# Global and Local Uncertainties in Small Open Economies

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# Overview

# Introduction: Uncertainty Matters in Decision-Making

## Long history of theoretical discussion:

- Edgeworth, Keynes began to incorporate probabilistic theory into economic analysis in late 19th. *Treatise* (1921) $\rightarrow$ Savage (1954) approach.
- Knightian uncertainty (1921): probabilities are *subjectively un-quantifiable*
- Fundamental uncertainty in The General Theory (1936): *objective ignorance* of outcome probabilities $\rightarrow$ agents rely on *bounded rationality* (Simon,1961).
- Deep uncertainty: Hansen-Sargent (01,06,08,22,23) $\rightarrow$ decision making of modeller

## Rich empirical implications:

- Micro uncertainty: Intra-household bargaining; human capital investment; gender imbalance; dynamic discrete choice; real-option view of corporate decision-making; size-value premium; "granular uncertainty"
- Macro uncertainty: climate change economics; policy uncertainty; macroeconomics & firm decisions; C-CAPM; macro friction and portfolio choice; academic dropout in recessions

# Motivation: Global and Local Uncertainties Are Correlated

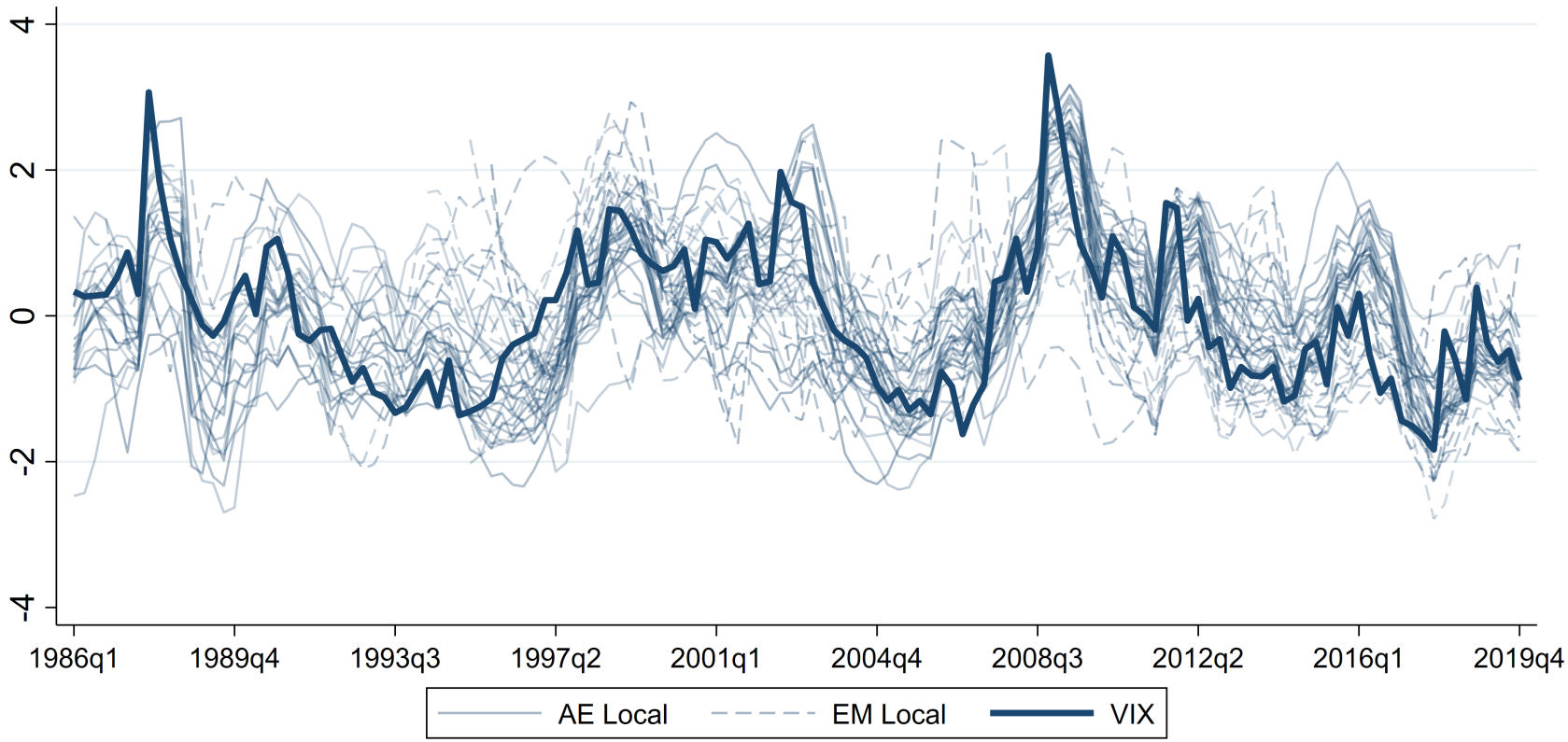
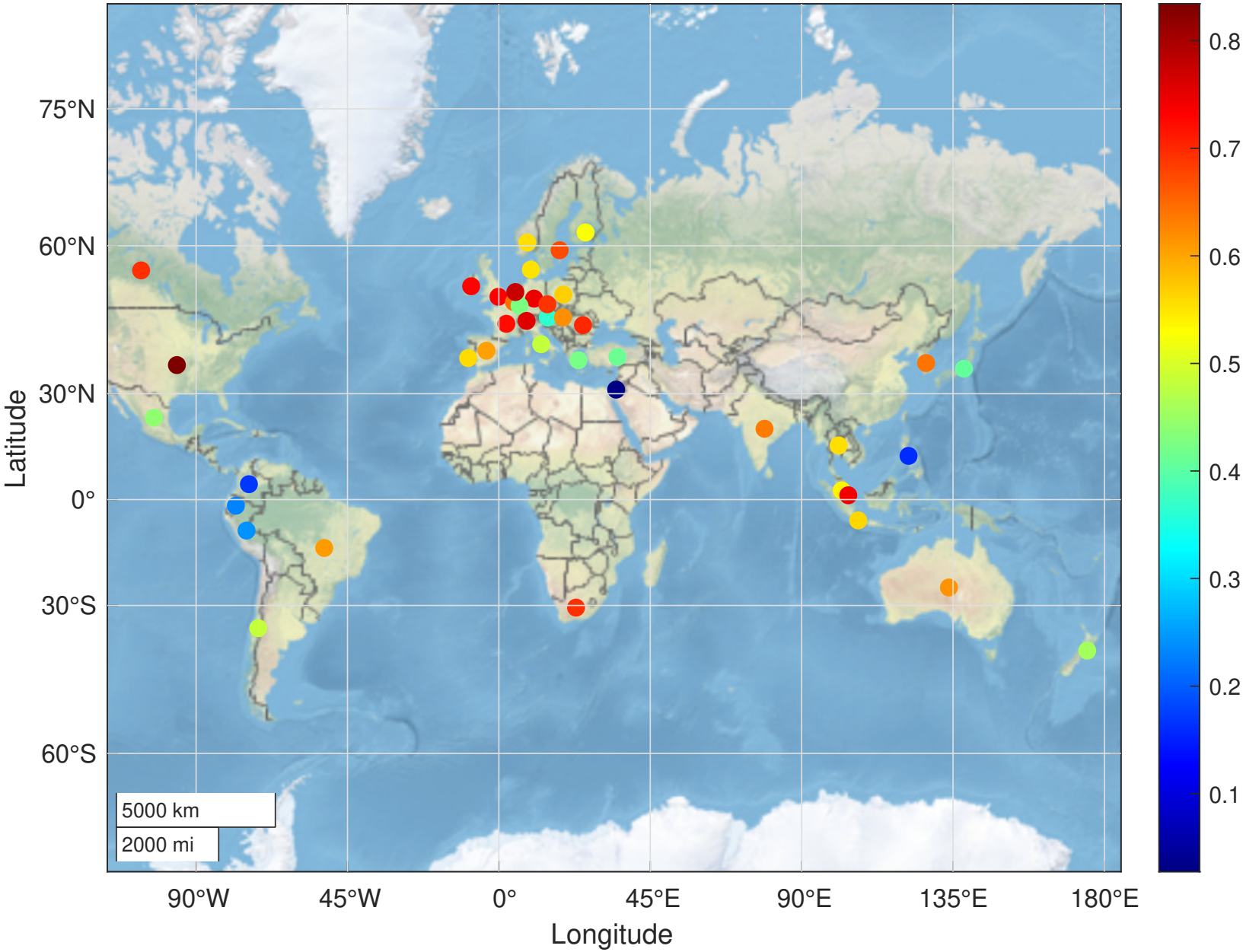



Figure: Standardized VIX and Local Macro Uncertainty ($\rho = 0.42$)

# Motivation: Global and Local Uncertainties Are Correlated



# Research Question

Many work on global and spillover effects; many work on local uncertainty effects.

Few bring them together in a cross-country study. If they do, global uncertainty tends to work as an instrument.

**We bridge the two and ask if global/local uncertainty shocks affect small open economies (SOEs) differently in the short run.**

We focus on Macro uncertainty but check other uncertainties as well.

# Empirical Design Overview

- Panel of small open economies
- Identify IRFs to global/local uncertainties via combining exogeneity assumption on global shocks and external instruments on local shocks.
- Use LP-IV method for transparency and robustness.
- Sanity checks and extensive robustness checks.

# Main Takeaways

1. Global uncertainty shocks to SOEs are aggregate demand shocks. EMs are more susceptible to global shocks than AEs.

2. Local uncertainty shocks to SOEs are aggregate supply shocks. The effects of local shocks are more sizable and persistent. AEs and EMs respond rather differently to local shocks.

3. Caution against confusing global/local uncertainty shocks. IRFs are otherwise contaminated.

# Overview

# Literature on Uncertainty is Extensive

**Uncertainty and business cycles in general:** See Castelnuovo (2019) for a good ten-page reference.

**Global uncertainty and spillover:** Fernàndez-Villarverde et al.(2011); Benigno et al.(2012); Colombo(2013); Carrière-Swallow & Céspedes (2013); Born & Pfeifer (2014b); Bloom (2017); Huang et al. (2018); Angelini et al. (2018); Cesa-Bianchi et al. (2018); Baley et al.(2019); Caggiano et al.(2019); Ahair et al.(2018, 2019, 2022); Bhattarai et al.(2020)

**Local/Domestic uncertainty:** Engel & Rangel(2008); Bloom(2009); Bachmann et al.(2013); Alexopoulos & Cohen(2015); Baker et al. (2016); Jurado et al.(2015); Rossi & Sekhposyan(2015); Leduc & Liu (2016); Nakamura et al.(2017); Bloom et al. (2018); Ludvigson et al. (2019); Angelini & Fanelli (2019); Angelini et al. (2019) ; Piffer & Podstawski (2018); Carriero et al.(2019); Alessandri & Mumtaz(2019); Chatterjee (2022); Miescu(2023); Baker, Bloom, and Terry (2023);

# Grid of Empirical Literature

| | Identification Strategy | | |
|---|---|---|---|
| | Timing | Structural | Natural Experiment |
| Global | CC(2013)<br>BCP(2020) | | ABF(2022) |
| Local | Bloom(2009)<br>ER(2008) | Bloom et al.(2018)<br>Chatterjee(2022) | Miescu(2023)<br>BBT(2023)<br>ABF(2022) |
| Both | This paper | | This paper |

# Literature on Empirical Design

**SVAR/LP(IV):** Jordà(2005); Angrist et al.(2017); Stock(2008); Stock & Watson(2012,2016,2017); Mertens & Ravn(2013); Mertens(2015); Gertler & Karadi(2015); Caldara & Kamps(2017); Ramey(2016); Montiel-Olea et al.(2021); Corodnichenko & Lee(2020); Montiel-Olea & Plagborg-Møller (2021); Plagborg-Møller & Wolf(2017,2021); Xu(2023)

**IV for uncertainty:** Piffer & Podstawski(2018); Angelini & Fanelli(2019); Miescu(2023); Baker, Bloom, and Terry (2023)

**Caution in Identification:** Koo et al.(2023); Kilian et al.(2023); Jacobson et al.(2023)

# Overview

# SVAR Framework (1/2)

Country $i$'s SVAR system for

$$Y_{it} = (v_t, u_{it}, X_{it}')'$$

$v_t$: global uncertainty index
$u_{it}$: local uncertainty index
$X_{it}$: vector of macro variables

driven by structural shocks $\{e_{Y,it}\}$:

$$\Gamma_i(L) Y_{it} = e_{Y,it}, \quad e_{Y,it} \sim WN(0, I)$$

with $p$-th order linear filter $\Gamma_i(L) = \Gamma_{i,0} - \sum_{k=1}^{p} \Gamma_{i,k} L^k$ such that there is $\Gamma_i(L)^{-1} = \Phi_i(L) = \sum_{k=0}^{\infty} \Phi_{i,k} L^k$.

**Assumption:** $\{\Phi_{i,k}\}_k$ to be absolutely summable, and $\Phi_i(z)$ has full row rank for all complex scalars $z$ on the unit circle.

# SVAR Framework (2/2)

Suppressing $i$, we assume a contemporaneous relation

$$\Gamma_0 = \begin{pmatrix} 1 & 0 & 0'_{(1\times n_x)} \\ -\gamma_{uv,0} & 1 & -\gamma'_{ux,0}{}_{(1\times n_x)} \\ -\gamma_{xv}{}_{(n_x\times 1)} & -\gamma_{xu,0} & \Gamma_{xx,0}{}_{(n_x\times n_x)} \end{pmatrix}$$

$v_t$ is shared by all countries, and exogenous ▸ Test, with

$$\Gamma_{k,[1,2]} = \cdots = \Gamma_{k,[1,n_y]} = 0, \quad k = 0, \cdots, p.$$

We remain agnostic about the causal relation between local uncertainty and macro variables.

# SVMA Representation

Structural Vector Moving Average (SVMA) representation

$$Y_{it} = \sum_{k=0}^{\infty} \Phi_{i,k} e_{Y,it-k}$$

where $\Phi_{i,k} = (\Phi_{i,k,v\cdot}, \Phi_{i,k,u\cdot}, \Phi_{i,k,X\cdot})$.

The $h$-period IRFs of global and local uncertainty shocks on $Y_i$ are given by, respectively, $\{\Phi_{i,k,v\cdot}\}$ and $\{\Phi_{i,k,u\cdot}\}$, $k = 0, 1, \cdots, h-1$.

Denote $\Phi_{i,k,vX}$ and $\Phi_{i,k,uX}$ as the $(n_x \times 1)$ vectors that capture the IRFs of $X_i$ to $v$ and $u$ shocks.

# Estimation of IRF to Global Uncertainty

MW (2021, ECTA) shows one can estimate the normalized $\Phi_{i,k,vX}$ by linear regressions

$$X_{it+k} = \beta_k v_t + \sum_{l=1}^{p} \Psi_{il} Y_{it-l} + \xi_{t,k}, \quad k = 0, \cdots, h$$

The relative IRF of the global uncertainty shock on $X_{it}$ is

$$\beta_k = \Phi_{i,k,vX} \Big/ \sqrt{\mathbb{E}(v_t - Proj(v_t | Y_{it-l}, l = 1, \cdots, p))^2}.$$

$\beta_k$ is a $(n_x \times 1)$ vector, and $/$ denotes the element-wise division.

Similarly, can estimate $\gamma_{uv,0}$. Useful for sanity checks later.

# Estimation of IRF to Local Uncertainty (1/4)

Expand $X_{it+h}$ in SVMA,

$$
\begin{aligned}
X_{it+h} = & \sum_{k=0}^{h-1} \Phi_{i,k} e_{Y,it+h-k} \\
& + \Phi_{i,h,u} . e_{u,it} + \Phi_{i,h,v} . e_{v,t} + \Phi_{i,h,X} . e_{X,it} \\
& + \sum_{k=h+1}^{\infty} \left( \Phi_{i,k,u} . e_{u,it-k} + \Phi_{i,k,v} . e_{v,t-k} + \Phi_{i,k,X} . e_{X,it-k} \right) .
\end{aligned}
$$

With global and local uncertainty

$$
v_t = \sum_{k=1}^{p} \gamma_{vv,k} v_{t-k} + e_{v,t}
$$

$$
u_{it} = X_{it}' \gamma_{ux,0} + \sum_{k=1}^{p} Y_{it-1}' \gamma_{uy,k} + \gamma_{uv,0} v_t + e_{u,it} .
$$

# Estimation of IRF to Local Uncertainty (2/4)

Substitute out $e_{u,it}$ and $e_{v,t}$ to have

$$
\begin{aligned}
X_{it+h} = & \sum_{k=0}^{h-1} \Phi_{i,k} e_{Y,it+h-k} \\
& + \Phi_{i,h,u\cdot} u_{it} + \left(\Phi_{i,h,v\cdot} - \Phi_{i,h,u\cdot}\gamma_{uv,0}\right) v_t + \Psi_{i,h,X\cdot} e_{X,it} \\
& + \sum_{k=h+1}^{\infty} \left(\Psi_{i,k,u\cdot} e_{u,it-k} + \Psi_{i,k,v\cdot} e_{v,t-k} + \Psi_{i,k,X\cdot} e_{X,it-k}\right).
\end{aligned}
$$

Clearly, $u_{it}$ is endogenous for it is a function of $\{e_{X,it-l}\}, l = 0, 1, \cdots, p$.

If otherwise, LP via standard panel OLS/GMM should suffice.

# Estimation of IRF to Local Uncertainty (3/4)

External instrumental variables can be used for the identification of local shocks.

In line with MW, we consider instruments $Z_{it}$ such that

$$Z_{it} = \alpha_i e_{u,it} + \sum_{l=1}^{\infty}(B_{i,z,l} Z_{it-l} + B_{i,y,l} Y_{i,t-l}) + c_{z,i} + \zeta_{it}$$

where the vector $\alpha_i \neq 0$ and measurement error $\zeta_{it}$ that is independent of $e_{Y,it}$ at all leads and lags.

BBT(2023, RES) propose such a set of instruments: **disasters local to each country**.

# Estimation of IRF to Local Uncertainty (4/4)

The correct relative IRFs of local uncertainty shock can be estimated by 2SLS. The first stage regression is,

$$u_{it} = \beta'_{FS,z} Z_{it} + \beta_{FS,v} v_t + \sum_{l=1}^{p} \psi'_{i,u,l} Y_{it-l} + \xi_{FS,t}.$$

The second stage regressions for $k = 0, 1, \cdots, h$ are

$$X_{it+k} = \beta_{SS,u,k} \hat{u}_{it} + \beta_{SS,v,k} v_t + \sum_{l=1}^{p} \Psi_{SS,il} Y_{it-l} + \xi_{SS,t,k}$$

$\beta_{SS,u,k}$ estimates the response of $X_{it+k}$ to a local uncertainty shock of magnitude that raises $u_{it}$ by one unit.

# Overview

# Panel Data

- Data Source: IFS, Eurostat, OECD, and individual country resources. Splined with earlier sample from Uribe and Schmitt-Groh́e (2016).
- Unbalanced panel for 40 countries (exclude US) from 1986Q1-2019Q4.
- $X_{it}$ = quarterly growth rate of real GDP ($y$), private consumption expenditure ($c$), gross fixed capital formation ($i$), CPI ($cpi$) and real effective exchange rate ($rer$), trade balance to GDP ratio ($tby$), all in percentage.
- $u_{it}$ = standard deviations of daily stock returns within quarter $t$. Returns are computed from the broadest stock market index. Source: Global Financial Database.
- $v_t$ = VIX for 1990-2019, VXO for 1986-1990.
- $Z_{it}$: IVs from BBT (see below).

# Business Cycle Moments

| | All | AE | EM |
|---|---|---|---|
| $\sigma(y)$ | 1.10 | 1.03 | 1.17 |
| $\sigma(c)/\sigma(y)$ | 1.17 | 1.04 | 1.27 |
| $\sigma(i)/\sigma(y)$ | 3.92 | 4.26 | 3.64 |
| $\sigma(tby)$ | 3.02 | 2.32 | 3.66 |
| $\sigma(cpi)$ | 1.08 | 0.68 | 1.45 |
| $\sigma(rer)$ | 2.89 | 2.10 | 3.60 |

Note: average std.dev across countries; see country-wise statistics in ▸ Addendum

# Disasters, Coups, Revolutions, and Terrorists

- **Natural disasters:** Extreme weather events such as droughts, earthquakes, insect infestations, pandemics, floods, extreme temperatures, avalanches, landslides, storms, volcanoes, fires, and hurricanes.
- **Coups:** Military action which results in the seizure of executive authority taken by an opposition group from within the government.
- **Revolutions:** A violent uprising or revolution seeking to replace the government or substantially change the governance of a given region.
- **Terrorist attacks:** Bombings and other non-state-sponsored attacks.
- Binary event occurrences are weighted by the increase in the daily count of articles mentioning the affected country in Access World News in the 15 days after the event compared to the 15 days before the event.

# News Coverage Weighted Disasters (BBT, Figure 1)

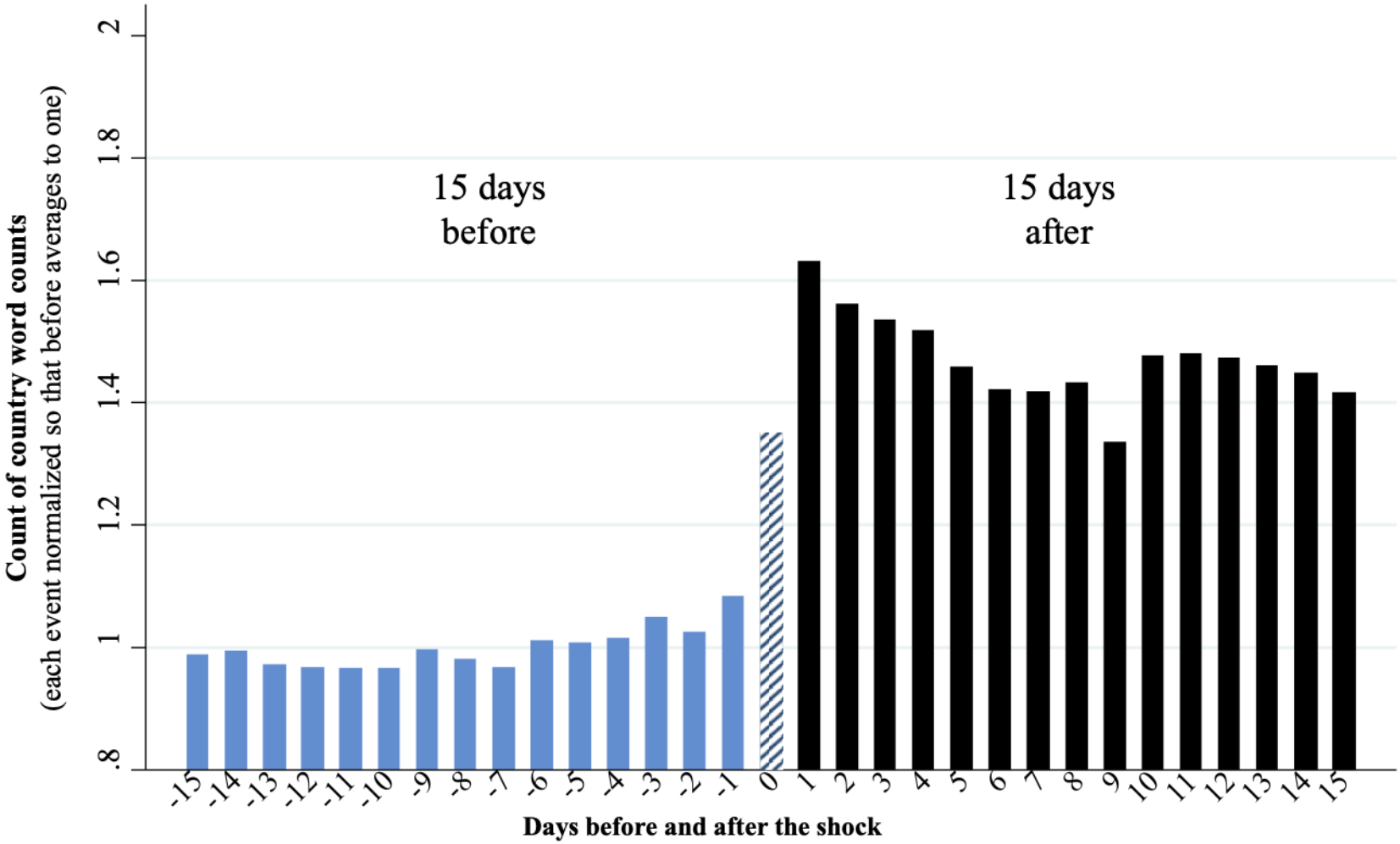



FIGURE 1

# News Coverage Weighted Disasters (BBT, Figure 2)

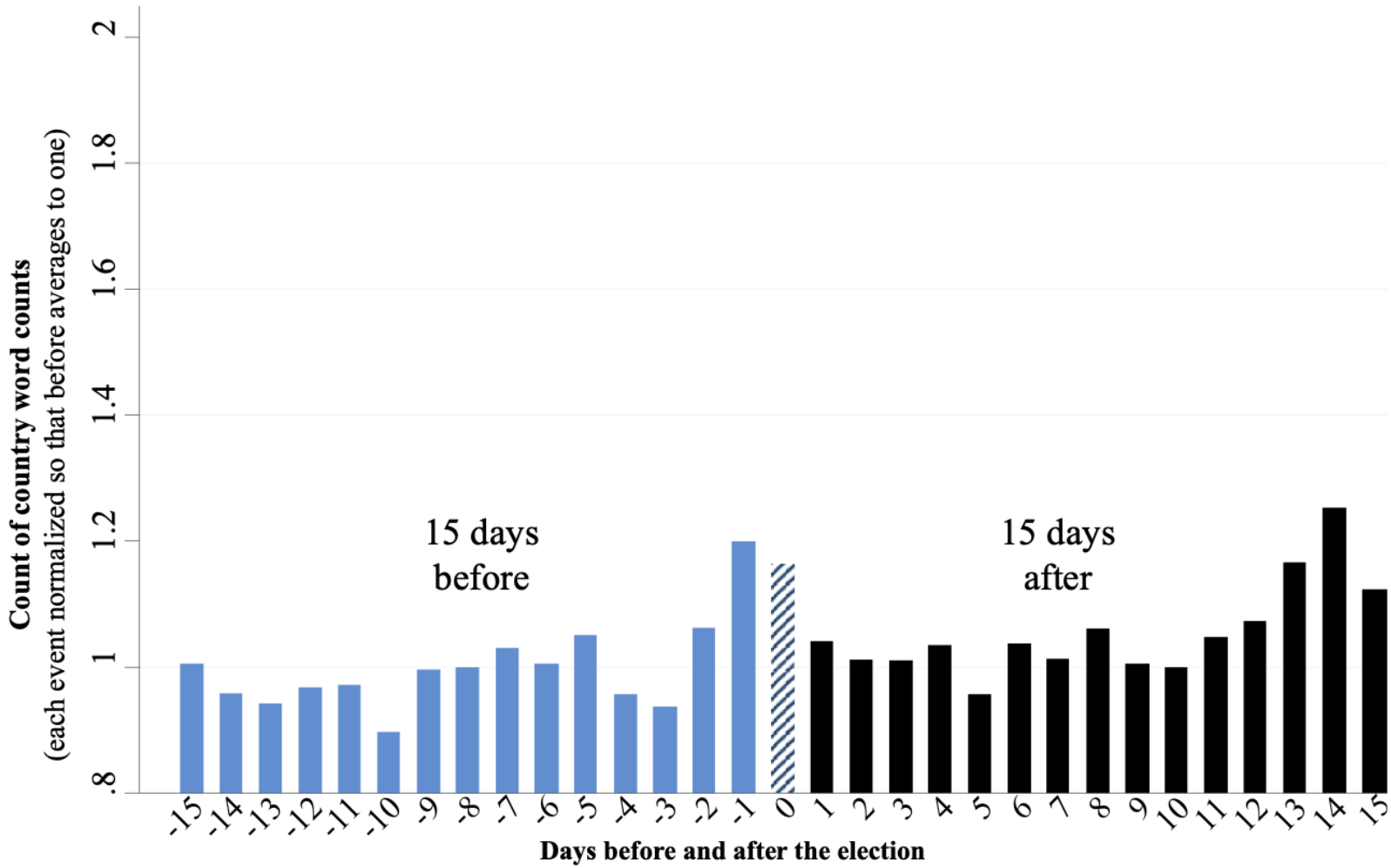



FIGURE 2

# Overview

# Benchmark Setting

- VIX
- Macro uncertainty: quarterly standard deviation of daily stock returns from the broadest stock market index.
- Marco variables:
  - 100*RGDP growth,
  - 100*consumption growth,
  - 100*investment growth,
  - 100*CPI growth,
  - 100*RER growth,
  - trade balance to GDP ratio.
- LP-OLS(8) and LP-IV(8).

# Spillover of Global Uncertainty on Local Uncertainty

| | All | AE | EM |
|---|---|---|---|
| $\gamma_{uv,0}$ | 0.327 | 0.378 | 0.269 |
| | (0.029) | (0.034) | (0.044) |
| Year FE | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes |
| Obs | 4,137 | 2,240 | 1,897 |

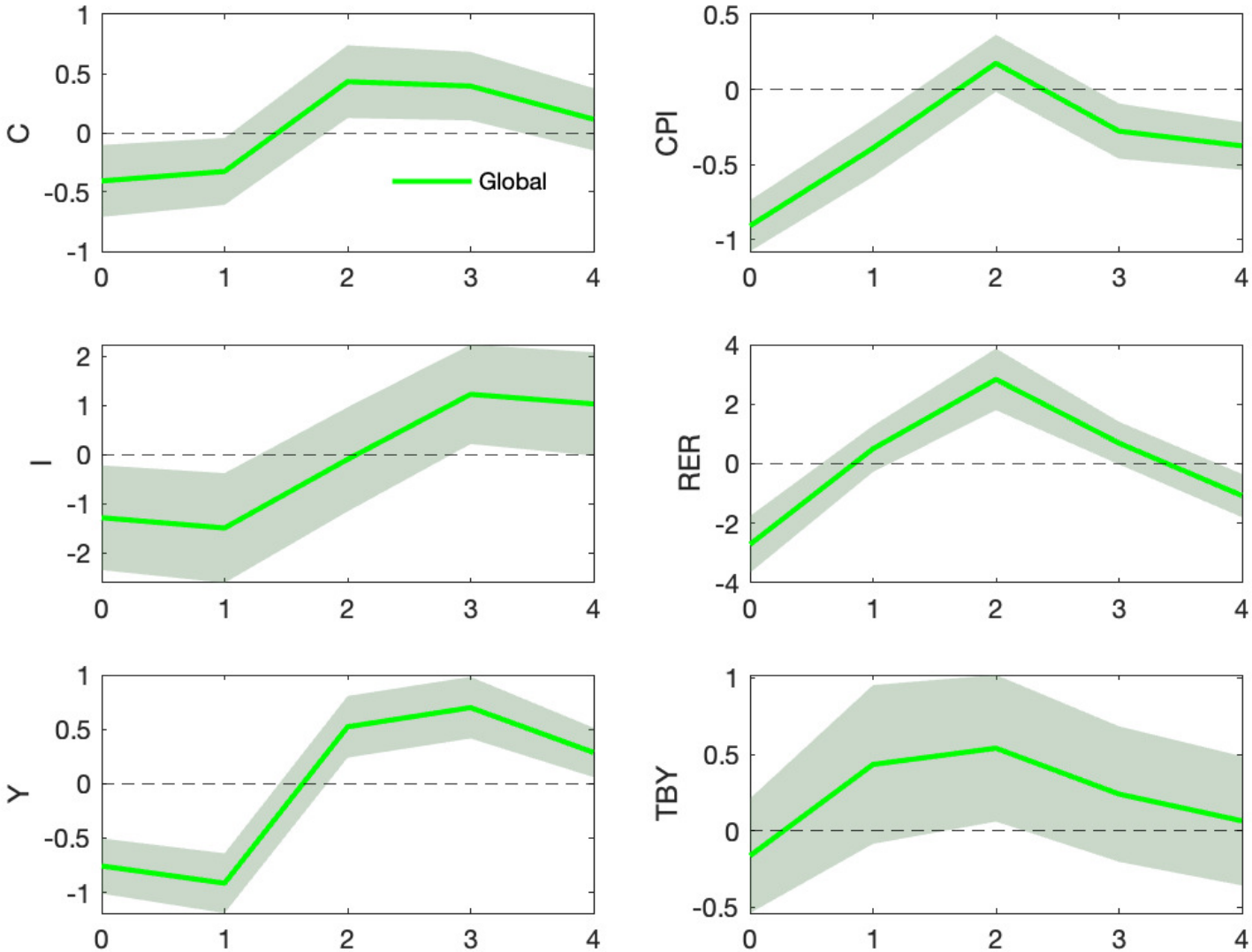
Year FE appears somewhat important for controlling the global business cycle and obtaining reasonable IRFs of outputs. Other IRFs are fairly robust.

# Instrument Validity

| | All | EM | AE |
|---|---|---|---|
| $\text{Disaster}_t$ | 0.010 | 0.012 | 0.033 |
| | (0.029) | (0.031) | (0.045) |
| $\text{Coup}_t$ | 0.103 | 0.060 | |
| | (0.224) | (0.230) | |
| $\text{Revolution}_t$ | $-0.878^{***}$ | $-0.751^{***}$ | |
| | (0.247) | (0.260) | |
| $\text{Terrorist}_t$ | 0.207 | 0.460 | $0.290^{*}$ |
| | (0.176) | (0.975) | (0.150) |
| Sargan $p$-val | 0.609 | 0.563 | 0.414 |
| Instrument F-test | 4.861 | 3.242 | 2.099 |
| Observations | 4,137 | 1,897 | 2,240 |
| No. of countries | 40 | 21 | 19 |
| Year FE | YES | YES | YES |
| Country FE | YES | YES | YES |

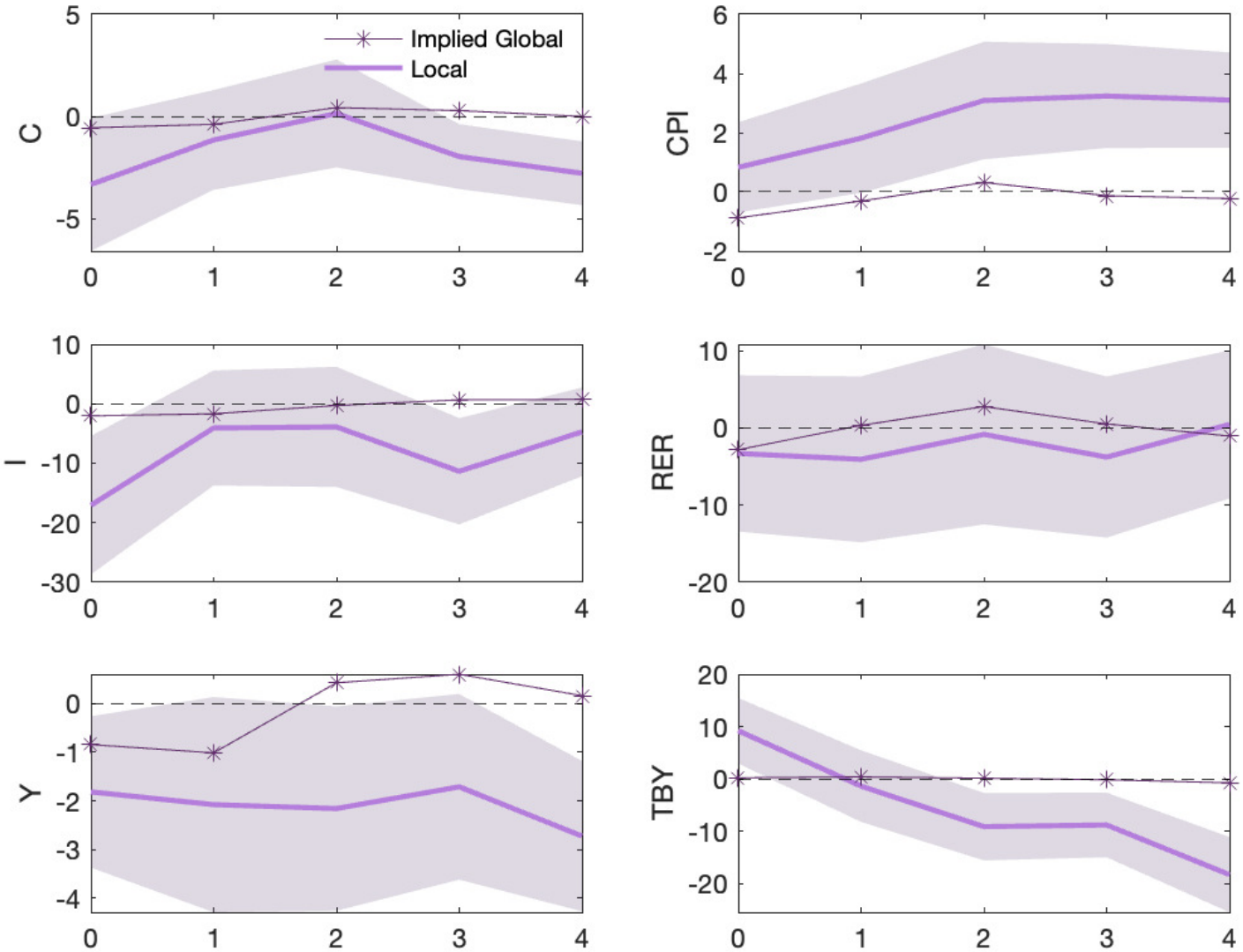
Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

# Global Uncertainty Shocks are Aggregate Demand Shocks



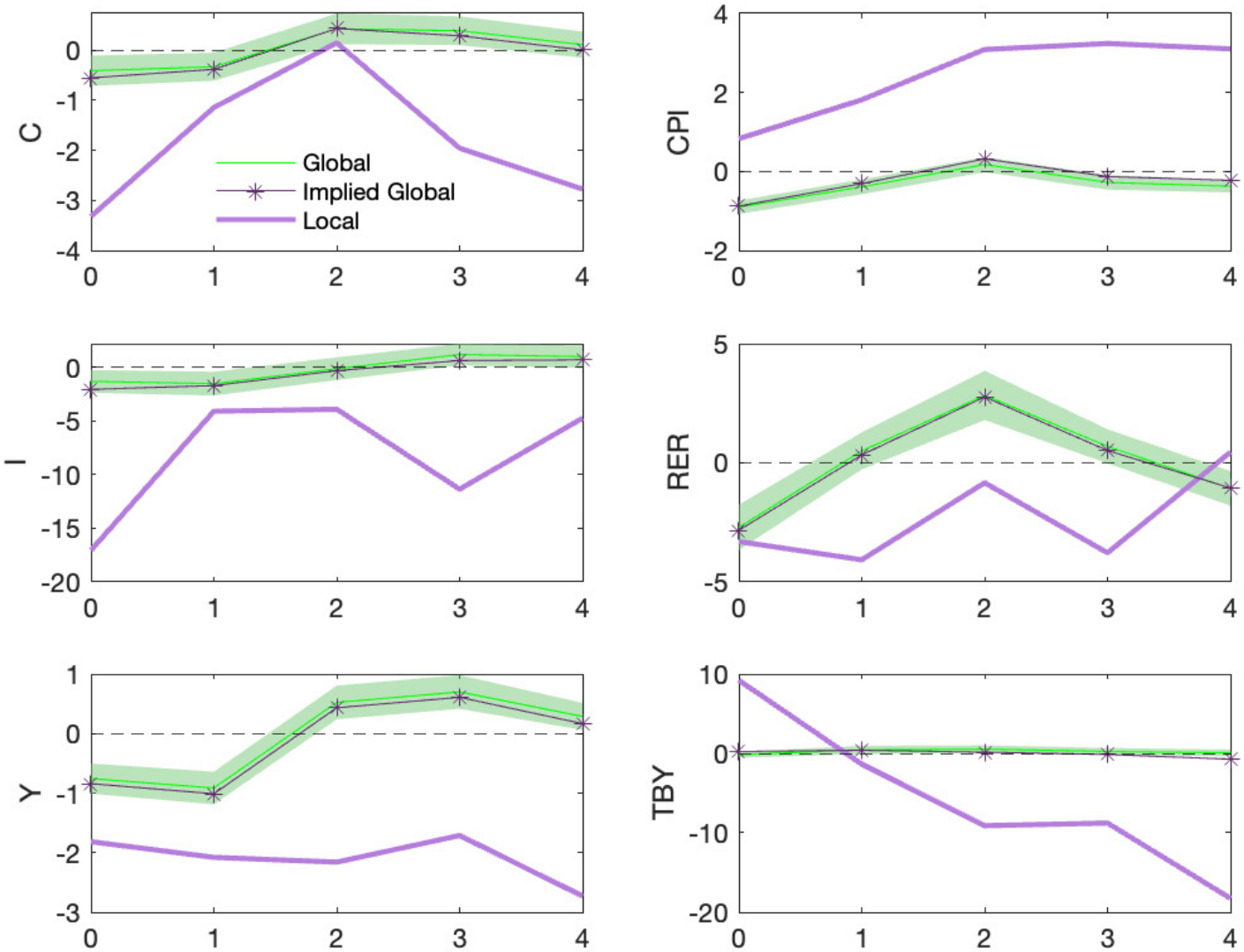

Note: % change in growth rates.

# Local Uncertainty Shocks are Aggregate Supply Shocks



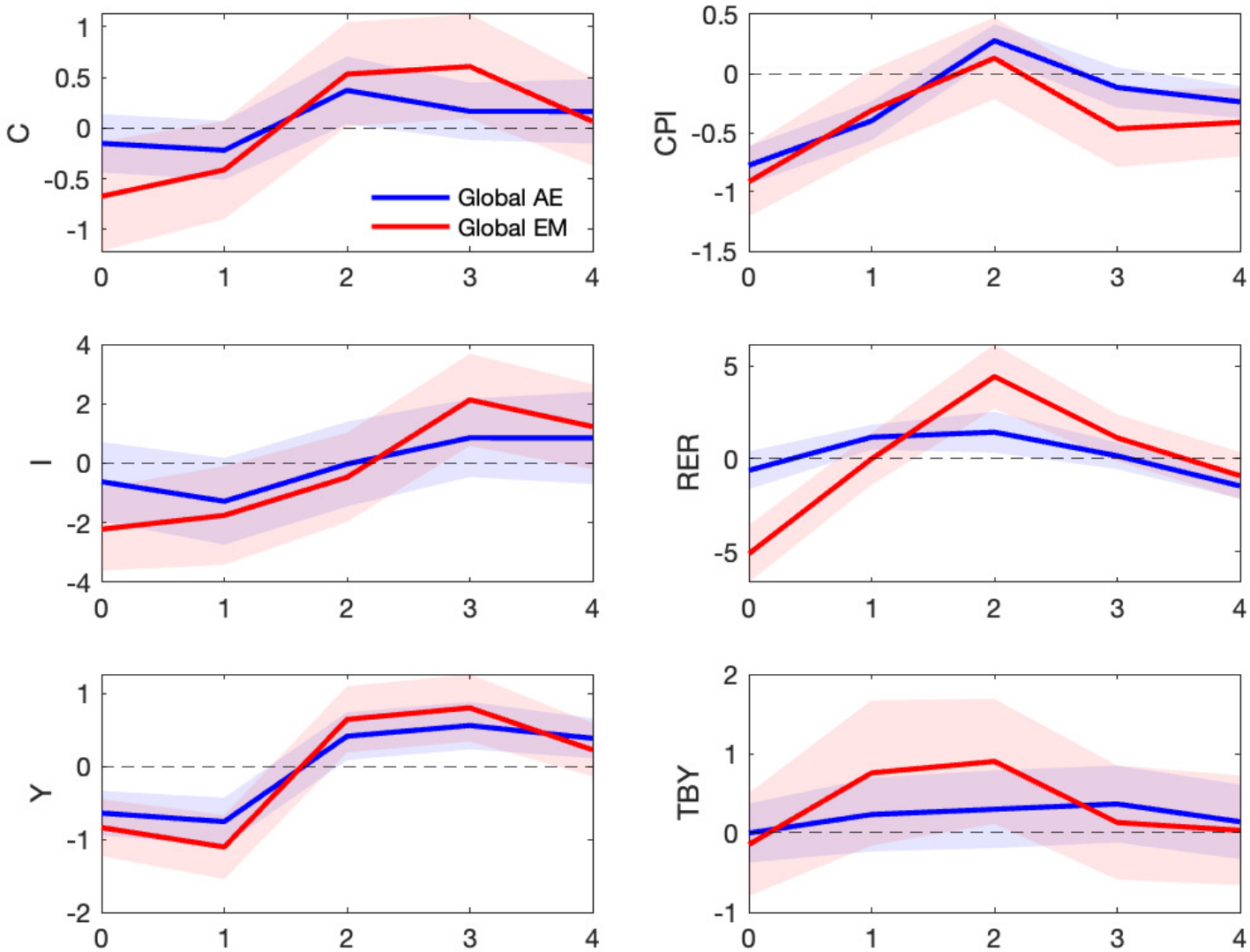

Note: % change in growth rates.

# Local Uncertainty Effects Are More Sizable/Persistent



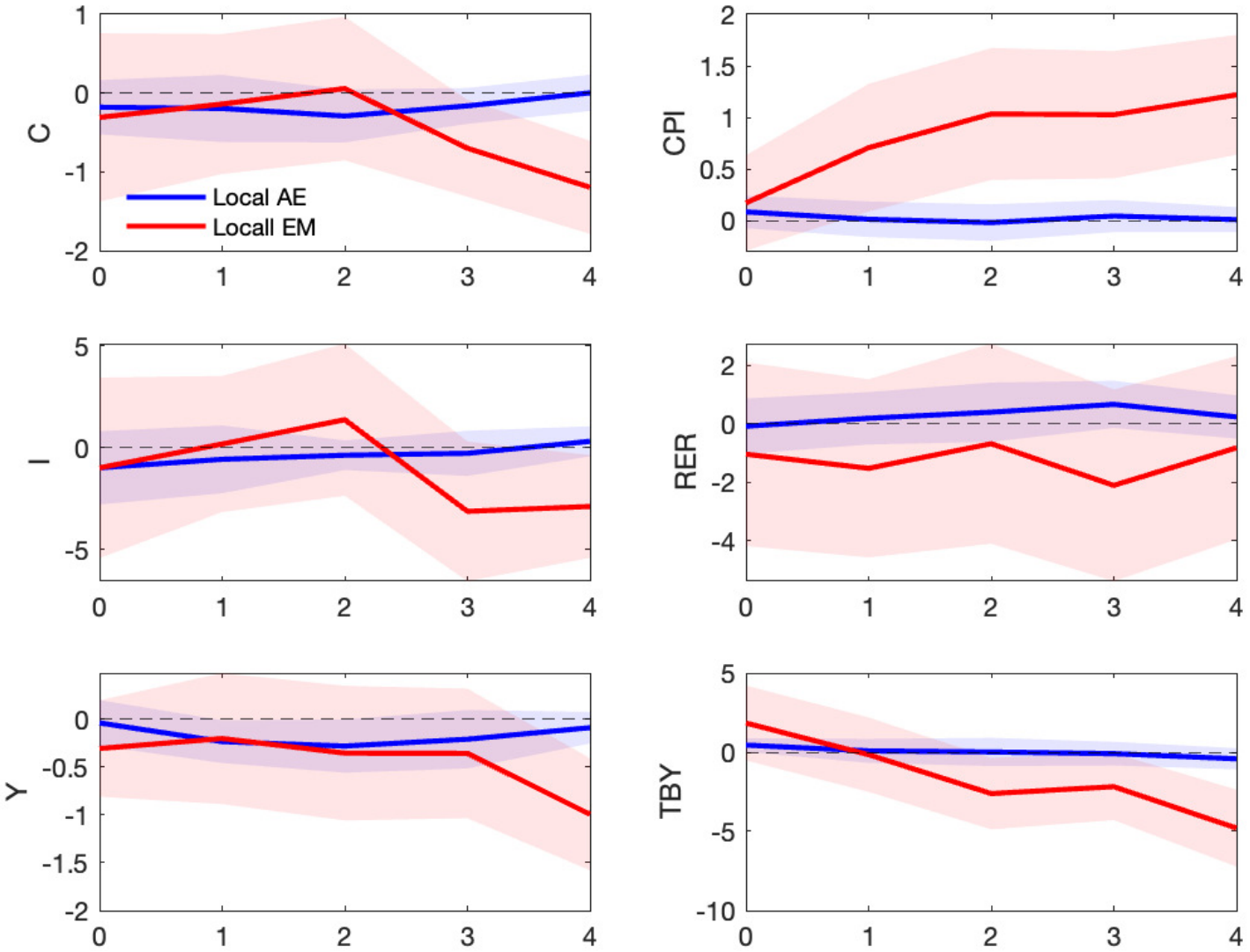

Note: % change in growth rates.

# EMs Are More Susceptible to Global Shocks




Note: % change in growth rates.

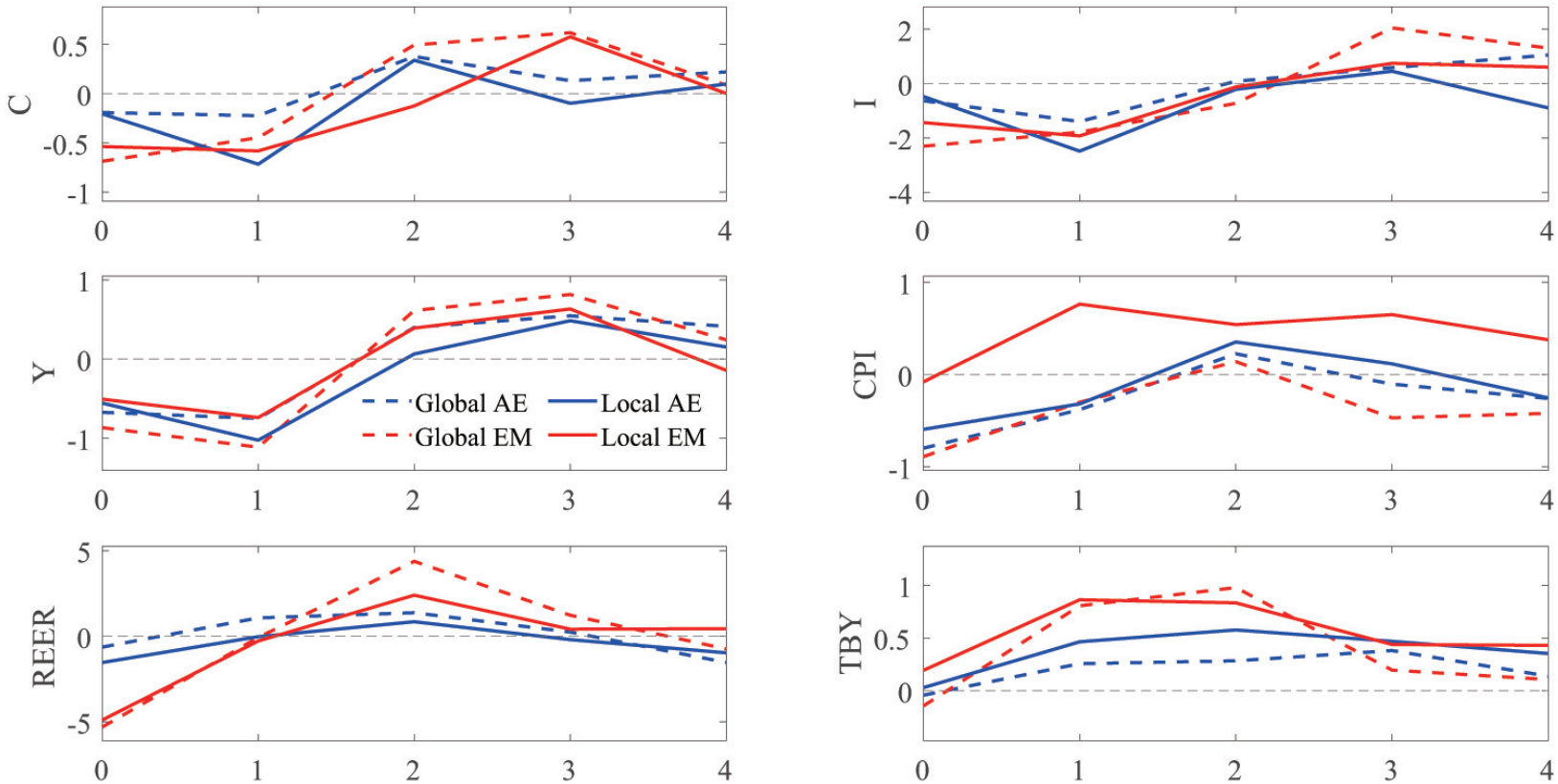
# AE and EM Respond Differently to Local Uncertainty




Note: % change in growth rates. All IRFs normalized to 1% change in investment

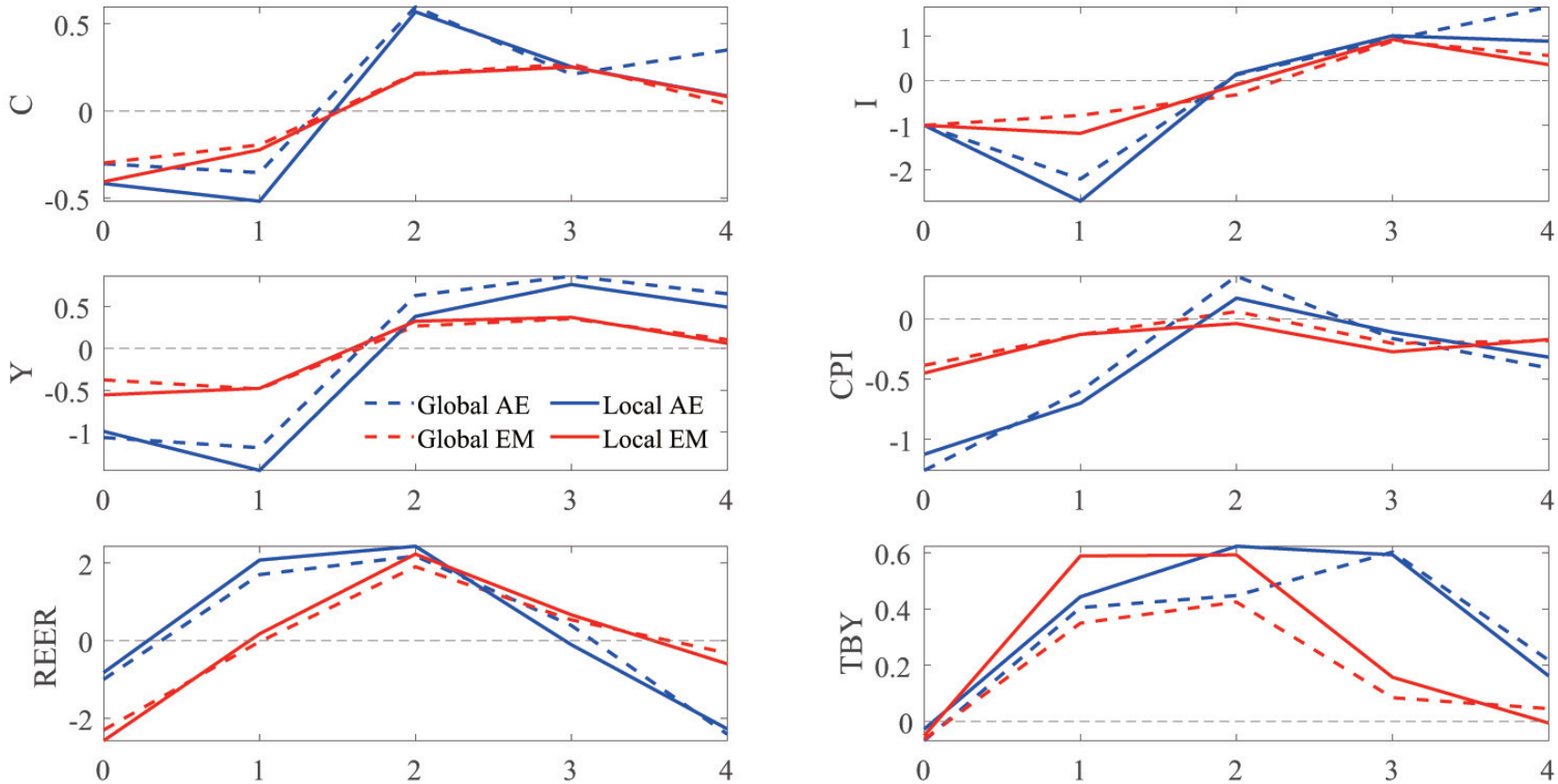
# If Failed to Distinguish Global/Local Shocks

More




Note: % change in growth rates.

# If Exploit Global Shock as Instrument to Local Shocks




Note: Percentage change in growth rates. All IRFs normalized to 1% change in investment growth.

# Sanity and Robustness Checks: The Findings are Robust

- Implied global shock IRFs
- Specifications ▸ Robustness I
  - BBT (2023): Output
  - CC (2013): Consumption, Investment
  - Uribe & Yue (2006): Output, Investment, Trade Balance
  - Include policy rate
  - VIX only
  - Local only
  - Include average stock return
  - No year FE
- VAR lengths ▸ Robustness II
  - SVAR(6) - LP(6)
  - SVAR(10) - LP(10)
- Types of Uncertainty ▸ Robustness II
  - Micro: Cross-section dispersion of stock returns
  - An index of Micro-Macro Mix
- Sample selection ▸ Robustness II
  - Exclude: France, Germany, Japan, UK
- Estimation method
  - Panel SVAR-IV (MSW, Ramey, MR, BBT, etc)

# Overview

# Conclusion and Future Work

Global and local uncertainties have different effects on SOEs.

Global shocks are demand shocks, and work conventionally.

Local shocks are supply shocks, and affect AEs and EMs differently.

Beware, confusing global/local shocks can yield misleading results.

We are working on a model to understand these differences.

# Overview

# Business Cycle Moments of Advanced Economies

| Country | $\sigma(y)$ | $\sigma(c)/\sigma(y)$ | $\sigma(i)/\sigma(y)$ | $\sigma(tby)$ | $\sigma(cpi)$ | $\sigma(rer)$ |
|---|---|---|---|---|---|---|
| Australia | 0.73 | 0.93 | 4.19 | 1.34 | 0.87 | 4.06 |
| Austria | 0.62 | 1.24 | 2.29 | 1.29 | 0.58 | 0.97 |
| Belgium | 0.59 | 0.81 | 4.22 | 1.85 | 0.44 | 1.24 |
| Canada | 0.73 | 0.86 | 3.01 | 0.52 | 0.78 | 2.57 |
| Denmark | 1.17 | 1.16 | 4.70 | 1.73 | 0.76 | 1.36 |
| Finland | 1.27 | 1.11 | 2.87 | 3.85 | 0.57 | 2.05 |
| France | 0.48 | 1.18 | 2.28 | 1.57 | 0.81 | 1.37 |
| Germany | 0.93 | 0.94 | 2.58 | 3.89 | 0.54 | 1.54 |
| Greece | 1.57 | 1.11 | 6.06 | 2.85 | 1.50 | 1.32 |
| Ireland | 2.12 | 0.66 | 4.01 | 4.55 | 0.82 | 1.99 |
| Italy | 0.70 | 1.06 | 2.51 | 1.66 | 1.08 | 1.93 |
| Japan | 0.94 | 0.98 | 1.76 | 1.52 | 0.65 | 4.44 |
| Luxembourg | 1.80 | 1.39 | 4.80 | 2.39 | 0.50 | 0.87 |
| Netherlands | 0.75 | 1.32 | 14.05 | 2.21 | 0.51 | 1.29 |
| New Zealand | 1.74 | 0.97 | 2.92 | 2.15 | 1.33 | 3.77 |
| Norway | 1.25 | 0.87 | 4.79 | 5.31 | 0.69 | 2.10 |
| Spain | 0.81 | 1.23 | 4.88 | 2.83 | 1.19 | 1.76 |
| Sweden | 1.01 | 0.95 | 5.19 | 2.15 | 1.03 | 2.84 |
| UK | 0.67 | 1.27 | 4.28 | 2.01 | 0.93 | 3.09 |

## Business Cycle Moments of Emerging Economies

| Country | $\sigma(y)$ | $\sigma(c)/\sigma(y)$ | $\sigma(i)/\sigma(y)$ | $\sigma(tby)$ | $\sigma(cpi)$ | $\sigma(rer)$ |
|---|---|---|---|---|---|---|
| Brazil | 1.17 | 1.24 | 3.02 | 2.49 | 0.95 | 7.25 |
| Chile | 1.10 | 1.19 | 3.38 | 5.25 | 0.76 | 3.39 |
| Colombia | 1.01 | 0.72 | 7.15 | 2.05 | 1.70 | 4.42 |
| Czech Rep. | 0.82 | 0.87 | 2.36 | 5.71 | 0.99 | 2.40 |
| Hungary | 0.95 | 1.30 | 4.16 | 5.71 | 1.57 | 2.86 |
| India | 0.58 | 3.95 | 3.44 | 0.00 | 1.35 | 3.05 |
| Indonesia | 0.11 | 1.45 | 4.75 | 0.00 | 0.81 | 3.42 |
| Israel | 1.57 | 1.37 | 3.05 | 4.79 | 9.75 | 2.80 |
| Korea | 1.30 | 1.49 | 2.20 | 3.06 | 0.73 | 5.73 |
| Malaysia | 1.62 | 1.63 | 4.92 | 10.49 | 0.69 | 2.82 |
| Mexico | 1.27 | 1.23 | 3.74 | 1.08 | 2.41 | 5.53 |
| Peru | 1.26 | 0.87 | 4.45 | 3.28 | 0.89 | 2.31 |
| Philippines | 0.52 | 0.62 | 5.87 | 0.08 | 0.57 | 1.82 |
| Poland | 1.04 | 1.28 | 4.16 | 3.80 | 1.46 | 3.57 |
| Portugal | 1.58 | 1.08 | 2.26 | 2.61 | 1.18 | 1.15 |
| Romania | 1.51 | 1.72 | 4.72 | 4.19 | 3.02 | 3.08 |
| Singapore | 1.65 | 1.42 | 3.11 | 8.36 | 0.72 | 1.55 |
| South Africa | 0.64 | 1.21 | 3.95 | 4.17 | 1.14 | 4.82 |
| Switzerland | 0.67 | 0.74 | 2.32 | 3.15 | 0.69 | 2.17 |
| Thailand | 1.93 | 0.85 | 3.41 | 5.64 | 0.96 | 4.33 |
| Turkey | 2.42 | 1.31 | 2.97 | 2.59 | 6.20 | 7.46 |

# Overview

# Instrument Validity: Alternative Specifications

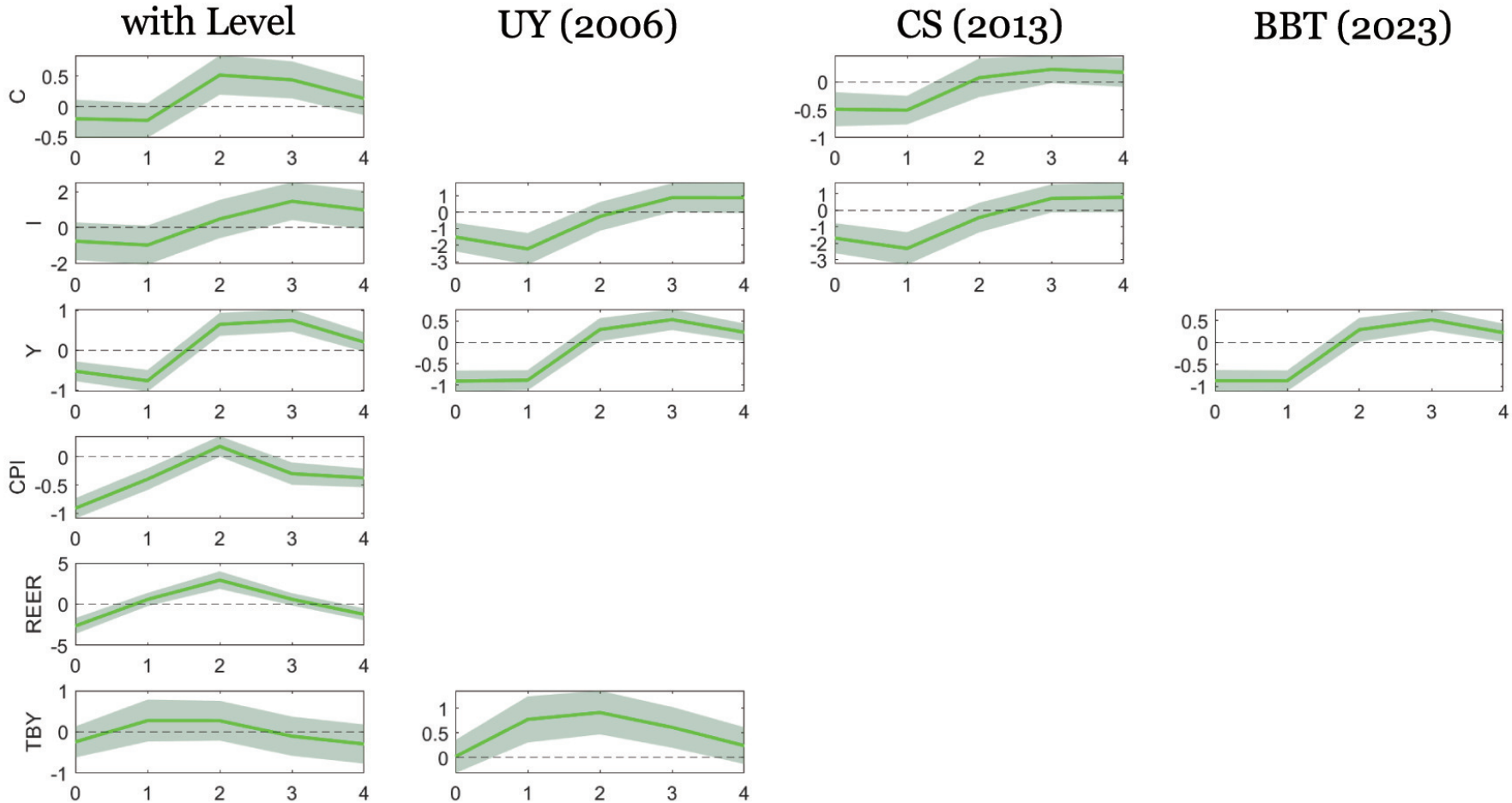
back

| | All | EM | AE | All | EM | AE | All | EM | AE |
|---|---|---|---|---|---|---|---|---|---|
| | *Panel A: Alternative Models* | | | | | | | | |
| | UY (2006) | | | BBT (2023) | | | CS (2013) | | |
| $\text{Disaster}_t$ | 0.011 | 0.012 | 0.028 | 0.015 | 0.013 | 0.023 | 0.013 | 0.011 | 0.027 |
| | (0.029) | (0.031) | (0.045) | (0.030) | (0.031) | (0.045) | (0.029) | (0.031) | (0.046) |
| $\text{Coup}_t$ | 0.147 | 0.132 | | 0.187 | 0.166 | | 0.168 | 0.135 | |
| | (0.214) | (0.213) | | (0.212) | (0.208) | | (0.212) | (0.210) | |
| $\text{Revolution}_t$ | -0.941[a] | -0.804[a] | | -0.932[a] | -0.787[a] | | -0.929[a] | -0.788[a] | |
| | (0.251) | (0.261) | | (0.251) | (0.267) | | (0.246) | (0.255) | |
| $\text{Terrorist}_t$ | 0.200 | -0.250 | 0.299[b] | 0.218 | -0.188 | 0.297[c] | 0.213 | -0.116 | 0.320[b] |
| | (0.178) | (0.963) | (0.151) | (0.181) | (0.988) | (0.155) | (0.181) | (0.918) | (0.158) |
| Sargan $p$ | 0.421 | 0.466 | 0.702 | 0.394 | 0.446 | 0.771 | 0.142 | 0.297 | 0.065 |
| IV F-test | 4.846 | 2.998 | 2.107 | 4.596 | 2.578 | 1.947 | 4.841 | 2.967 | 2.203 |
| | *Panel B: Without VIX, Include Level* | | | | | | | | |
| | No VIX | | | With Level: Volatility | | | With Level: Returns | | |
| $\text{Disaster}_t$ | 0.006 | 0.007 | -0.013 | 0.006 | 0.011 | 0.025 | 0.002 | 0.000 | 0.003 |
| | (0.026) | (0.031) | (0.041) | (0.030) | (0.031) | (0.045) | (0.005) | (0.005) | (0.019) |
| $\text{Coup}_t$ | 0.021 | 0.002 | | 0.127 | 0.081 | | -0.026 | -0.024 | |
| | (0.218) | (0.223) | | (0.230) | (0.234) | | (0.034) | (0.032) | |
| $\text{Revolution}_t$ | -0.813[a] | -0.720[b] | | -0.930[a] | -0.781[a] | | 0.113[c] | 0.102 | |
| | (0.314) | (0.310) | | (0.247) | (0.261) | | (0.066) | (0.067) | |
| $\text{Terrorist}_t$ | 0.282 | 0.454 | 0.358 | 0.223 | 0.472 | 0.292[c] | 0.002 | -0.020 | 0.004 |
| | (0.237) | (0.688) | (0.244) | (0.183) | (0.911) | (0.163) | (0.032) | (0.414) | (0.025) |
| Sargan $p$ | 0.445 | 0.528 | 0.557 | 0.520 | 0.435 | | 0.520 | 0.435 | |
| IV F-test | 2.686 | 2.108 | 1.138 | 5.451 | 3.437 | 1.752 | 0.759 | 0.584 | 0.022 |

Note: Robust standard errors in parentheses. [a] $p < 0.01$, [b] $p < 0.05$, [c] $p < 0.1$

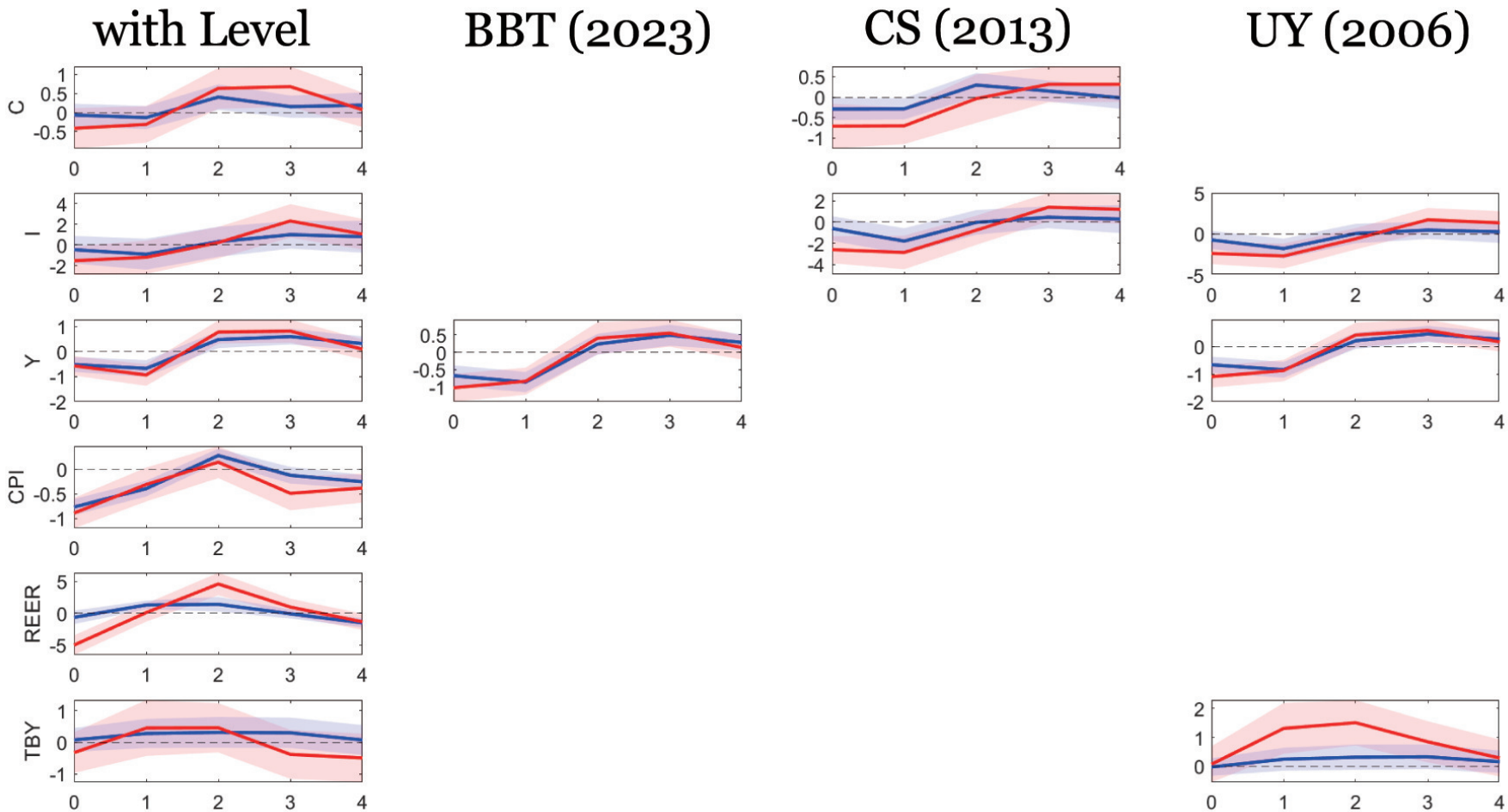
# Alternative Specifications: Global Shocks, All

back



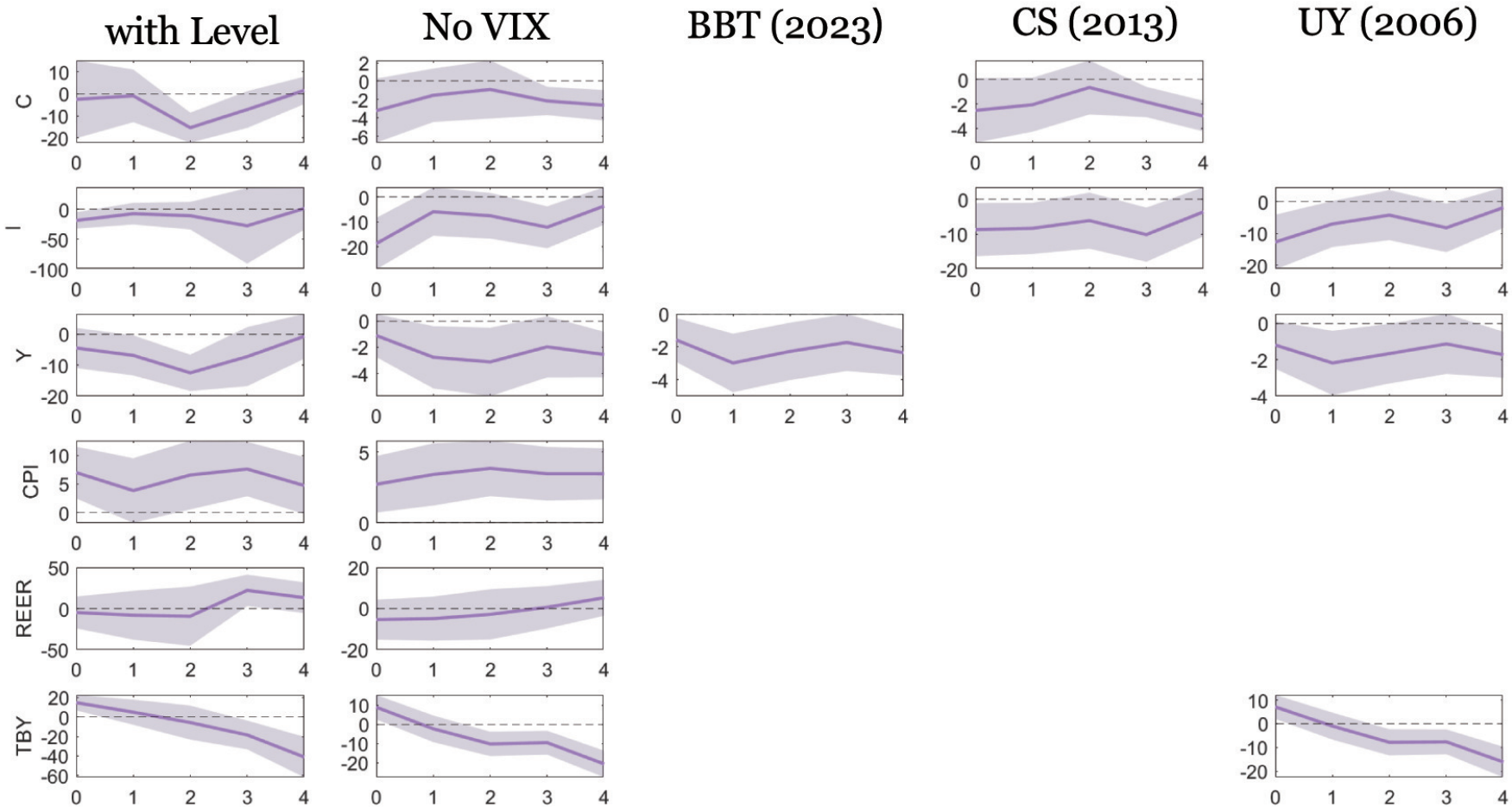
# Alternative Specifications: Global Shocks, AE vs EM

back



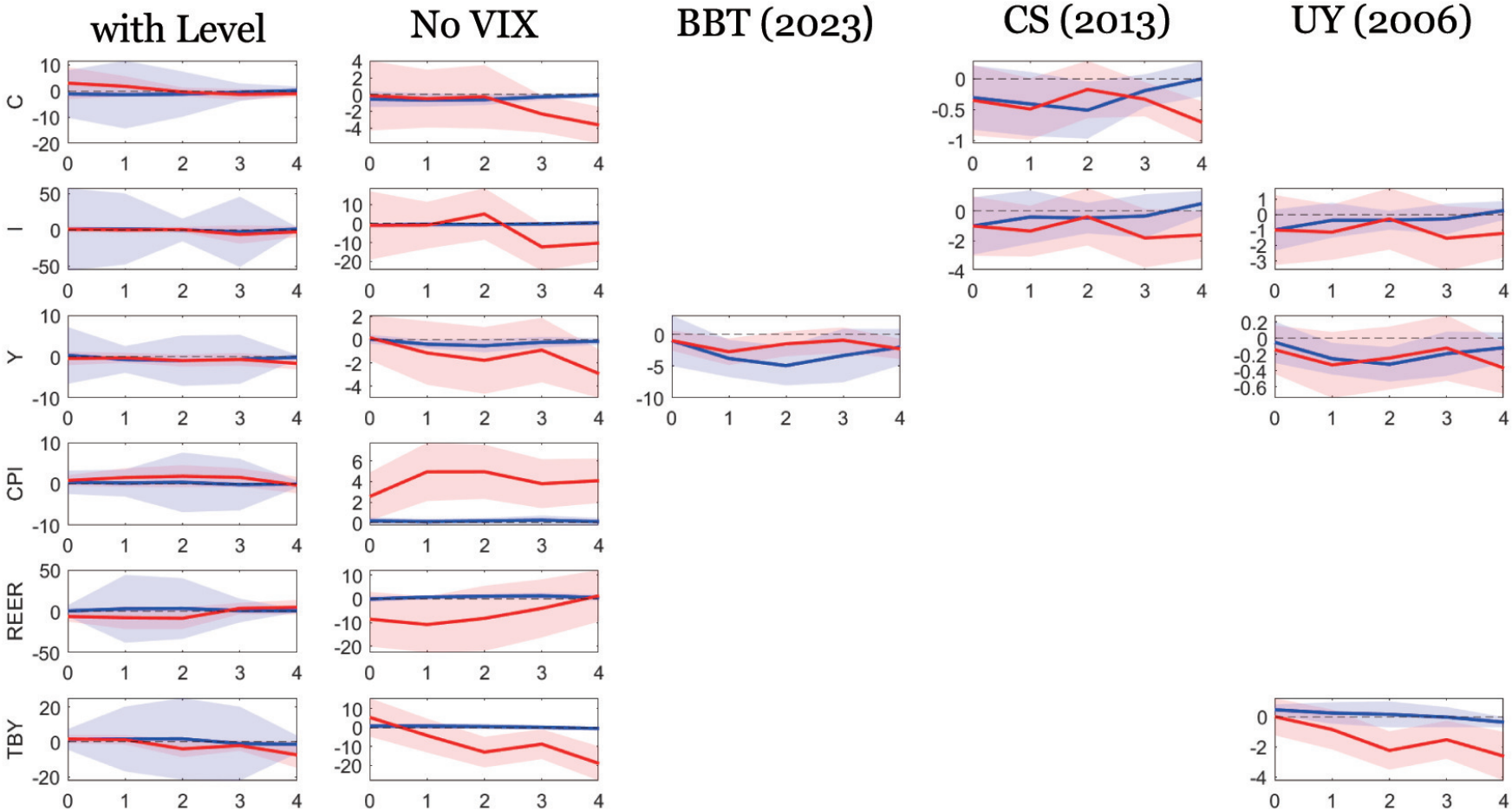
# Alternative Specifications: Local Shocks, All

back



# Alternative Specifications: Local Shocks, AE vs EM

back



# Instrument Validity: VAR Length, Sample Selection, Shock Types

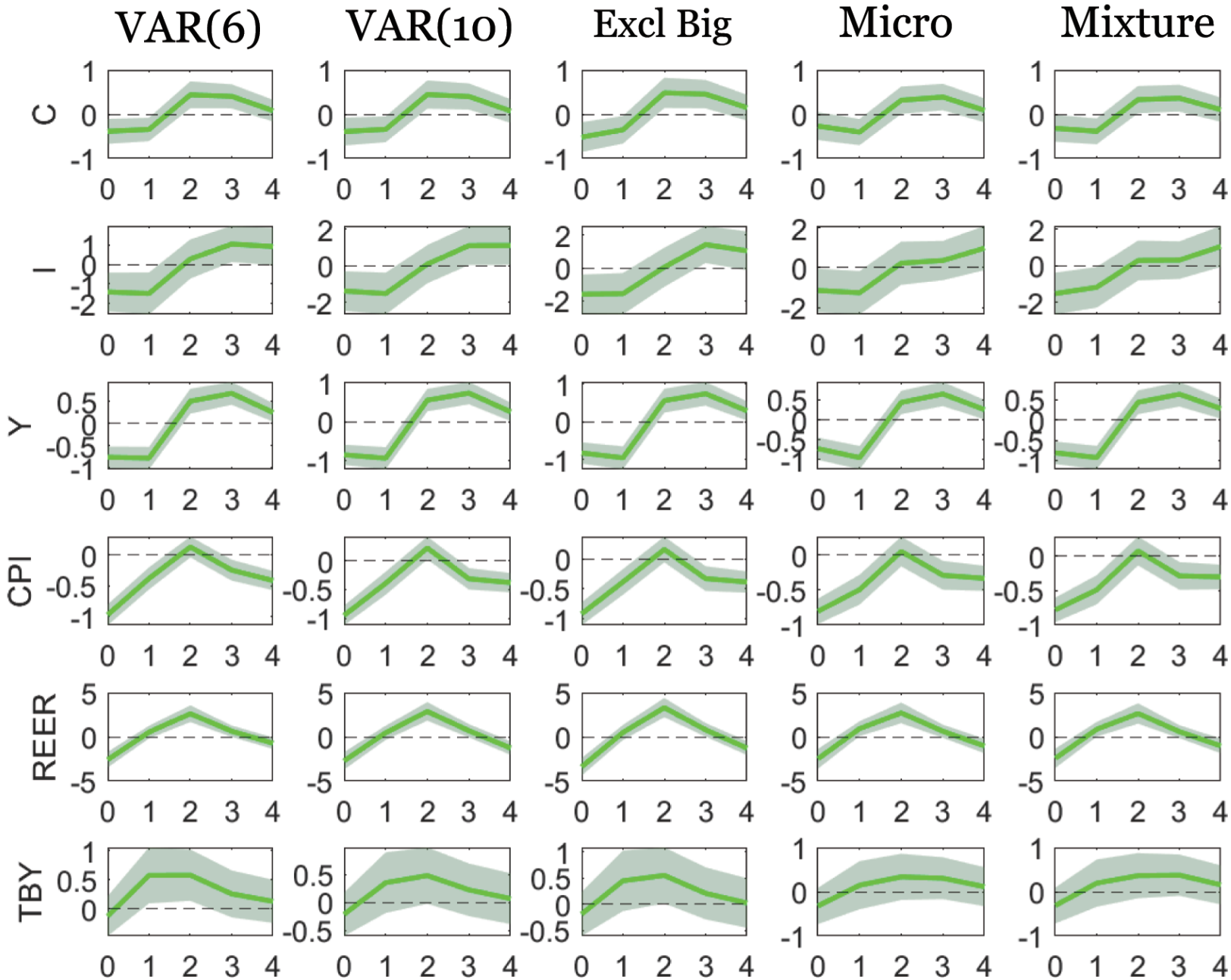
back

| | All | EM | AE | All | EM | AE | All | EM | AE |
|---|---|---|---|---|---|---|---|---|---|
| | *Panel A: VAR Lengths and Sample Selection* | | | | | | | | |
| | VAR(6) | | | VAR(10) | | | Excl FRA/GER/JPY/UK | | |
| $\text{Disaster}_t$ | 0.013 | 0.014 | 0.016 | 0.015 | 0.022 | 0.038 | 0.010 | 0.012 | 0.029 |
| | (0.029) | (0.031) | (0.043) | (0.031) | (0.034) | (0.045) | (0.030) | (0.031) | (0.044) |
| $\text{Coup}_t$ | 0.134 | 0.087 | | 0.115 | 0.080 | | 0.094 | 0.060 | |
| | (0.221) | (0.221) | | (0.238) | (0.239) | | (0.225) | (0.230) | |
| $\text{Revolution}_t$ | -0.854$^a$ | -0.720$^a$ | | -0.795$^a$ | -0.729$^a$ | | -0.870$^a$ | -0.751$^a$ | |
| | (0.242) | (0.253) | | (0.241) | (0.254) | | (0.252) | (0.260) | |
| $\text{Terrorist}_t$ | 0.210 | 0.438 | 0.286$^c$ | 0.109 | 0.323 | 0.205 | 0.327 | 0.460 | |
| | (0.182) | (1.136) | (0.160) | (0.232) | (1.128) | (0.195) | (1.209) | (0.975) | |
| Sargan $p$ | 0.599 | 0.566 | 0.396 | 0.581 | 0.652 | 0.697 | 0.475 | 0.563 | |
| IV F-test | 4.611 | 2.888 | 1.659 | 4.191 | 3.346 | 0.896 | 4.309 | 3.242 | 0.428 |
| | *Panel B: Types of Uncertainty* | | | | | | | | |
| | Macro (Baseline) | | | Micro | | | Micro-Macro Mix | | |
| $\text{Disaster}_t$ | 0.010 | 0.012 | 0.033 | 0.027 | 0.015 | 0.068 | 0.060 | 0.051 | 0.255 |
| | (0.029) | (0.031) | (0.045) | (0.018) | (0.019) | (0.044) | (0.085) | (0.085) | (0.194) |
| $\text{Coup}_t$ | 0.103 | 0.060 | | | | | | | |
| | (0.224) | (0.230) | | | | | | | |
| $\text{Revolution}_t$ | -0.878$^a$ | -0.751$^a$ | | -0.678$^a$ | -0.594$^b$ | | -2.776$^c$ | -2.518 | |
| | (0.247) | (0.260) | | (0.256) | (0.247) | | (1.447) | (1.600) | |
| $\text{Terrorist}_t$ | 0.207 | 0.460 | 0.290$^c$ | 0.074 | -0.166 | 0.103$^b$ | -0.229 | -4.811 | 0.243 |
| | (0.176) | (0.975) | (0.150) | (0.046) | (0.389) | (0.052) | (0.349) | (4.068) | (0.244) |
| Sargan $p$ | 0.609 | 0.563 | 0.414 | 0.289 | 0.465 | 0.565 | 0.273 | 0.504 | 0.974 |
| IV F-test | 4.861 | 3.242 | 2.099 | 3.901 | 2.185 | 2.942 | 1.528 | 1.408 | 1.274 |

Note: Robust standard errors in parentheses. $^a$ $p < 0.01$, $^b$ $p < 0.05$, $^c$ $p < 0.1$

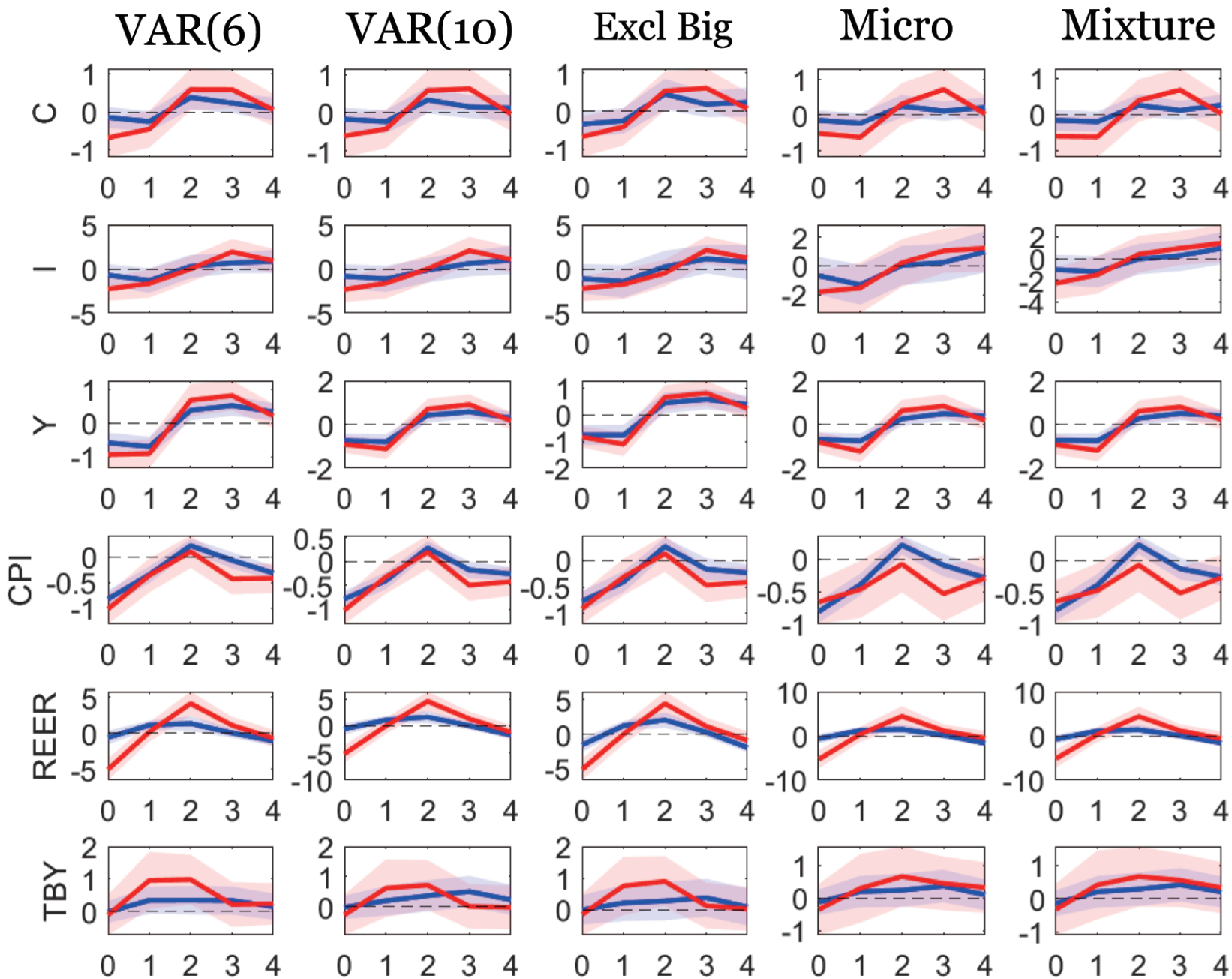
# Robustness II: Global Shocks, All

back



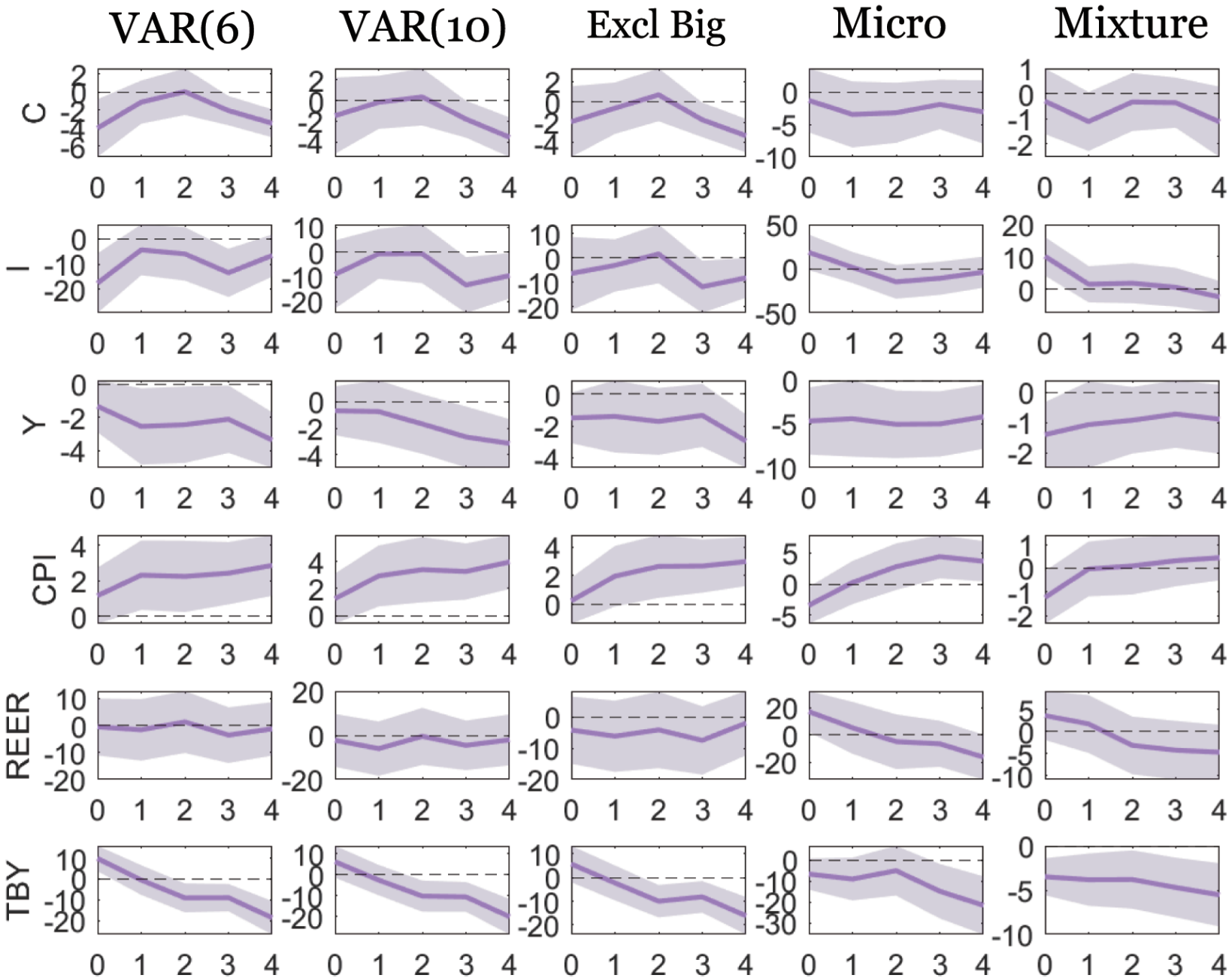
# Robustness II: Global Shocks, AE vs EM

back



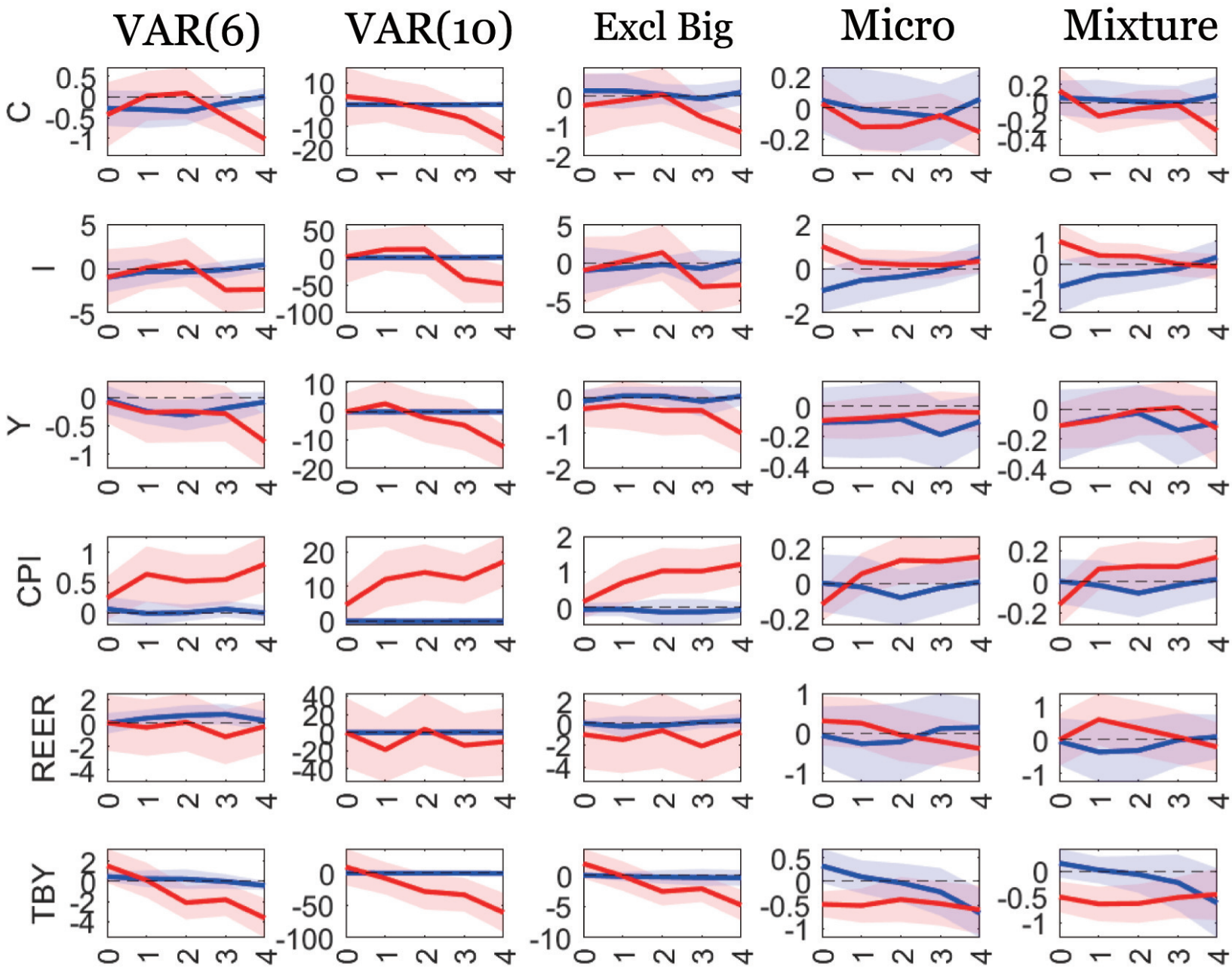
# Robustness II: Local Shocks, All

back



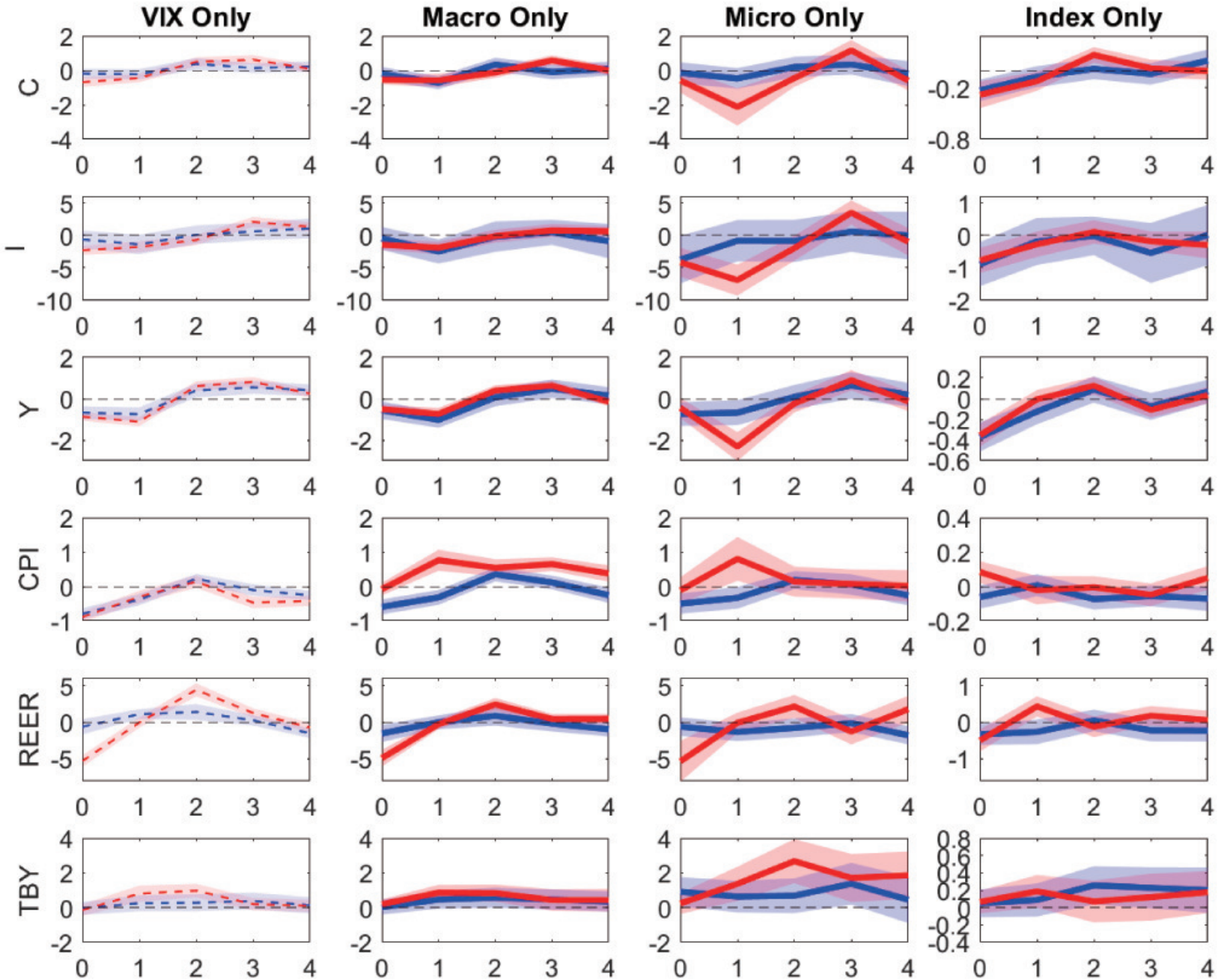
# Robustness II: Local Shocks, AE vs EM

back



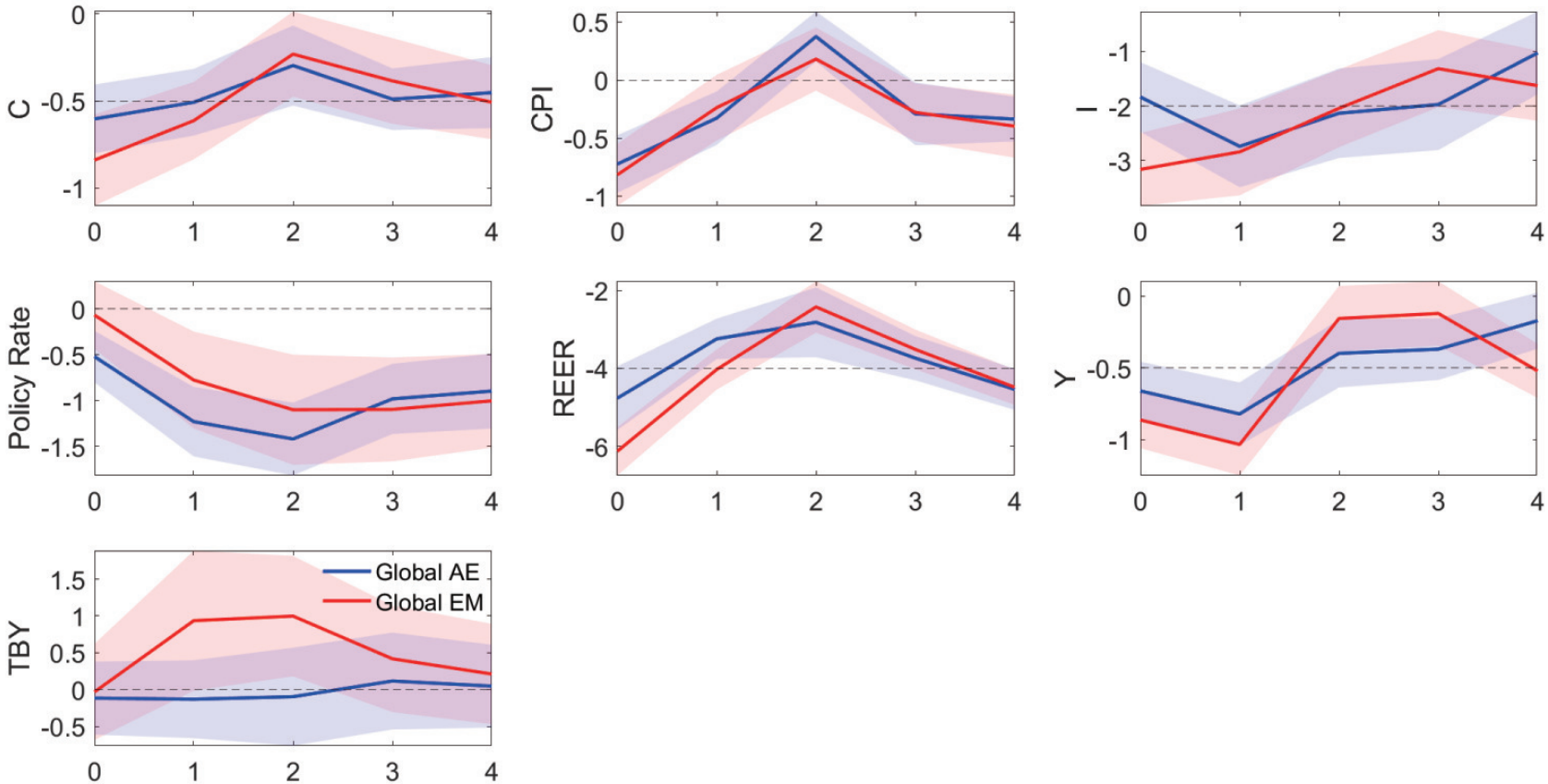
# If Failed to Distinguish Global/Local: LP-OLS

back



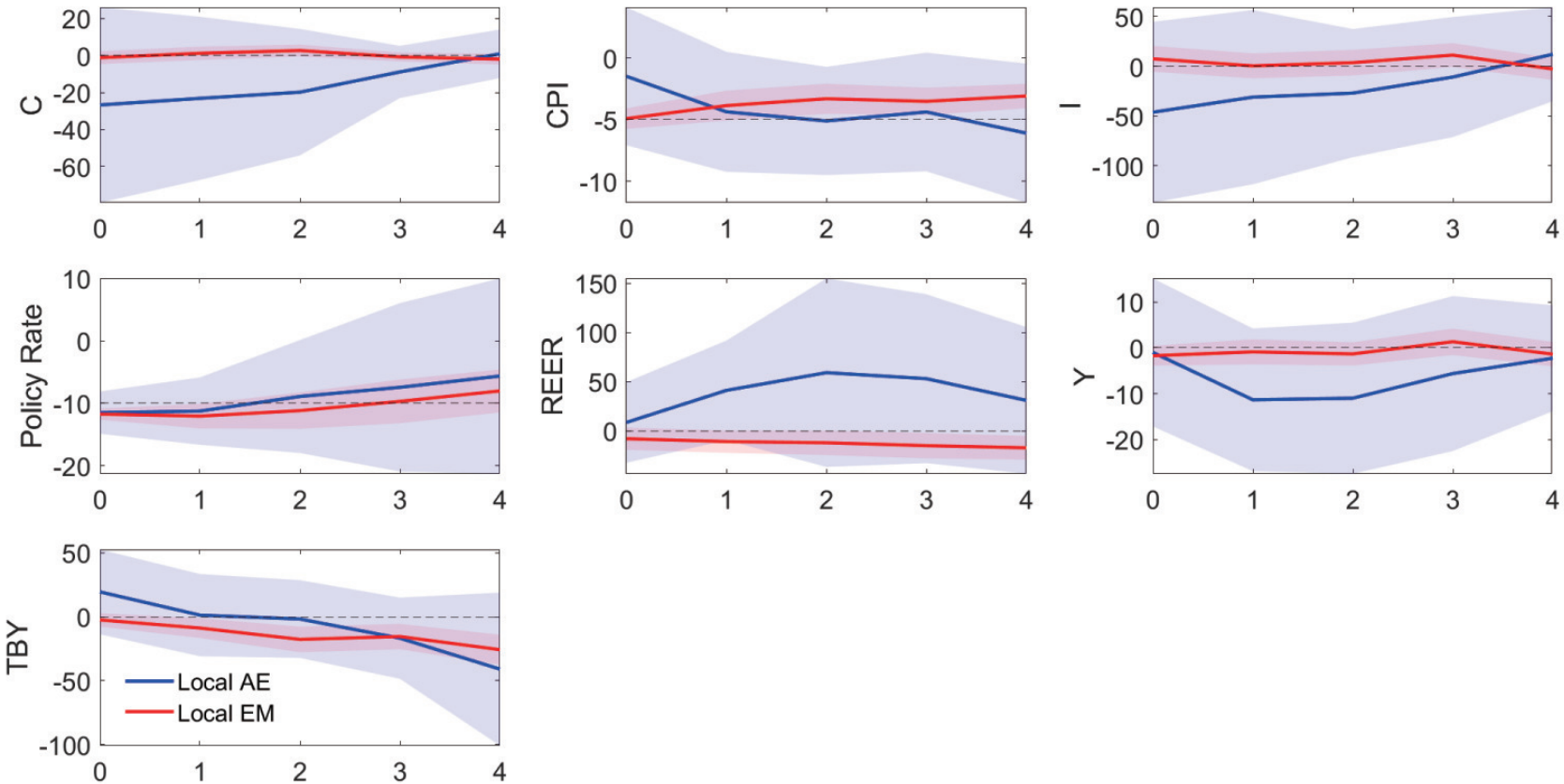
# Include Interest Rates: Global Shocks, AE vs EM

back



# Include Interest Rates: Local Shocks, AE vs EM

back



# Local Shock Does NOT Predict VIX

back

| | $VIX_t$ | | | | | |
|---|---|---|---|---|---|---|
| ln(Stock Vol$_t$) | -0.257$^c$ | 0.009 | -0.047 | -0.073 | -0.080 | -0.073 |
| | (0.150) | (0.230) | (0.046) | (0.074) | (0.181) | (0.074) |
| | *IV First Stage* | | | | | |
| Disaster$_t$ | -0.090 | 0.016 | -0.118 | -0.041 | -0.063 | -0.041 |
| | (0.076) | (0.045) | (0.086) | (0.046) | (0.041) | (0.046) |
| Coup$_t$ | 0.683$^a$ | 0.457$^a$ | 0.843$^a$ | 0.605$^a$ | 0.327 | 0.605$^a$ |
| | (0.053) | (0.069) | (0.040) | (0.047) | (0.254) | (0.047) |
| Revolution$_t$ | -0.671 | -0.887 | -1.080$^b$ | -1.215$^b$ | -0.845 | -1.215$^b$ |
| | (0.787) | (0.877) | (0.535) | (0.593) | (0.581) | (0.593) |
| Terrorist$_t$ | -3.693$^a$ | -2.988$^a$ | -2.401$^a$ | -1.617$^a$ | -1.592$^a$ | -1.617$^a$ |
| | (0.525) | (0.550) | (0.399) | (0.466) | (0.504) | (0.466) |
| Sargan $p$-val | 0.023 | 0.003 | 0.884 | 0.905 | 0.225 | 0.905 |
| Instrument F-test | 56.29 | 18.98 | 142.59 | 44.59 | 3.87 | 44.59 |
| Observations | 4,605 | 4,605 | 4,605 | 4,605 | 4,265 | 4,605 |
| Countries | 41 | 41 | 41 | 41 | 41 | 41 |
| Year FE | N | N | Y | Y | Y | Y |
| Country FE | N | Y | N | Y | Y | Y |
| VIX, lags(8) | N | N | N | N | Y | Y |
| Macro vars, lags(8) | N | N | N | N | N | Y |

Note: Robust standard errors in parentheses. $^a$ $p < 0.01$, $^b$ $p < 0.05$, $^c$ $p < 0.1$