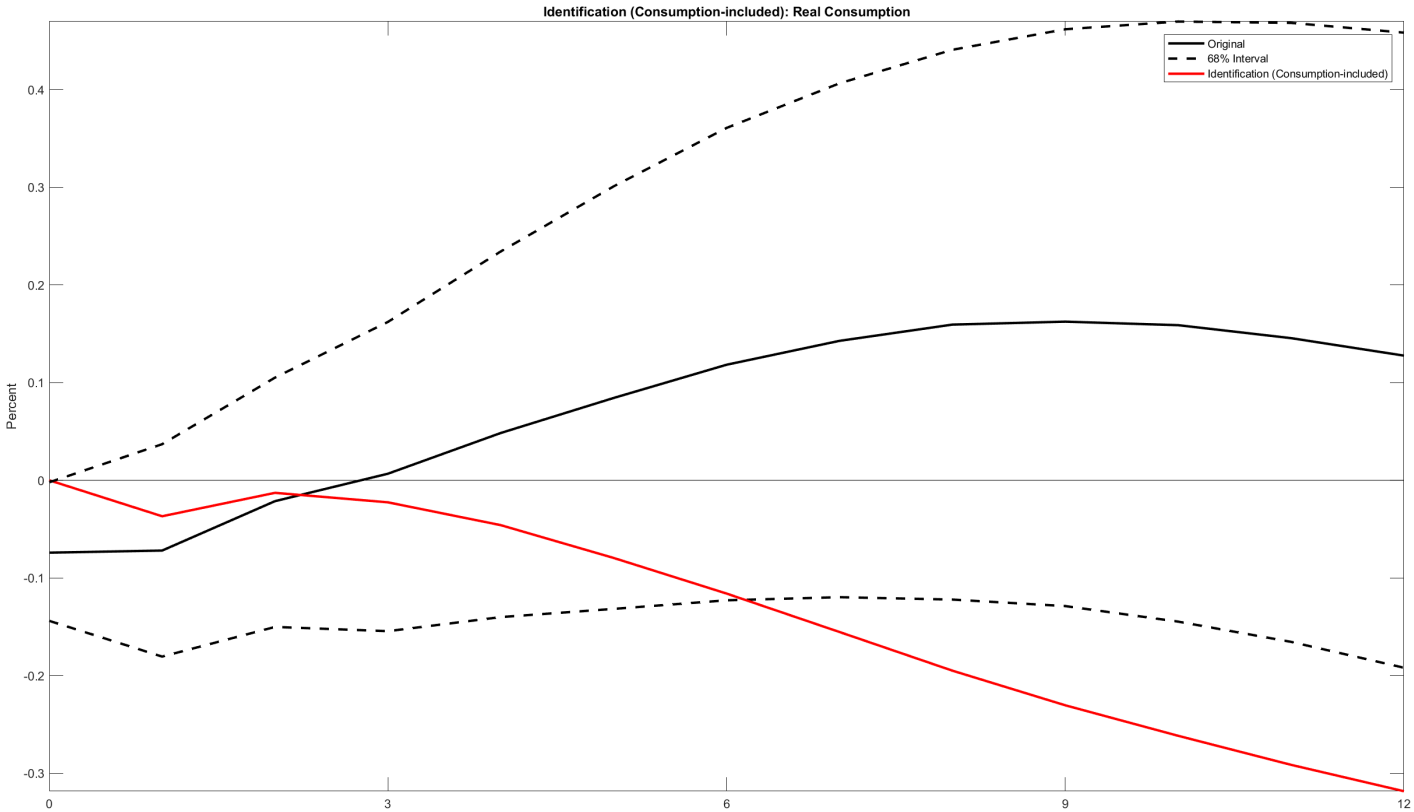
Alternatively, consider TPU as a "faster moving" variable:

TPU responds immediately to above shocks. | Above series respond with lag to TPU shock

$$\Uparrow \quad Y_t = \begin{pmatrix} \text{INVpc}_t \\ \text{Tariffs}_t \\ \text{GDPpc}_t \\ \text{TPU}_t \\ \text{MacroUnc}_t \\ \text{RDOL}_t \\ \text{CapTax}_t \end{pmatrix}$$

- Seems realistic especially for daily news paper articles-based TPU.
- Typical way to incorporate nominal rigidities in recursive macro VAR models.
- Also used in companion paper Caldera *et al.* (2019, FEDS Notes).


Identification: Real Business Fixed Investment
Original
68% Interval
Identification - No Consumption
Identification - Consumption Included
Percent
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
3
6
9
12

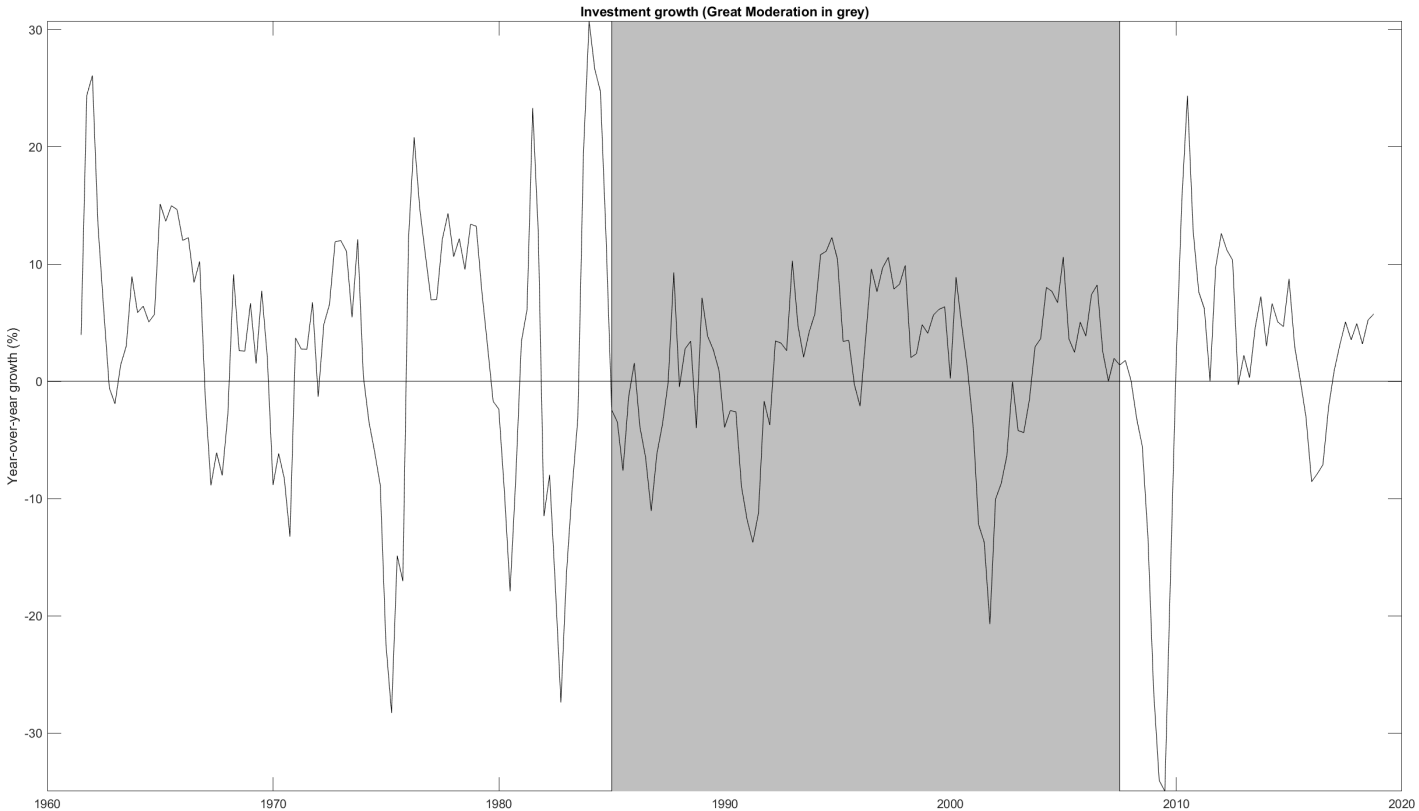

Identification (Consumption-included): Real Consumption
Original
68% Interval
Identification (Consumption-included)
Percent
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
0
3
6
9
12

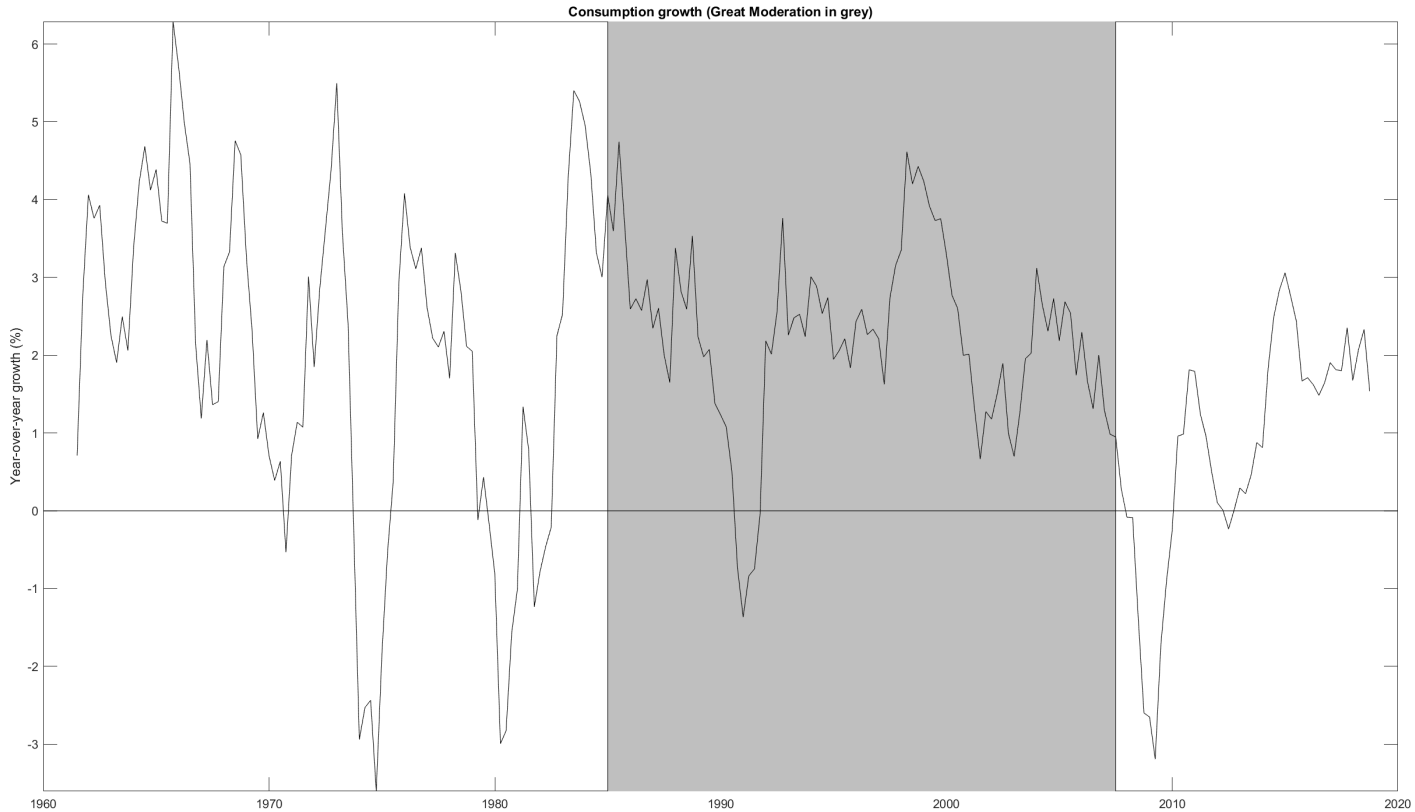
The macroeconomic VAR model is estimated on a 1960-2019 quarterly sample assuming that this a structurally stable sample.

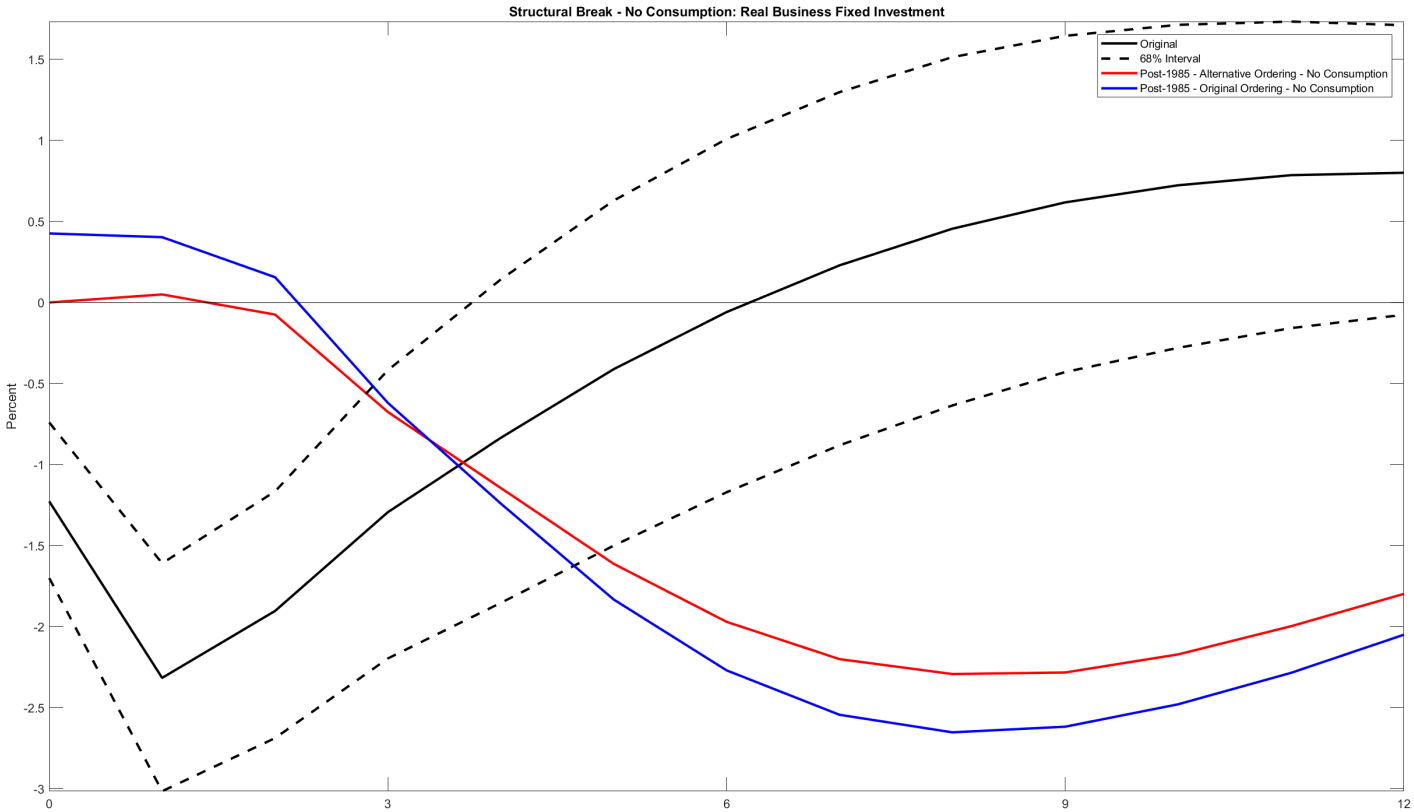
BUT: the 1985-2007 Great Moderation?
Multitude of studies point to significantly lower macroeconomic volatility since the mid-1980s.

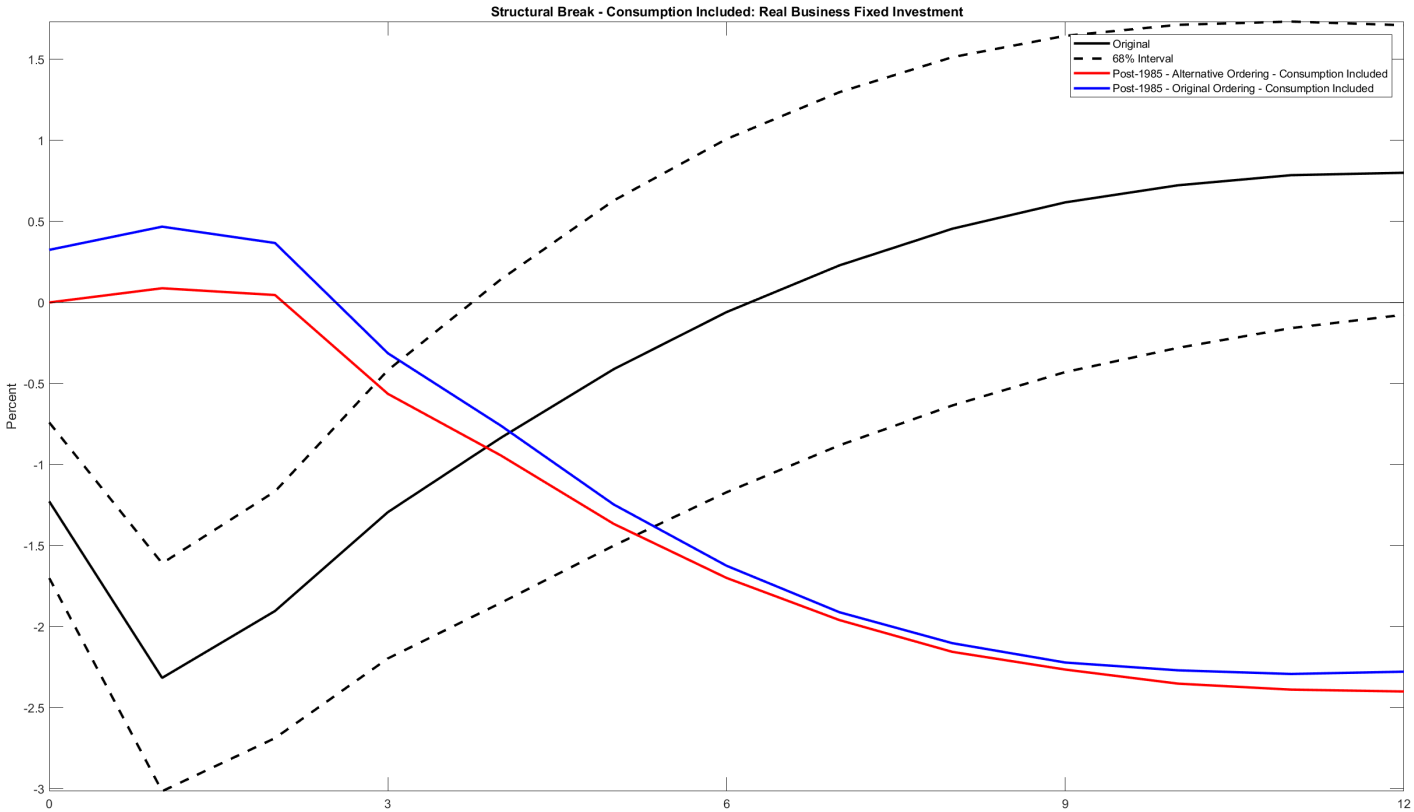
For example, Sensier and Van Dijk (2004, *REStat*) find that for 80% of 214 U.S. macroeconomic time series conditional volatility exhibit downward breaks between 1985 and 1987.

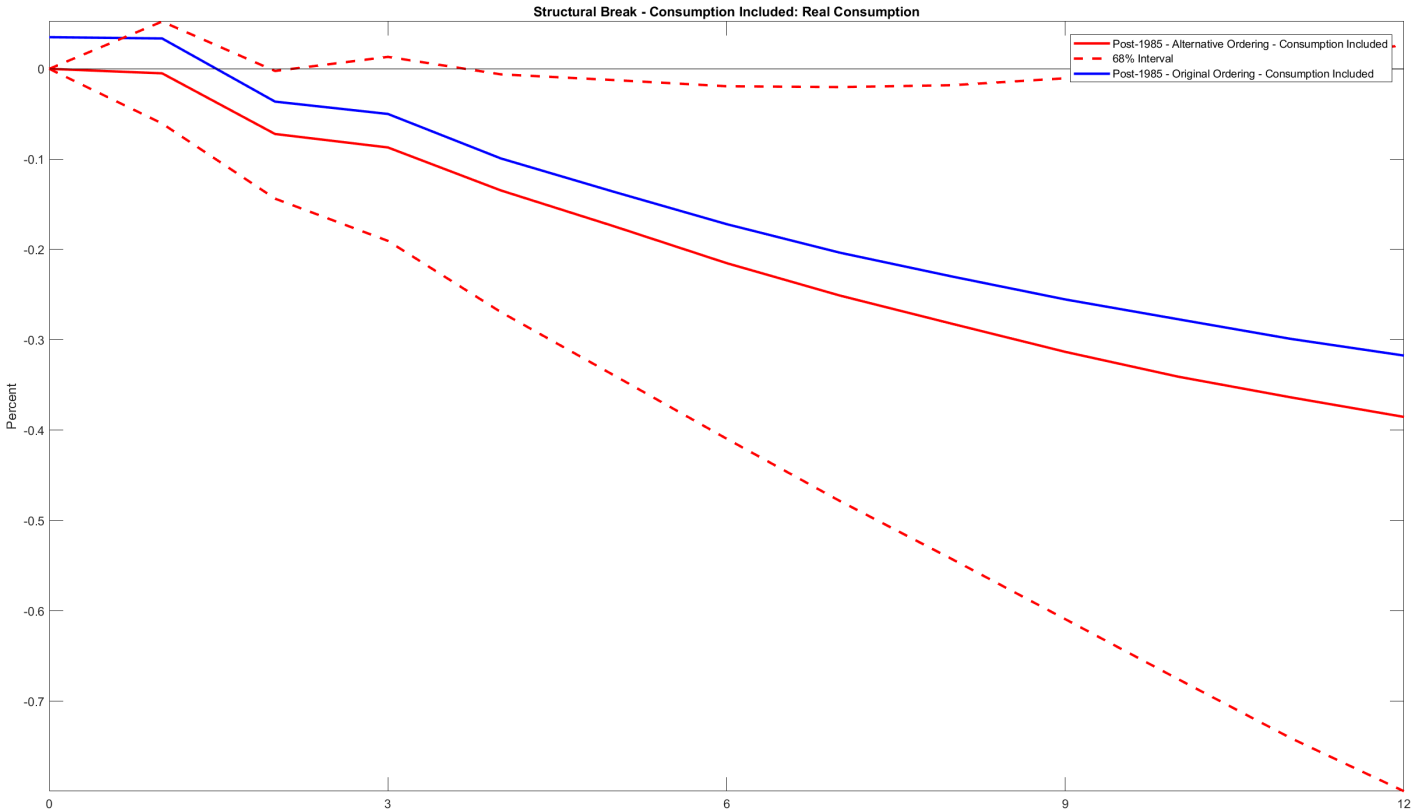
Stock and Watson (2012, *BPEA*): the 2007-2009 Great Recession likely more due to large, temporarily shocks rather structural break away from the Great Moderation.


Investment growth (Great Moderation in grey)
Year-over-year growth (%)
30
20
10
0
-10
-20
-30
1960
1970
1980
1990
2000
2010
2020


Consumption growth (Great Moderation in grey)
Year-over-year growth (%)
6
5
4
3
2
1
0
-1
-2
-3
1960
1970
1980
1990
2000
2010
2020


Structural Break - No Consumption: Real Business Fixed Investment
Original
68% Interval
Post-1985 - Alternative Ordering - No Consumption
Post-1985 - Original Ordering - No Consumption
Percent
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
3
6
9
12


Structural Break - Consumption Included: Real Business Fixed Investment
Original
68% Interval
Post-1985 - Alternative Ordering - Consumption Included
Post-1985 - Original Ordering - Consumption Included
Percent
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
3
6
9
12


Structural Break - Consumption Included: Real Consumption
Post-1985 - Alternative Ordering - Consumption Included
68% Interval
Post-1985 - Original Ordering - Consumption Included
Percent
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
3
6
9
12

Recap

Some caveats to quarterly 1960-2019 VAR-based evidence on TPU shock impact on U.S. economic activity:

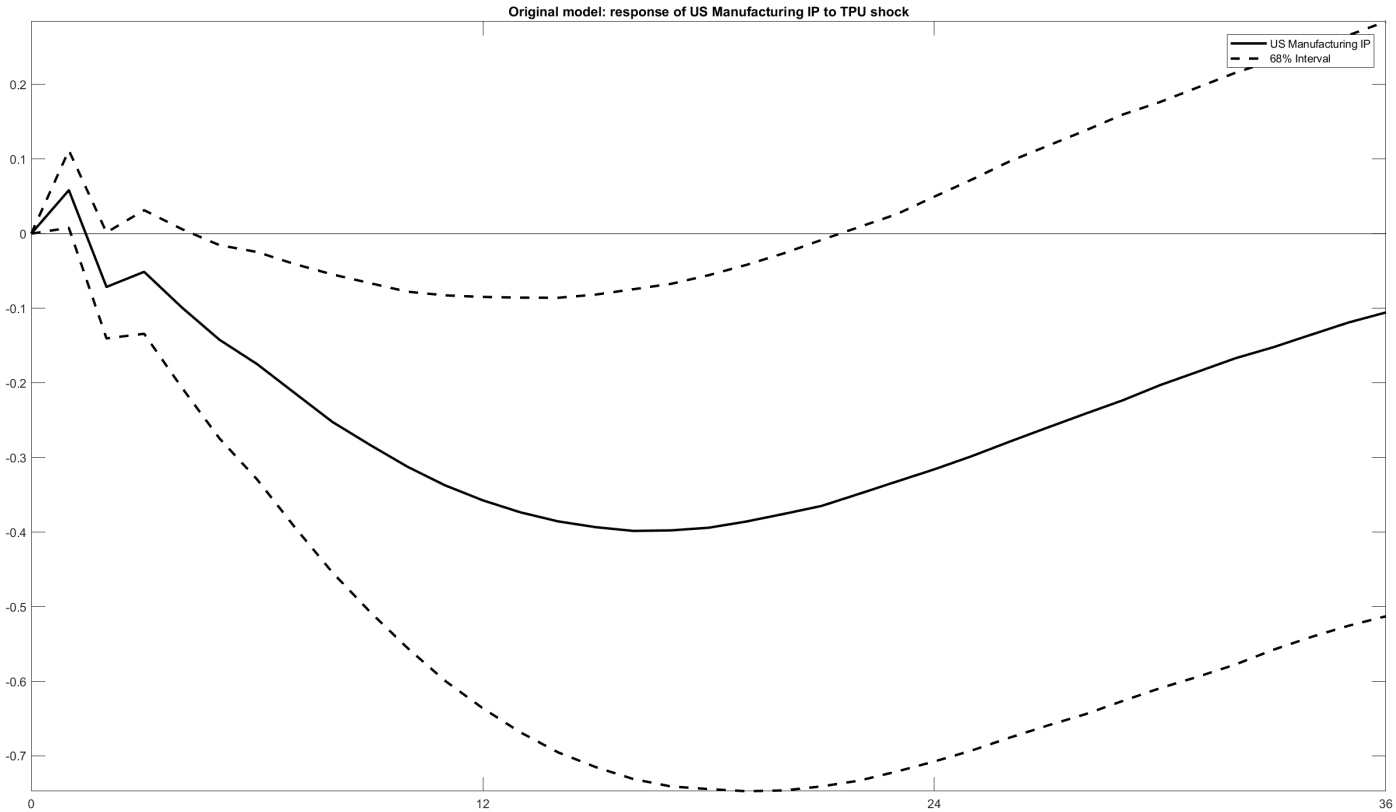
- Consumption does not seem to behave as in the Caldera *et al.* theoretical analysis.
- Different TPU shock identifications ("slow" vs. "fast" moving) seem to affect the impact of TPU shocks.
- It appears that structural breaks in the data impact the VAR analysis.

Recent period

Analyse the macroeconomic impact of TPU over monthly 1985-2019 sample. VAR analysis in companion paper Caldera *et al.* (2019, FEDS Notes):

$$\underbrace{Y_t}_{9\times 1} = \begin{pmatrix} \text{USIPMFG}_t \\ \text{AFEIP}_t \\ \text{EMEIP}_t \\ \text{WORLDIMP}_t \\ \text{Tariffs}_t \\ \text{TPU}_t \\ \text{S\&P500}_t \\ \text{RDOL}_t \\ \text{CORPBRP}_t \end{pmatrix}$$

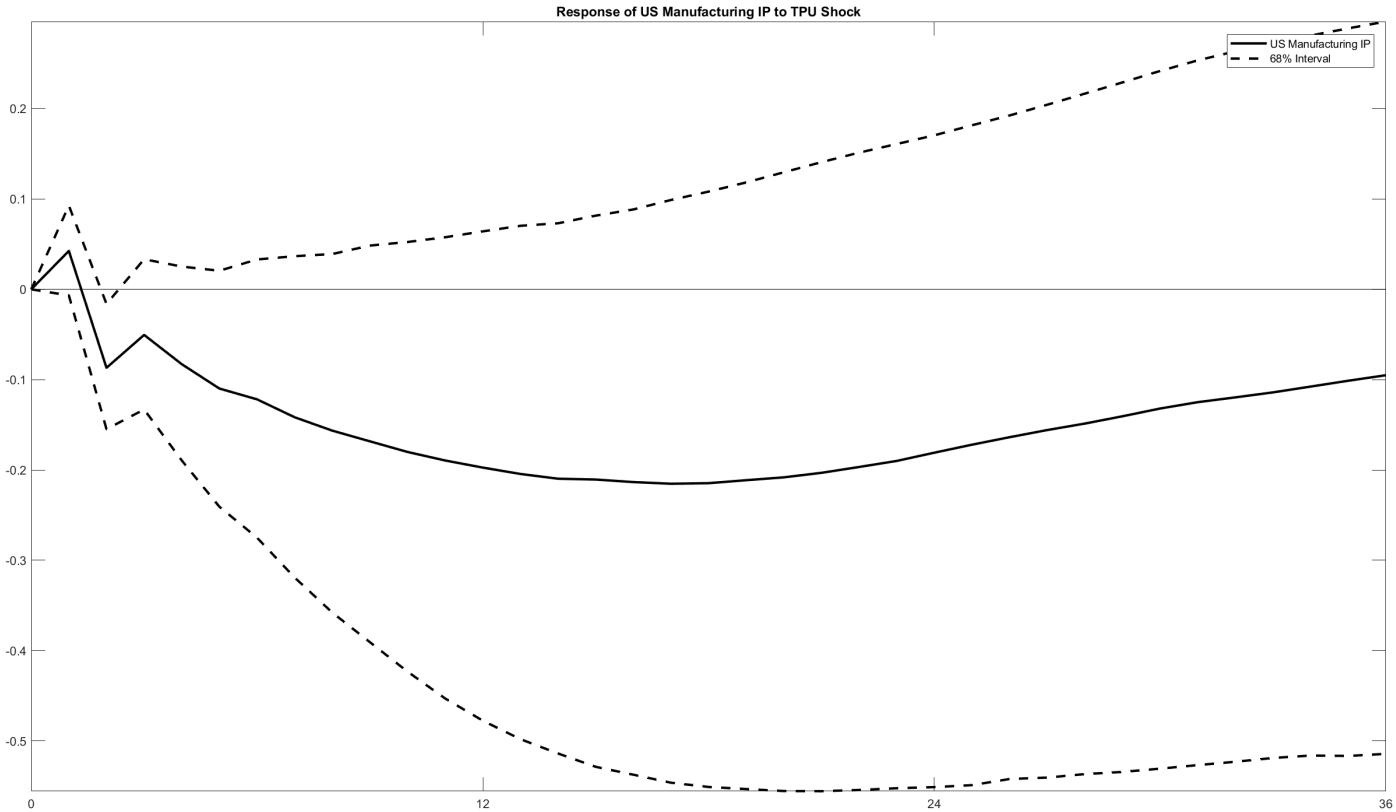
where CORPBRP_t is the Gilchrist and Zakrajsek (2012, *AER*) U.S. corporate bond risk premium.

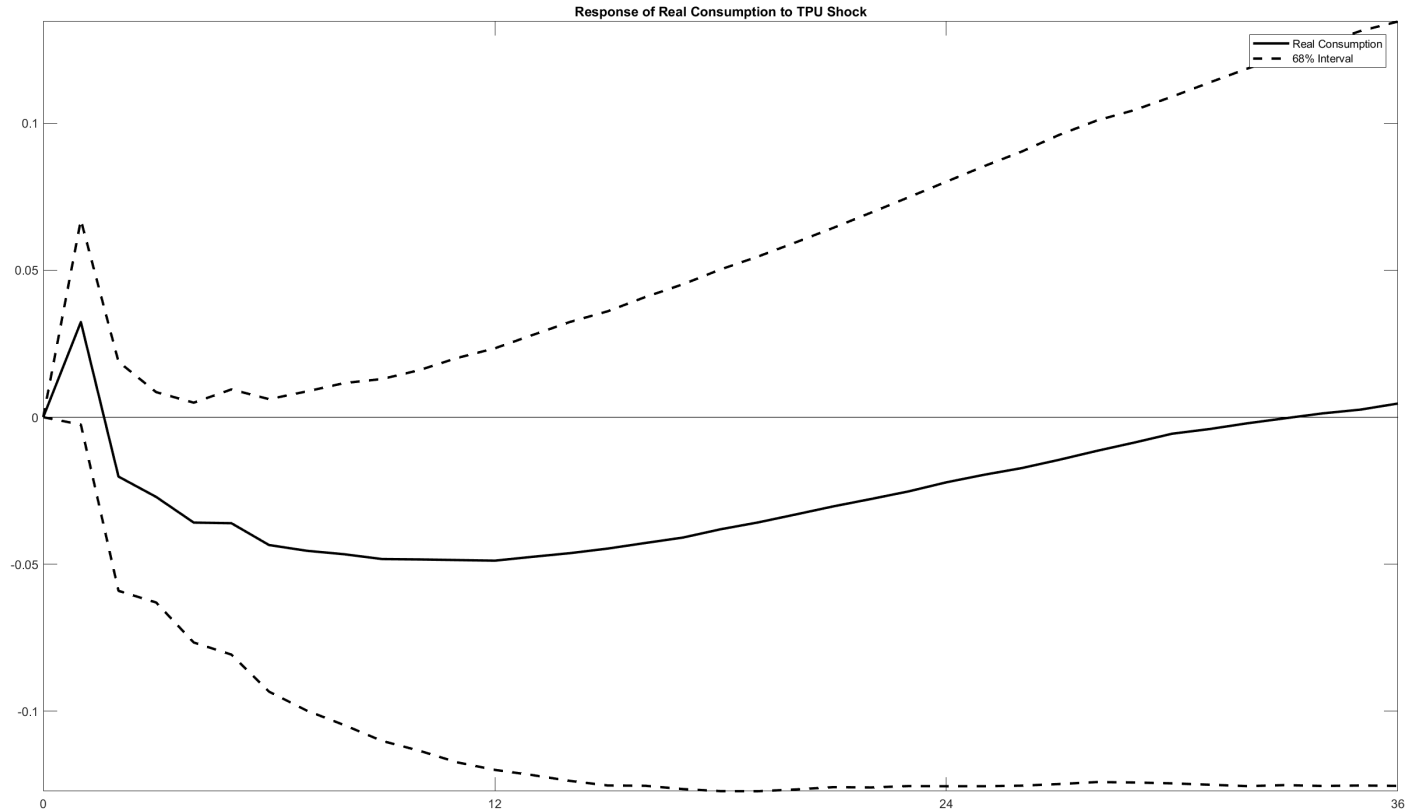

Original model: response of US Manufacturing IP to TPU shock
US Manufacturing IP
68% Interval
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
12
24
36

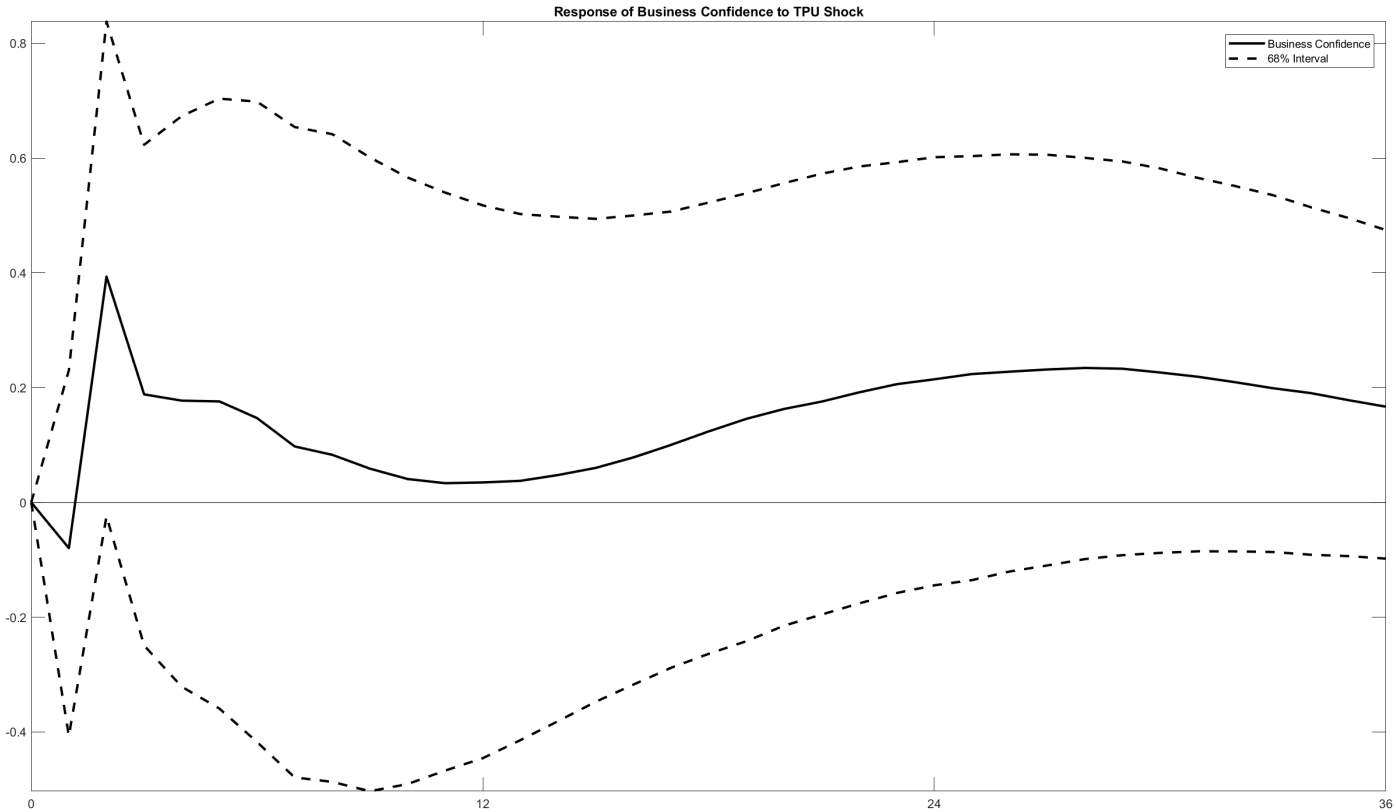
Benigno and Groen (2020, *mimeo FRBNY*), "Uncertainty about Trade Policy Uncertainty": Expand the Caldera *et al.* (2019, FEDS Notes) VAR model

$$\underbrace{Y_t}_{11\times 1} = \begin{pmatrix} \text{USIPMFG}_t \\ \text{AFEIP}_t \\ \text{EMEIP}_t \\ \text{RPCE}_t \\ \text{WORLDIMP}_t \\ \text{Tariffs}_t \\ \text{MfgConf}_t \\ \text{TPU}_t \\ \text{S\&P500}_t \\ \text{RDOL}_t \\ \text{CORPBRP}_t \end{pmatrix}$$

where MfgConf_t is the ISM Manufacturing survey.


Response of US Manufacturing IP to TPU Shock
US Manufacturing IP
68% Interval
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
0
12
24
36

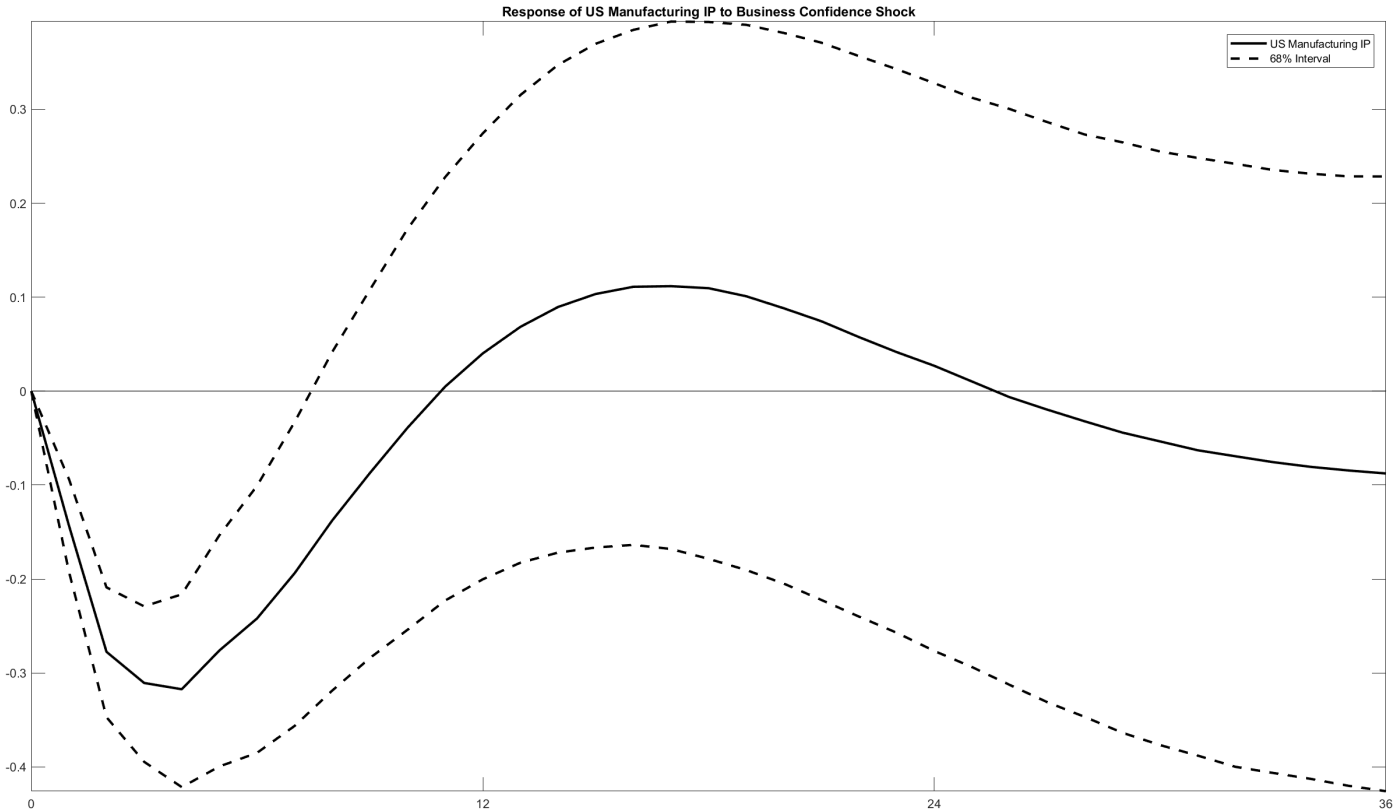

Response of Real Consumption to TPU Shock
Real Consumption
68% Interval
0.1
0.05
0
-0.05
-0.1
0
12
24
36

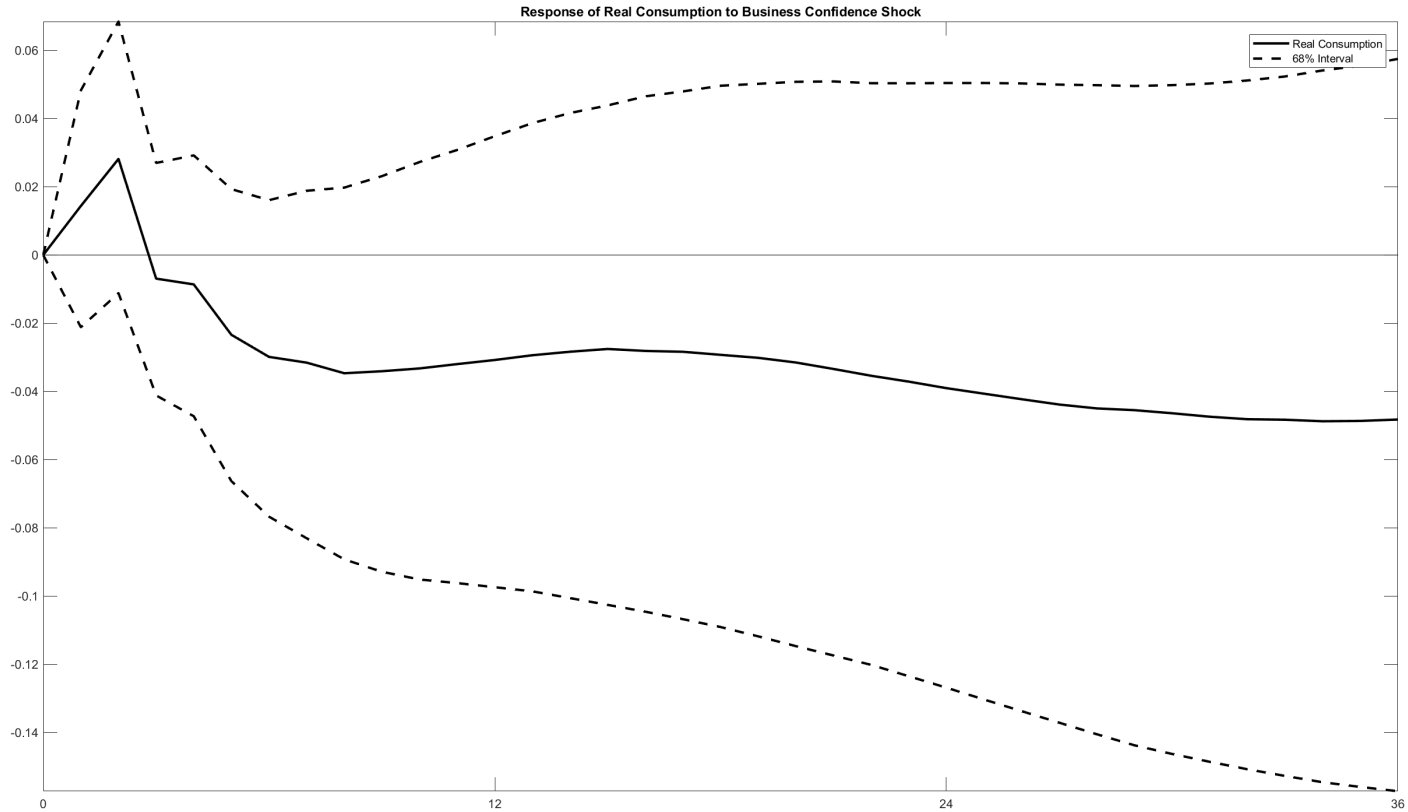

Response of Business Confidence to TPU Shock
Business Confidence
68% Interval
0.8
0.6
0.4
0.2
0
-0.2
-0.4
0
12
24
36

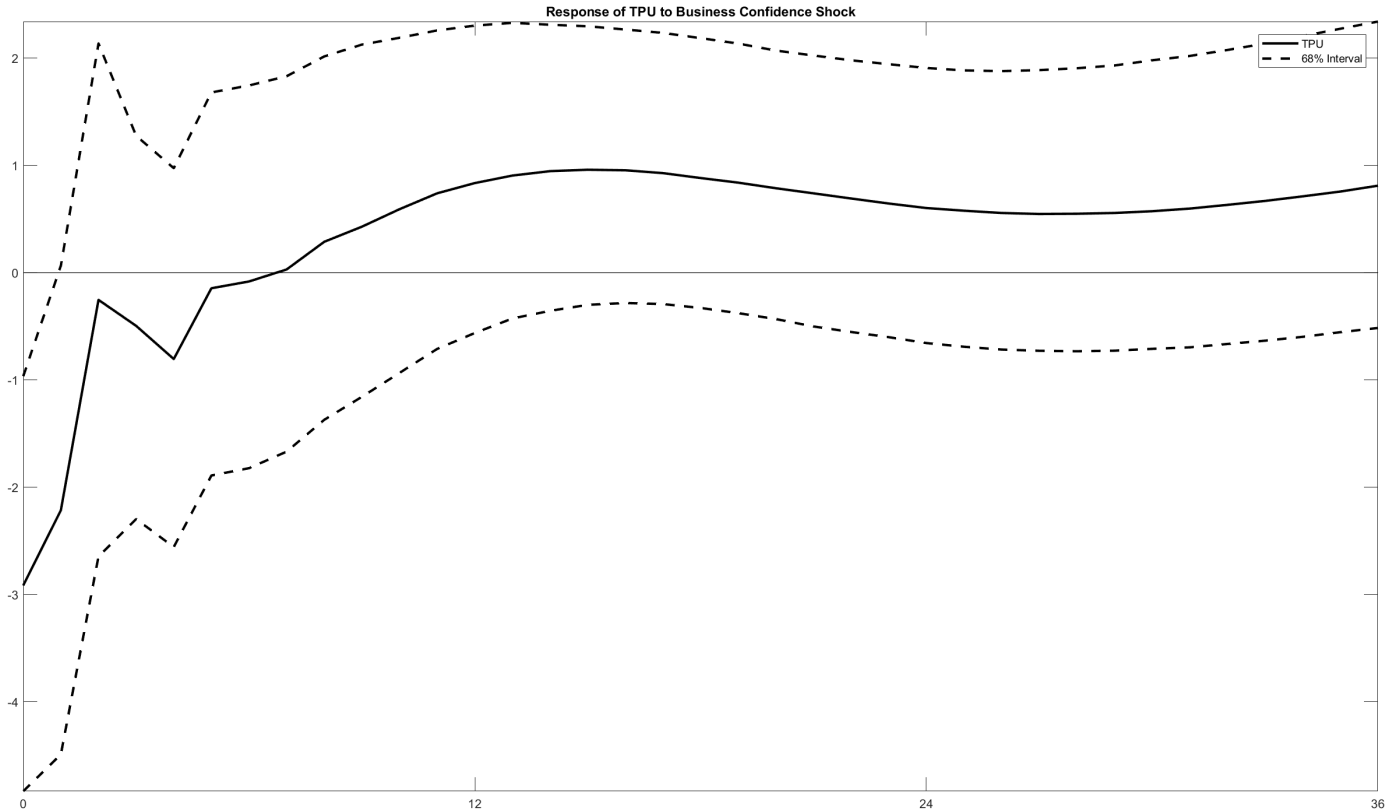
The effect of TPU shocks in the Benigno and Groen (2020, *mimeo FRBNY*) VAR model broadly in line with Caldera *et al.* (2019, FEDS Notes) VAR analysis except for the response of consumption.

During 2017-2019 U.S. consumption remained strong in contrast to the theoretical implications of TPU shocks in Caldera *et al.*

Alternative: Autonomous decline in business sentiment drives a slowdown in business activity (firms' 'animal spirits'), with no material impact on consumption.


Response of US Manufacturing IP to Business Confidence Shock
US Manufacturing IP
68% Interval
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
12
24
36


Response of Real Consumption to Business Confidence Shock
Real Consumption
68% Interval
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
0
12
24
36


Response of TPU to Business Confidence Shock
TPU
68% Interval
2
1
0
-1
-2
-3
-4
0
12
24
36

Recent developments

- The 2017-2019 developments could be consistent with either TPU shocks or negative business sentiment shocks.
- Recent subsiding trade tensions might not result in rebounding manufacturing output and investment spending, if business sentiment does not recover.