The Offensive Power of Defense News in Europe

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Defense Spending Evolution

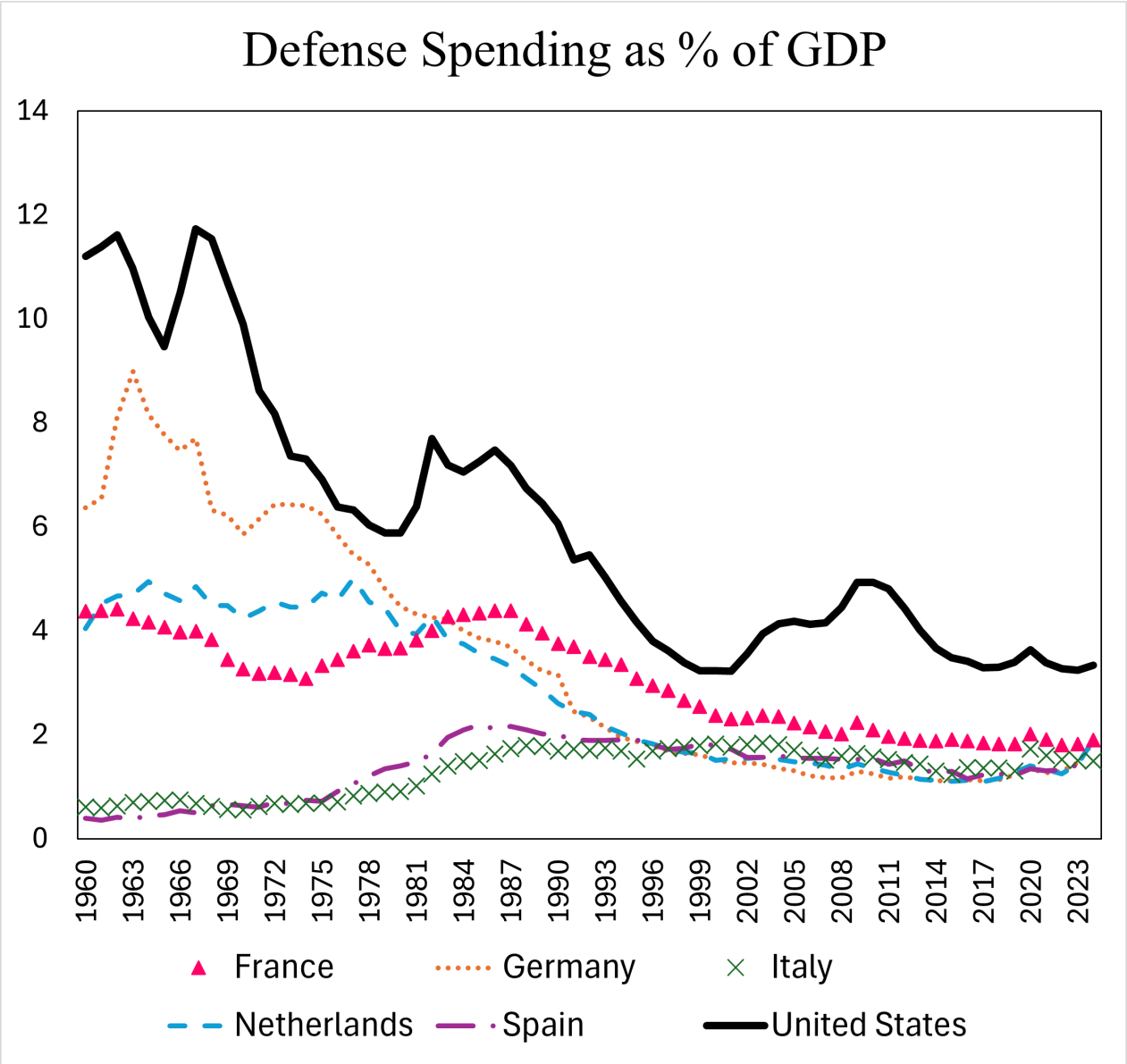


Figure 1: Defense Spending as Percentage of Gross Domestic Product

Now?

ReArm Europe / Readiness 2030

- Activation of the SGP national escape clause, allowing Member States to increase defense spending.
- Launch of the **€150 billion** loan instrument *Security Action for Europe (SAFE)*, adopted by the Council in May 2025, to support investment in missile defense, drones, and cyber security.
- Support for an expanded EIB mandate to finance defense and security projects, mobilizing private capital and reducing reliance on public funding.

Additional developments

- March 2025: Bundestag exempts defense spending above 1% of GDP from the debt brake.
- 2025 NATO Summit in The Hague, members´ commitment to gradually raise defense spending to 5 % of GDP by 2035 (at least 3.5 % for core defense).

"Fully leveraging these financial tools will have positive effects for the EU's economy and competitiveness."
— European Commission

Research question: *How do defense news shocks affect the European economy?*

What We Do

- Draw inference from historical variation in defense spending.
- Use annual data for Western European countries over five decades to estimate macroeconomic effects.
- Employ a Panel Structural VAR and identify **defense news shocks** as innovations that:
  - Maximize the forecast error variance of military spending over a 5-year horizon,
  - While remaining orthogonal to a) current military expenditure; b) current and future TFP movements and commodity price movements.

- **Methodological contribution:**
  - Extend medium-run restrictions pioneered by Uhlig (2004) to a panel VAR setting.
  - This extension is crucial for identifying news shocks in short European time samples.

Findings: Stimulative Effects

- Defense news shocks raise consumption, investment, and employment.
- Output multipliers exceed unity in the short and medium run.
- Gains primarily driven by higher R&D and TFP growth.
- Also, industry spillovers and crowd-out of other government spending
- Effects are stronger in Europe than in the U.S.
- A key difference: U.S. defense production is dominated by specialized contractors, while in Europe it is embedded in multi-purpose industrial firms.
- **However:** defense news shocks also increase income inequality.

Related Literature

- See Ilzetzki 2024.
- Macroeconomic effects of government spending using military expenditure (e.g., Hall (2009), Barro and Redlick (2011), and Miyamoto, Nguyen, and Sheremirov (2019)).
- Defense-specific transmission channels (e.g., Hooker and Knetter (1997)).
- Most existing work treats shocks as unanticipated and focuses on the U.S.
- Fiscal policy is often announced in advance $\rightarrow$ *fiscal foresight* (Leeper, Richter, and Walker (2012)).
- Identification of U.S. defense news shocks through:
  - Narrative methods (Ramey (2011) and Ramey and Zubairy (2018)),
  - Financial-market instruments (Fisher and Peters (2010)).
- Geographic distribution of military procurement Nakamura and Steinsson (2014): multipliers around 1.5.
- VAR-based identification: Ben Zeev and Pappa (2017) use medium-run restrictions to isolate defense news shocks.

Methodology

- Panel extension of Ben Zeev and Pappa (2017) based on medium-run restrictions (Uhlig (2004) and Barsky and Sims (2011)).
- Reduced-Form Panel VAR:

$$y_{i,t} = F_1 y_{i,t-1} + \cdots + F_p y_{i,t-p} + F_{i,c} + e_{i,t}. * \quad (1)$$

- $y_{i,t}$ $kx1$ vector of observables for country $i = 1, ..., N$, with logged real per-capita defense spending occupying the first position.
- F_j $(j = 1, \ldots, p)$ are $k \times k$ coefficient matrices,
- $F_{i,c}$ is a $k \times 1$ vector of country-specific fixed effects,
- $e_{i,t}$ is a $k \times 1$ vector of reduced-form innovations with variance-covariance matrix Σ.
- Baseline specification, $k = 8$ and $N = 17$ and $p = 1$.

*To simplify exposition, we consider the equivalent VAR in country-demeaned variables $\tilde{y}_{i,t}$:

$$\tilde{y}_{i,t} = F_1 \tilde{y}_{i,t-1} + \cdots + F_p \tilde{y}_{i,t-p} + e_{i,t}. \quad (2)$$

Mapping Reduced Form to Structural Panel VAR

Reduced Form Moving Average Stacked Representation:

$$\tilde{y}_t = B(L)e_t. \tag{3}$$

Assuming a linear mapping between the VAR and the SVAR:

$$e_t = A\varepsilon_t. \tag{4}$$

Combining (3) and (4) yields:

$$\tilde{y}_t = C(L)\varepsilon_t, \quad \text{with } C(L) = B(L)A. \tag{5}$$

The impact matrix A must satisfy $AA' = \Sigma$. We select a Cholesky decomposition $\widetilde{A}$ and define the full set of admissible matrices as $\widetilde{A}D$, where D is an orthonormal matrix.

Methodology: MFEV Identification I

The h-step ahead forecast error is:

$$\tilde{y}_{t+h} - \mathbb{E}_t[\tilde{y}_{t+h}] = \sum_{\tau=0}^{h} B_\tau \widetilde{A} D \varepsilon_{t+h-\tau}. \tag{6}$$

The contribution of structural shock s to the forecast error variance of variable v at horizon h is:

$$\Omega_{v,s}(h) = \sum_{\tau=0}^{h} B_{v,\tau} \widetilde{A} \gamma \gamma' \widetilde{A}' B'_{v,\tau}, \tag{7}$$

Methodology: MFEV Identification II

MFEV optimization problem:

$$\gamma^* = \text{argmax} \sum_{h=0}^{H} \Omega_{1,2}(h) = \text{argmax} \sum_{h=0}^{H} \sum_{\tau=0}^{h} B_{1,\tau} \widetilde{A} \gamma \gamma' \widetilde{A}' B'_{1,\tau} \quad (8)$$

$$\text{subject to } \widetilde{A}(1,s) = 0 \quad \forall s > 1 \quad (9)$$

$$\gamma(1,1) = 0 \quad (10)$$

$$\gamma'\gamma = 1. \quad (11)$$

Where the unanticipated defense spending shock is ordered first and the defense news shock as second in ε_t.
γ^* is used to obtain IRFs and FEV.

Bayesian Estimation and Inference

- Use a diffuse NIW prior (Jeffreys prior) for reduced-form panel VAR parameters.
- Standard NIW inference can fail under cross-sectional heteroscedasticity or correlation.
- Following Müller (2013), apply a sandwich estimator for robust posterior variance (see also Miranda-Agrippino and Ricco (2021)).
- Posterior centers at the MLE; Σ is drawn from its inverse-Wishart posterior, F from a normal posterior with robust variance.
- Generate 1000 draws from distribution $p(F, \Sigma \mid \text{data})$.; solve the MFEV problem for each to obtain γ^*.
- This yields 1000 sets of IRFs, FEV contributions, and multipliers forming their posterior distributions.

Heterogeneity and Pooling

- Impose homogeneity in A (and F), though some cross-group IRF heterogeneity remains.
- Such heterogeneity does not undermine pooling; analogous to time-invariant SVARs under DSGEs with time-varying parameters (Canova, Ferroni, and Matthes (2015)).
- Misspecified SVARs still recover average shapes/signs, with bias tending downward $\Rightarrow$ pooling is conservative.
- Jeffreys-prior pooling allows grouping by economic criteria while keeping inference data-driven.
- Hence, our central findings are robust across subgroups and not an artifact of arbitrary pooling.

Data

- Panel: 17 Western European countries (unbalanced).
- Sample: Starts in 1960 for Belgium, France, Italy, United Kingdom; post-1970 for others.
- Frequency: Annual.
- Main sources:
  - Defense spending: Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database.
  - Macroeconomic series: Annual Macroeconomic Database of the European Commission's Directorate General for Economic and Financial Affairs (AMECO).

Macroeconomic Effects of Defense News Shocks: Panel Evidence from Europe

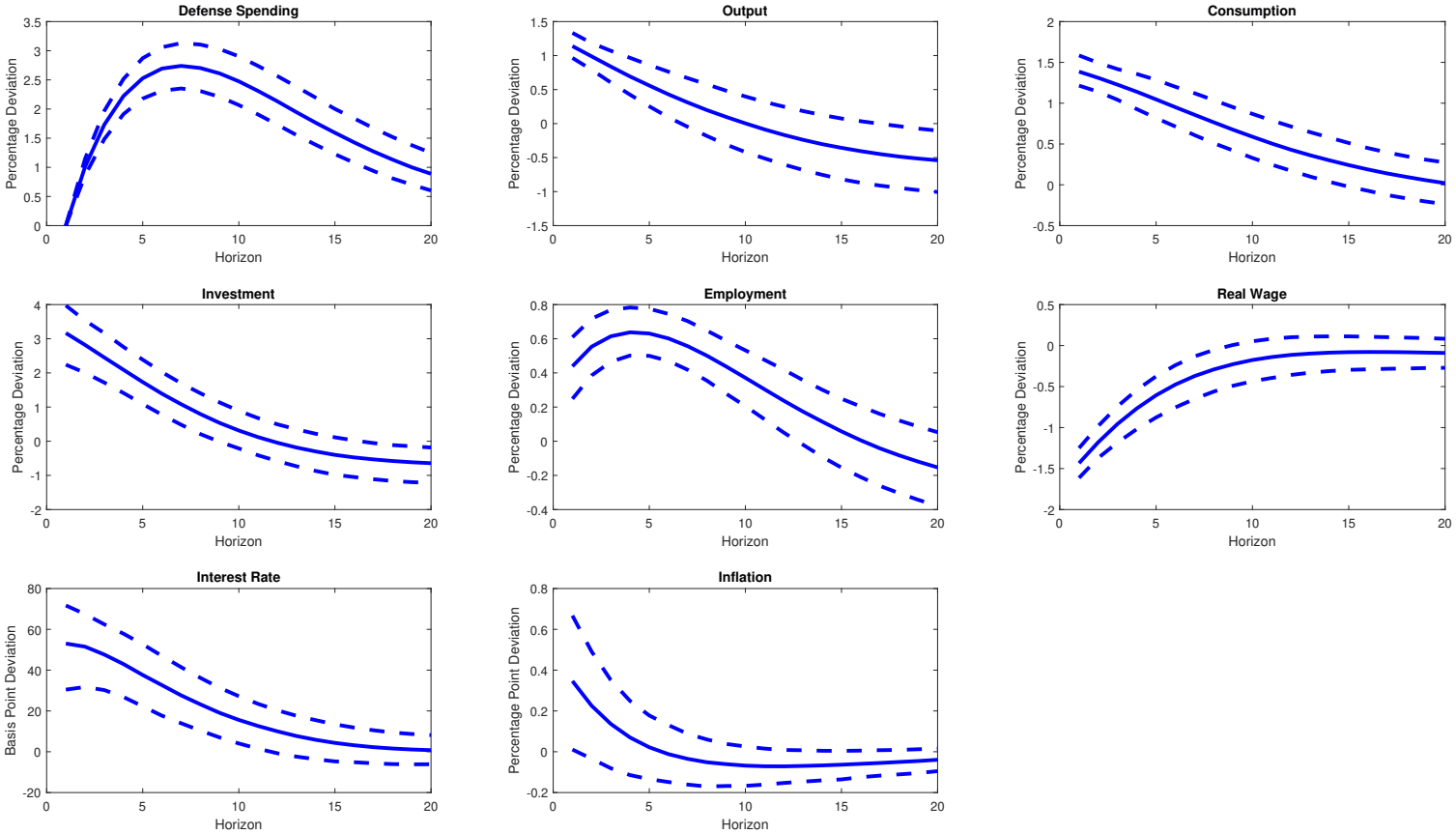


Figure 2: IRFs Defense News Shock: Baseline Panel VAR

▸ US ▸ FEV ▸ Surprise ▸ Robustness ▸ GPR ▸ Heterogeneity

Multipliers

Specification	**H1**	**H2**	**H4**	**H8**	**H10**
US	0.66 (-0.4, 2.8)	0.71 (-0.3, 2.7)	0.72 (-0.4, 2.6)	0.61 (-0.7, 2.8)	0.55 (-0.7, 2.9)
Europe	2.00 (1.6, 2.5)	1.86 (1.5, 2.4)	1.60 (1.2, 2.1)	1.13 (0.7, 1.6)	0.92 (0.4, 1.5)

Table 1: Multipliers of Defense News Shocks at Selected Horizons

▸ Definition ▸ Outliers ▸ More Multipliers

Propagation Mechanism

- Increases in government investment.
- Gains primarily supply-driven.
- Higher R&D spending and TFP.
- Fall in labor share.

Other Government Components

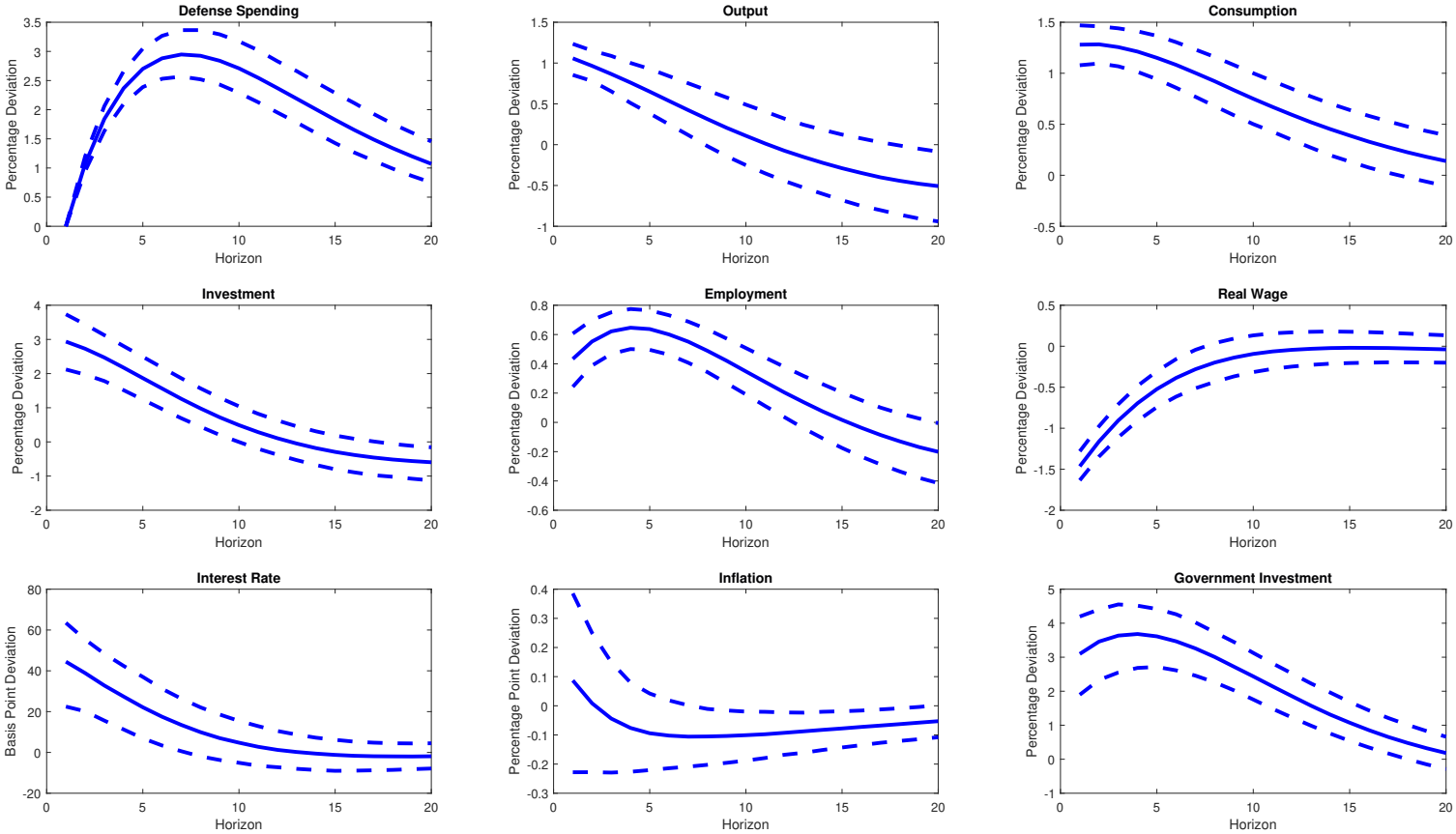


Figure 3: IRFs Defense News Shock: Government-Investment-Inclusive Panel VAR

Supply-Driven Mechanism: TFP Channel

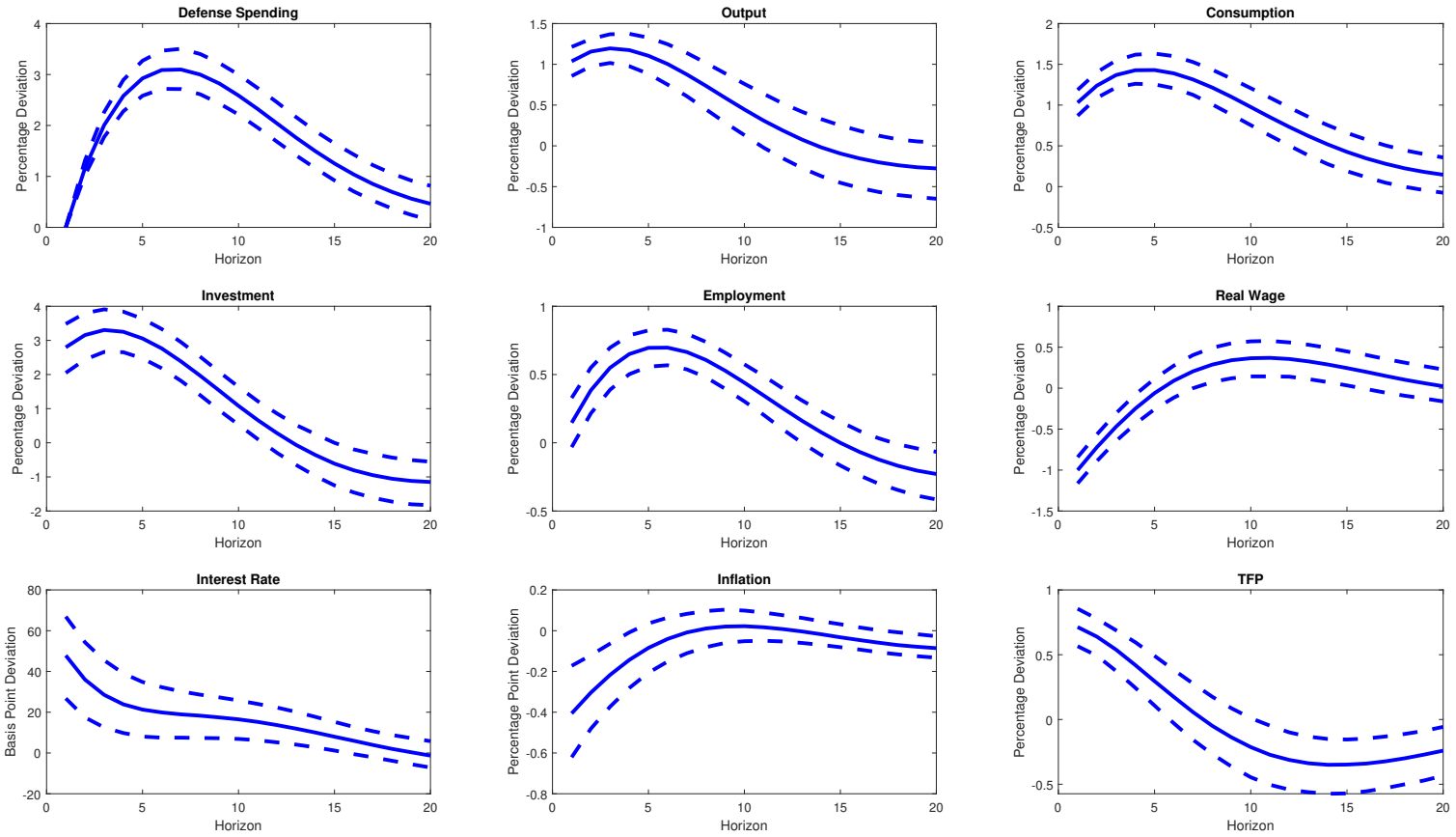


Figure 4: IRFs Defense News Shock: TFP-Inclusive Panel VAR

Supply-Driven Mechanism: R&D Channel

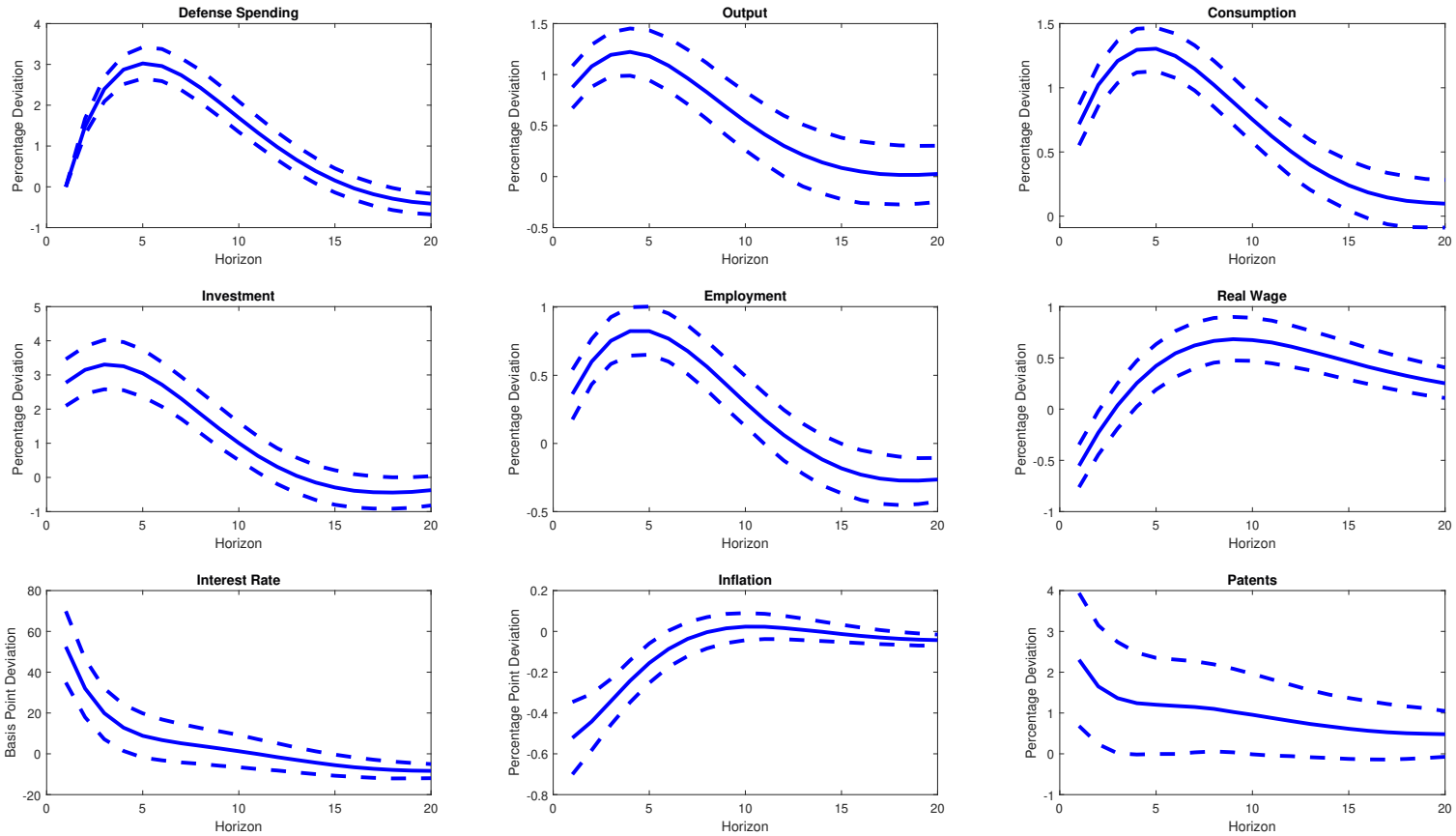


Figure 5: IRFs Defense News Shock: Patent-Inclusive Panel VAR

Effects on Income Distribution

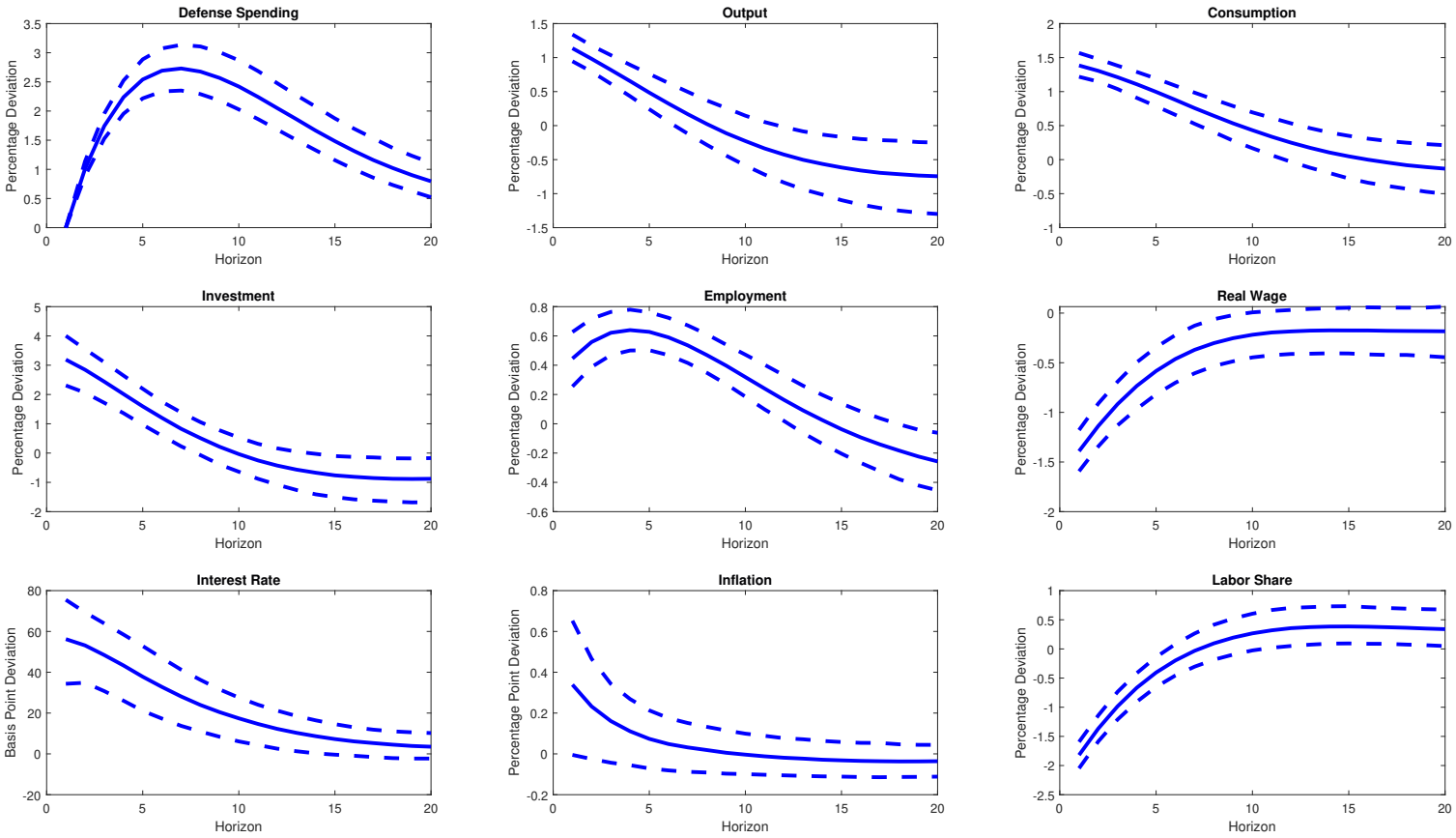


Figure 6: IRFs Defense News Shock: Labor Share Inclusive Panel VAR

Coincident technology shocks

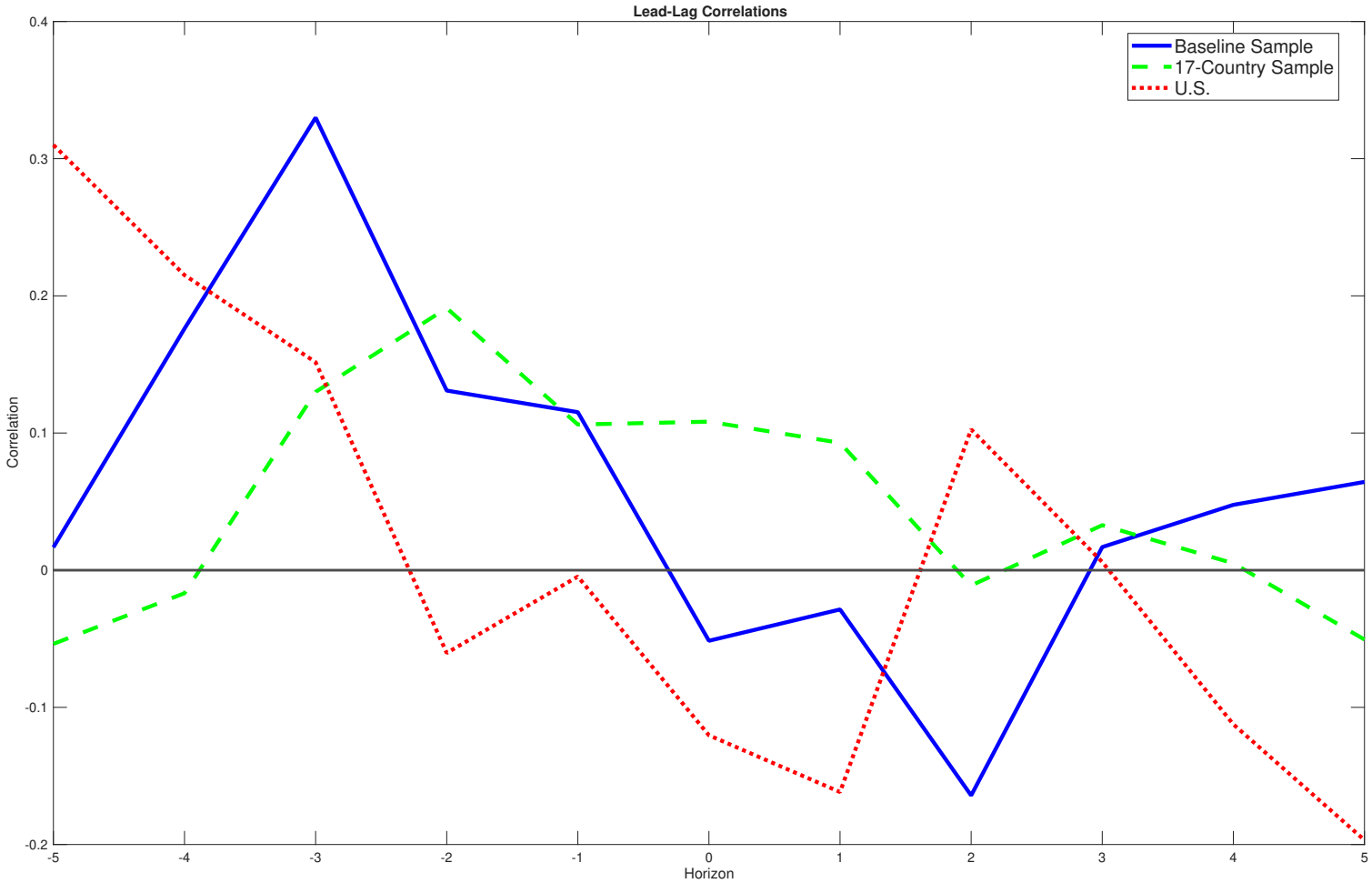
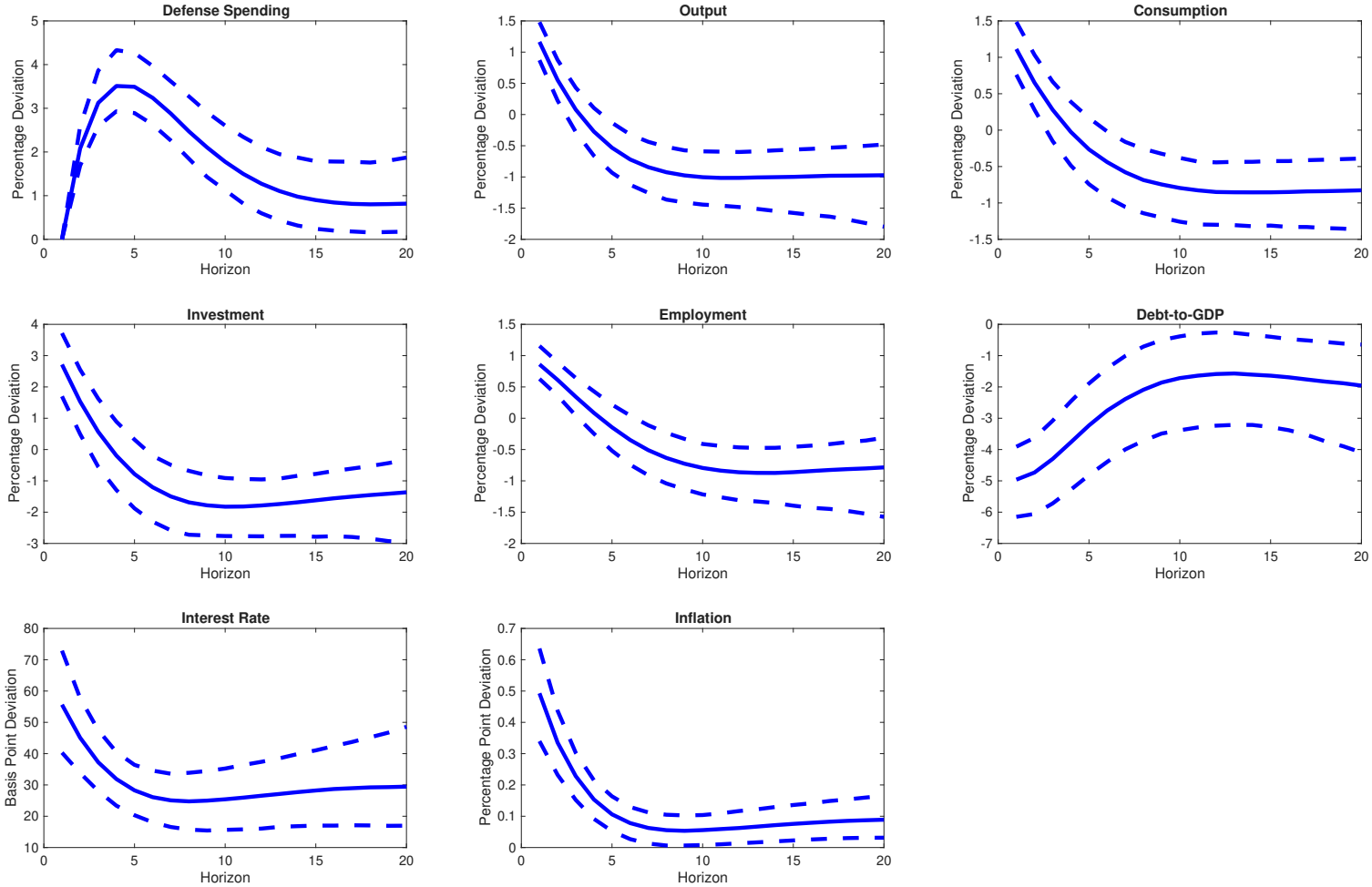


Figure 7: Lead and lag correlations defense spending and GDP

Control for shocks that move GDP contemporaneously

- Focus on Germany, France, Italy, Spain and the Netherlands with TFP utilization adjusted series from EUROPROD-UA database, hosted by the Bank of Spain
- Orthogonalize defense news to TFP and commodity prices
- Include debt to GDP

Macroeconomic Effects of Defense News for the Big 5 (Controlling for Contemporaneous Output Shocks)



IRFs to a Defense News Shock — Big 5 Panel VAR

* preliminary results

Multipliers of Defense News for the Big 5 (Controlling for Contemporaneous Output Shocks)

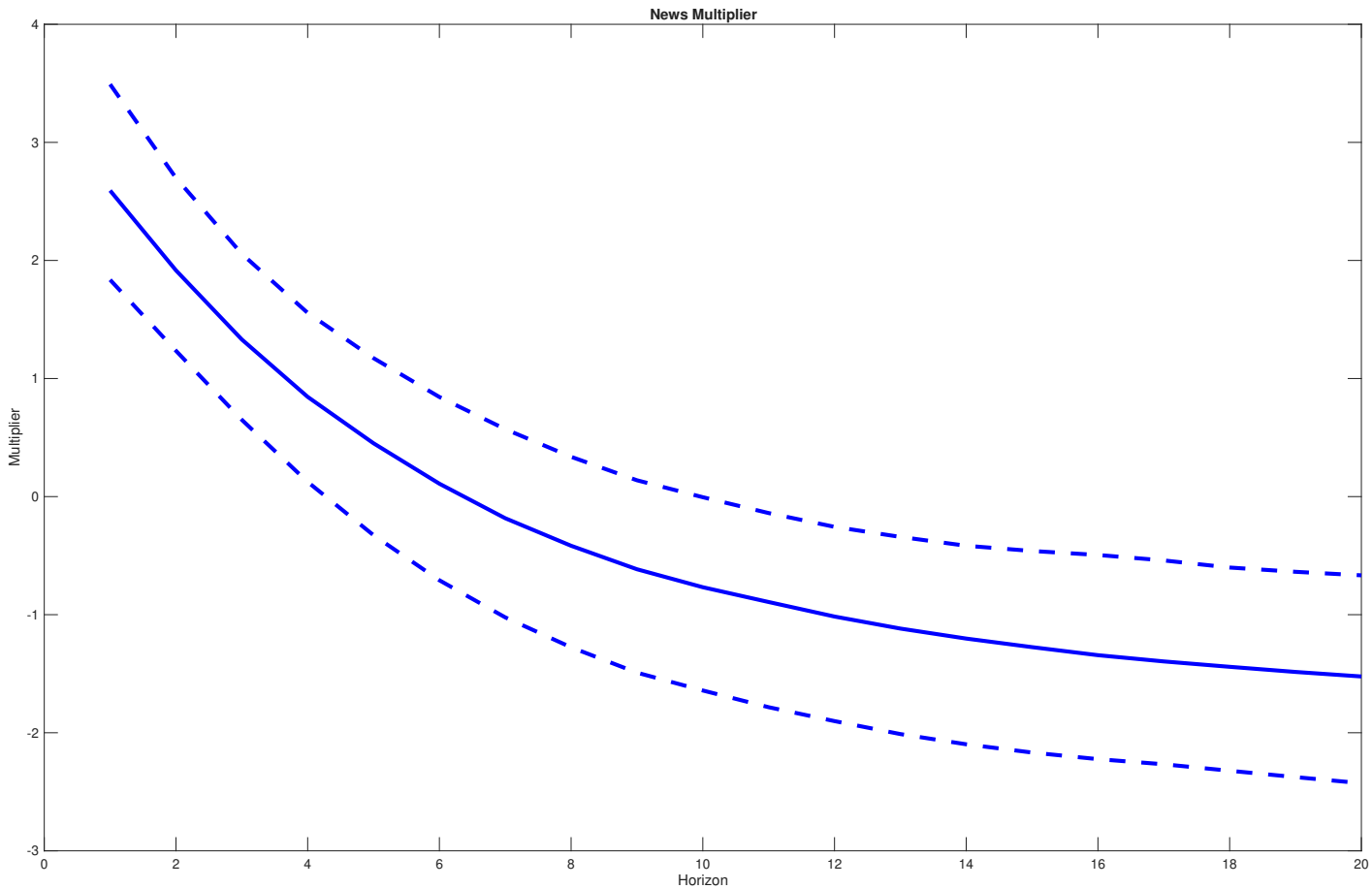


Figure 8: Multipliers Defense News Shock: Big 5 Panel VAR

* preliminary results

High Multipliers Despite no TFP Effects?

- Crowd-out of other government spending.
- Crowd-in of key industries (in progress).

Macroeconomic Effects of Defense News for the Big 5, Government Investment

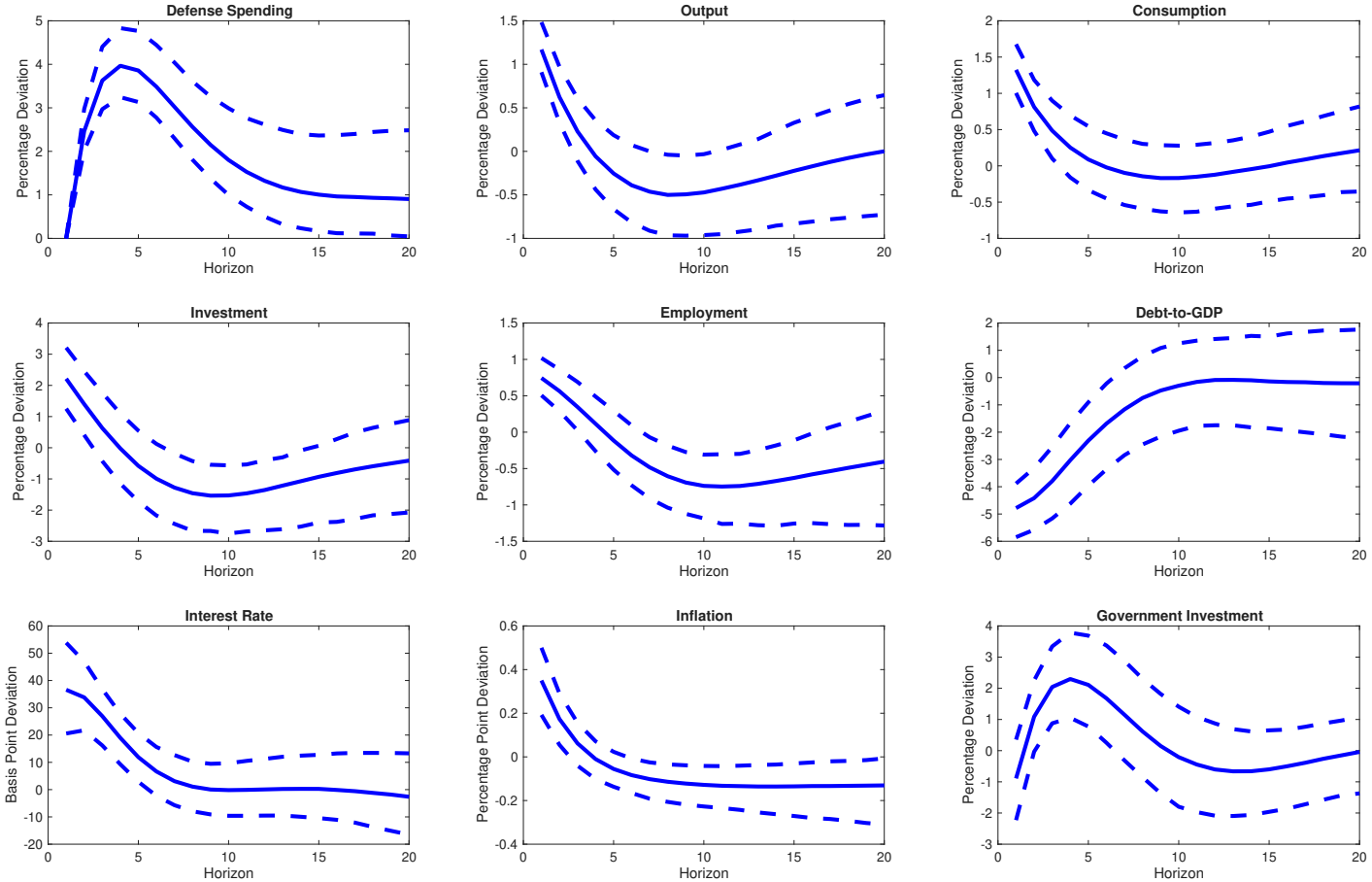


Figure 9: Multipliers Defense News Shock: Big 5 Panel VAR - Government investment

* preliminary results

Macroeconomic Effects of Defense News for the Big 5, General Government Spending

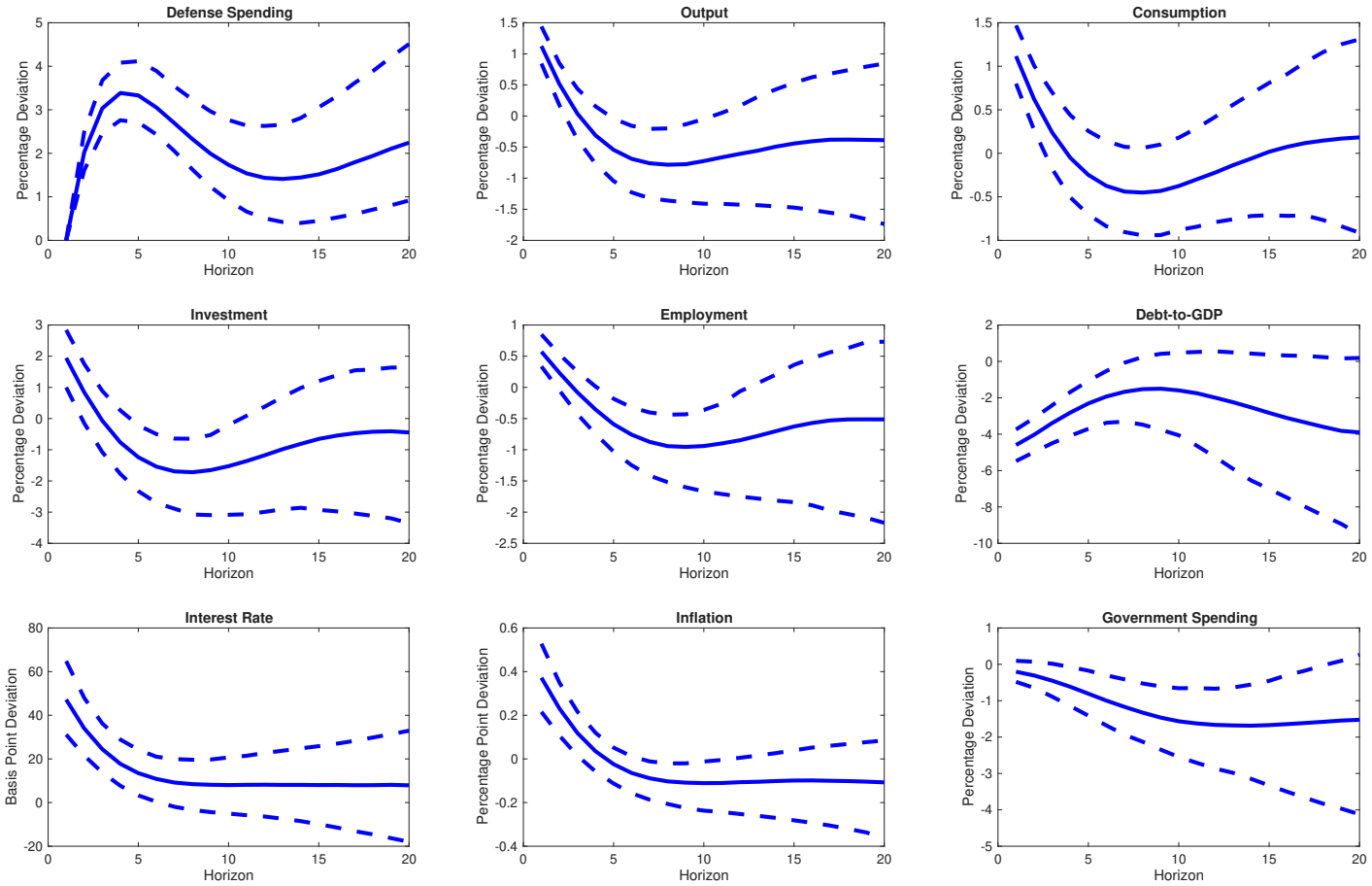


Figure 10: Multipliers Defense News Shock: Big 5 Panel VAR - General government spending

* preliminary results

Conclusions

- Defense news shocks stimulate European economies.
- Output multipliers exceed unity and are larger than in the U.S.
- Effects are partly supply-driven from higher TFP and R&D.
- Government responses: crowd-in of public investment and crowd-out of other expenditures.
- Private responses: crowd-in of investment in related industries.
- Distributional effects: increases in inequality.
- Policy relevance for both fiscal and defense strategies in Europe.

Our Results and the Political Arena

Figure 11: Current Defense new should revive European Economy

See German data...for promise

Gross domestic product, price adjusted
Changes on a year earlier (percent):

2023				2024				2025		
1st qtr	2nd qtr	3rd qtr	4th qtr	1st qtr	2nd qtr	3rd qtr	4th qtr	1st qtr	2nd qtr	3rd qtr
0.0	-1.1	-1.3	-1.0	-1.1	-0.3	-0.2	-0.4	0.0	-0.1	0.3

Figure 12: Data from German Statistical Office

Thank you!

Change in title

- Previous title: *"Guns and Roses: The positive economic effects of defense news in Europe."*
- García-Serrador, Sarasa, and Ulloa (2025): *"Buy Guns or Buy Roses? EU Defence Spending Fiscal Multipliers."*
  - Consider unanticipated changes to government spending, and COFOG definition of military spending.
  - Do not account for anticipation.

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Validating SIPRI Data: U.S. VARs

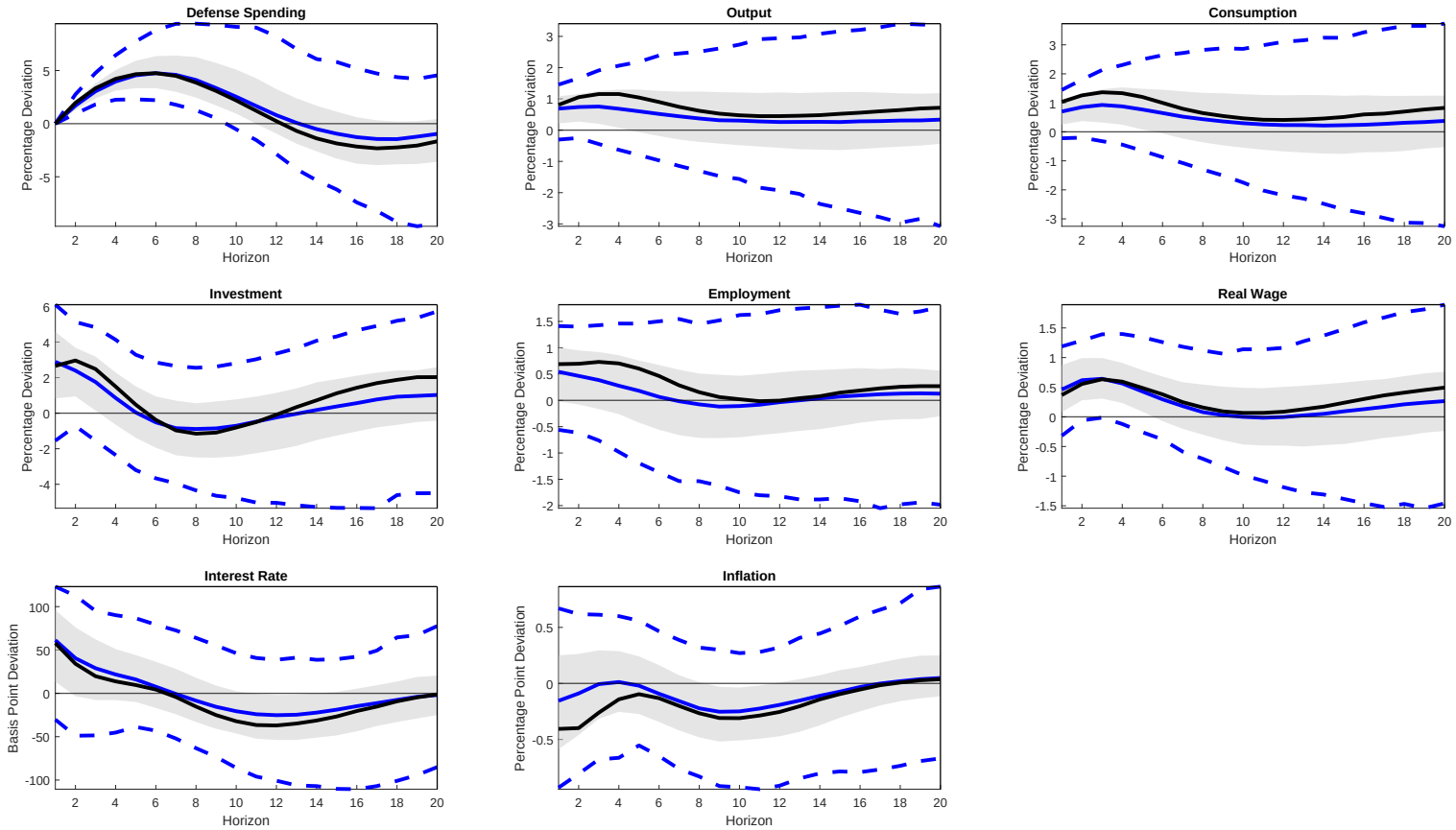

Figure 13: IRFs to a Defense News Shock: U.S. Annual VARs Using SIPRI (blue) vs NIPA (black) Defense Data

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Forecast Error Variance Contributions of Defense News Shocks

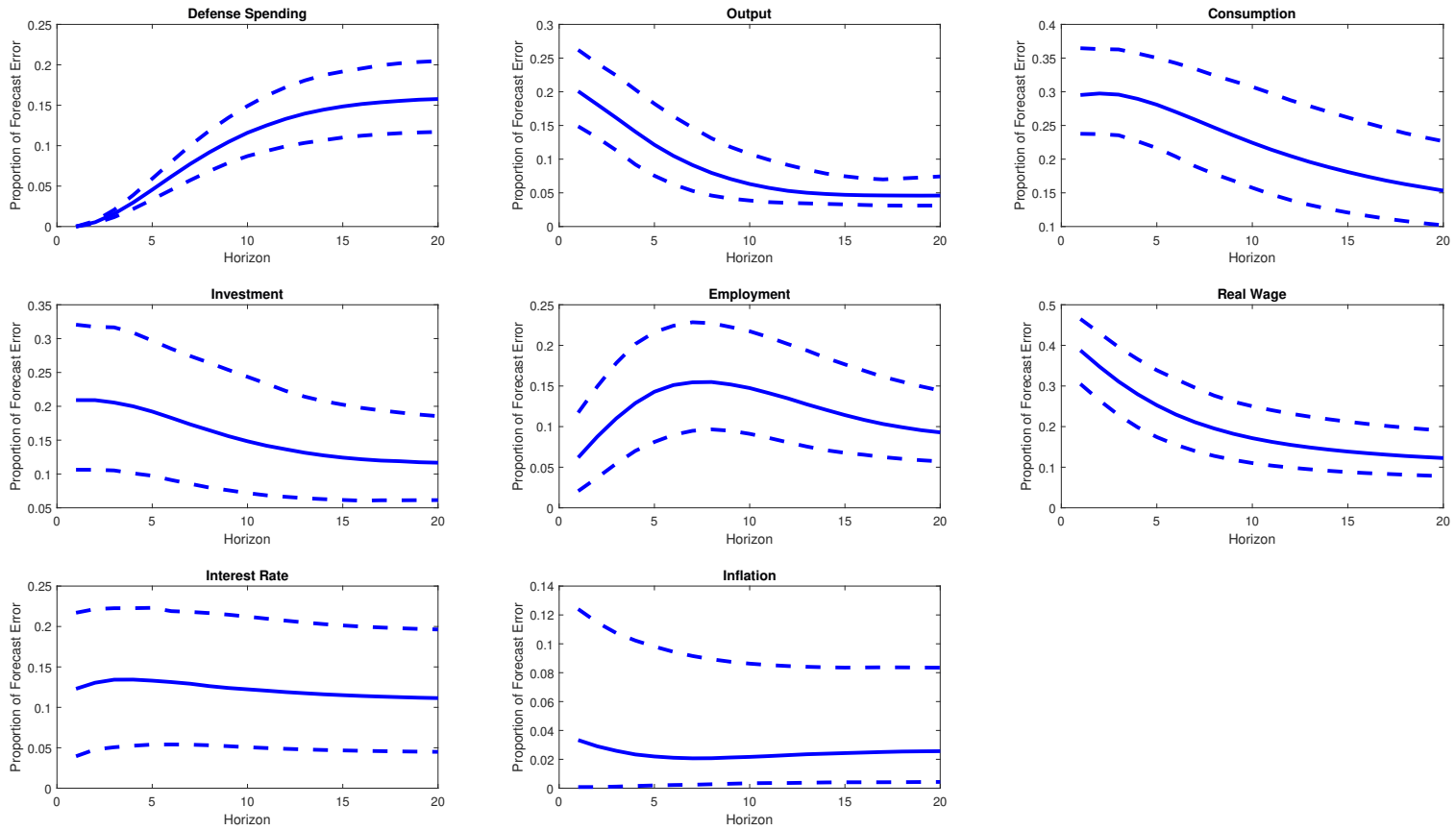

Figure 14: FEV Contributions of Defense News Shock: Baseline Panel VAR

▸ Back ▸ More FEVs

Macroeconomic Effects of Defense Surprise Shocks

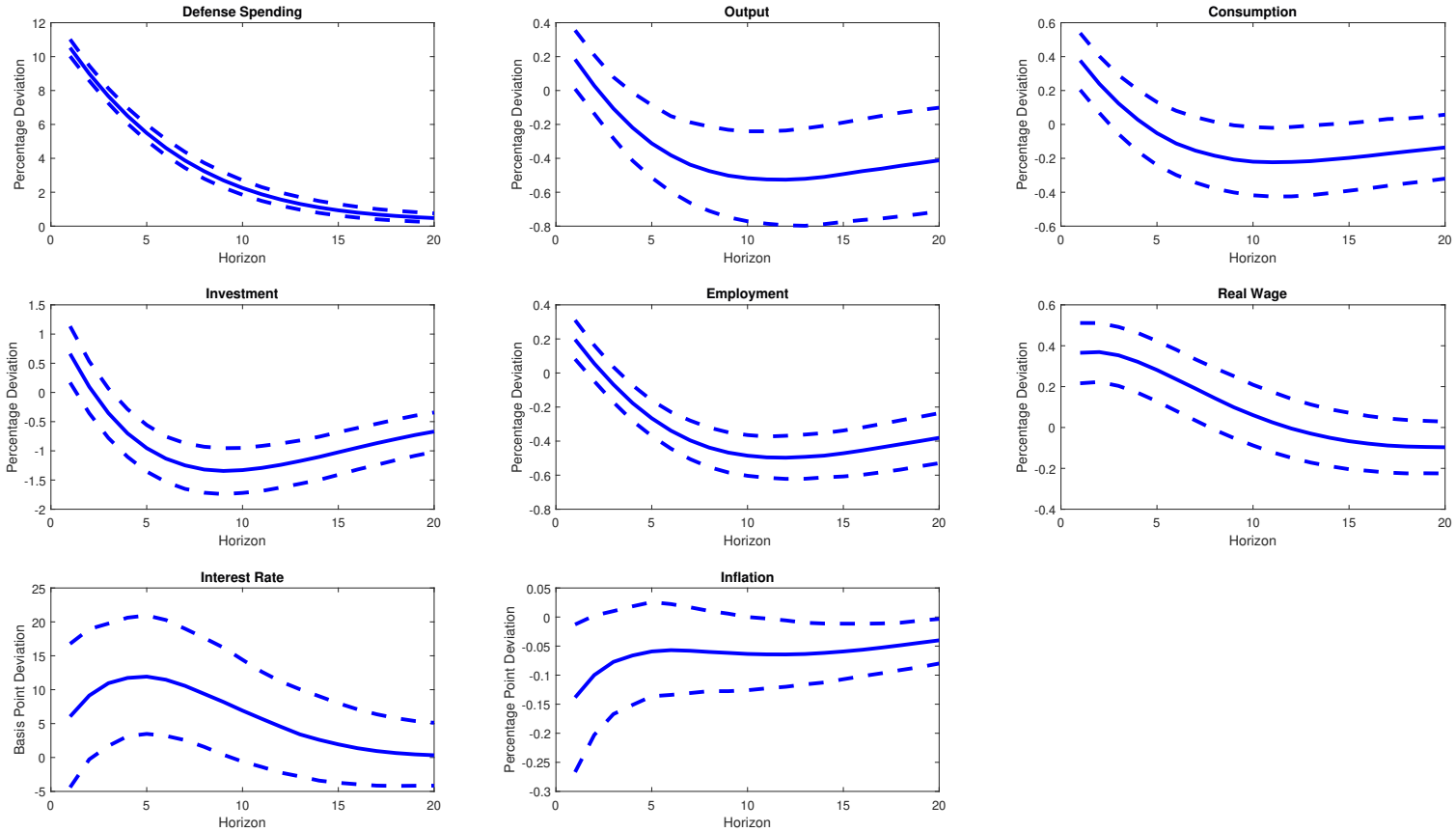

Figure 15: IRFs Defense Surprise Shock: Baseline Panel VAR

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FEV Contributions of Defense Surprise Shock

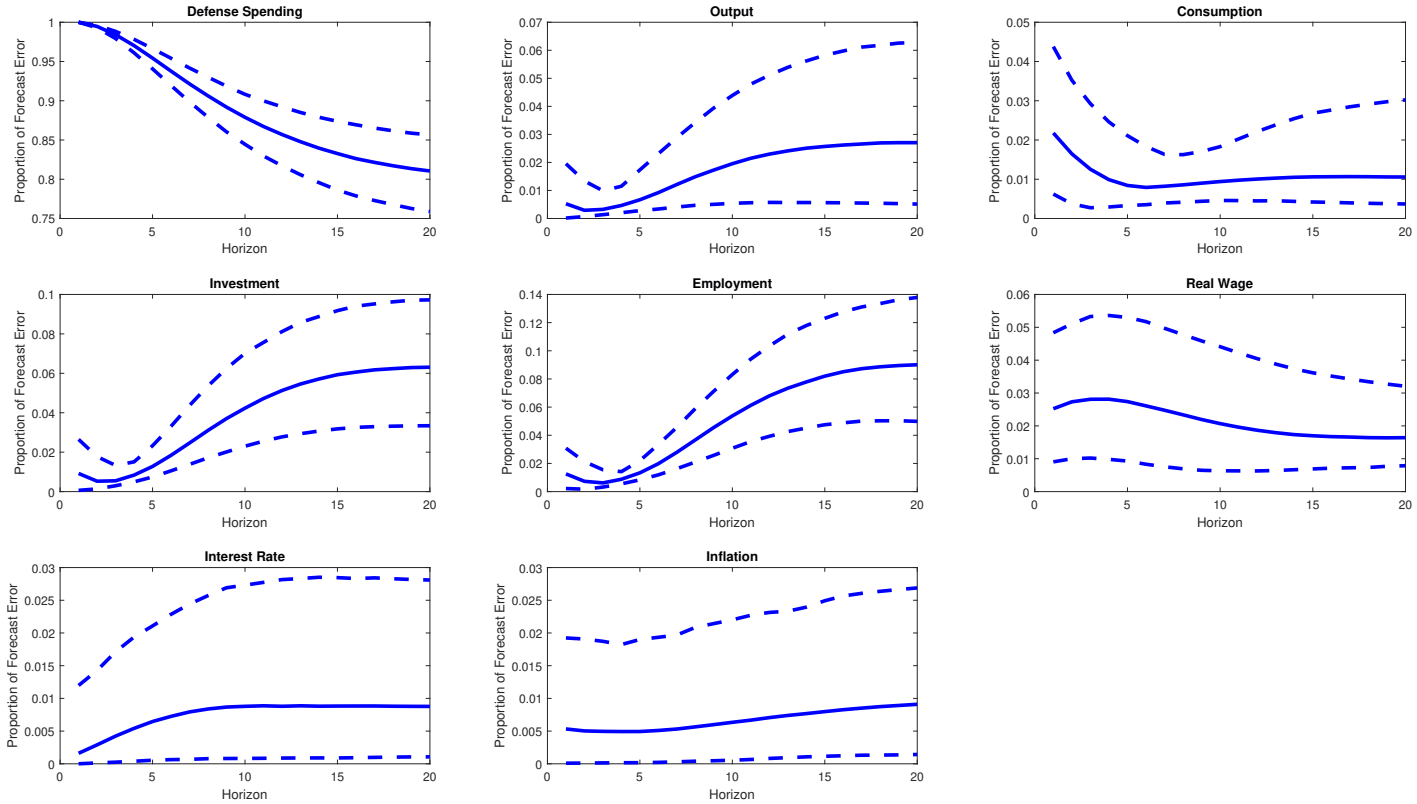

Figure 16: FEV Contributions of Defense Surprise Shock: Baseline Panel VAR

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Robustness

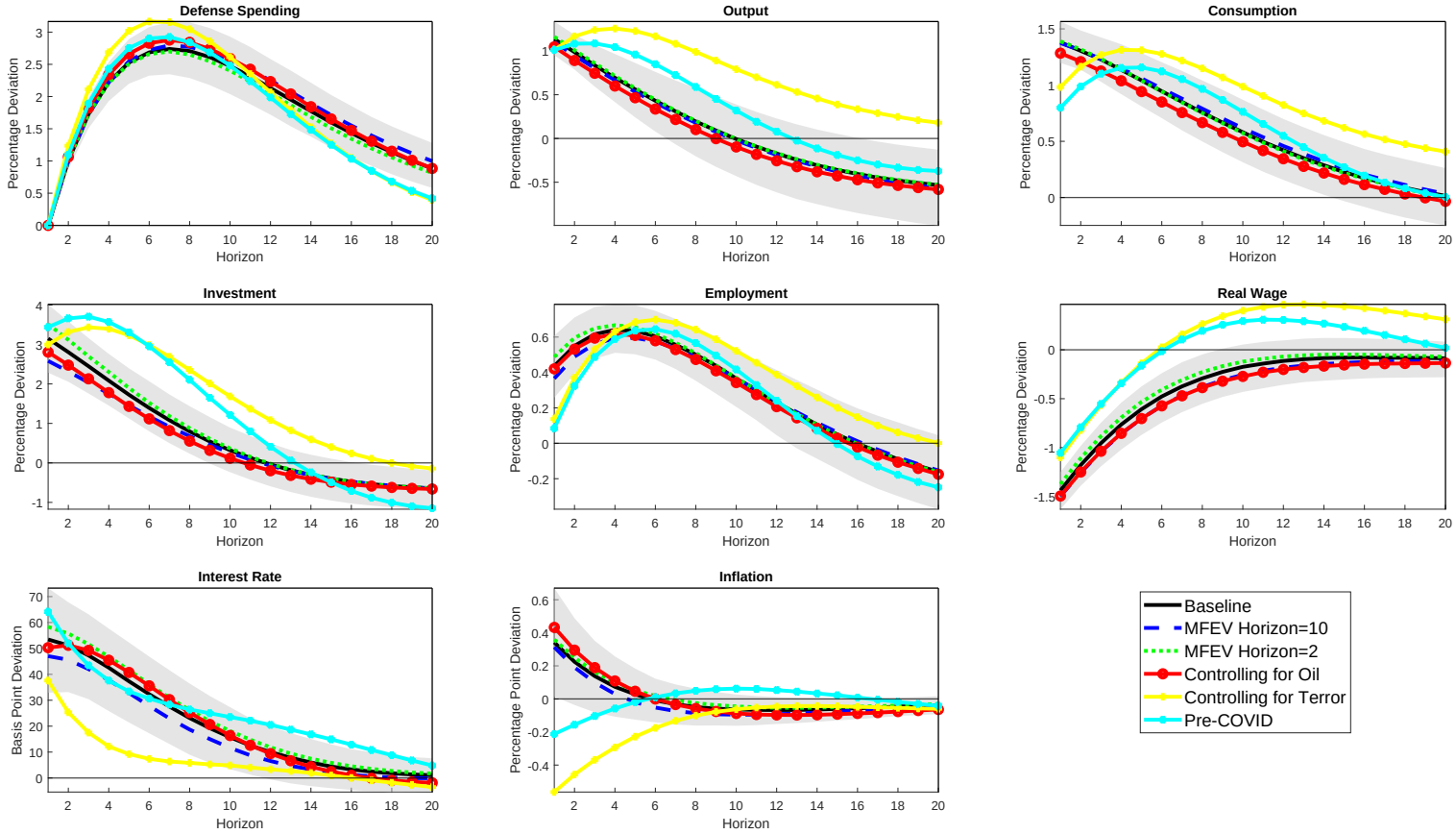

Figure 17: IRFs Defense News Shock: Robustness Across Specifications

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Geopolitical Risk

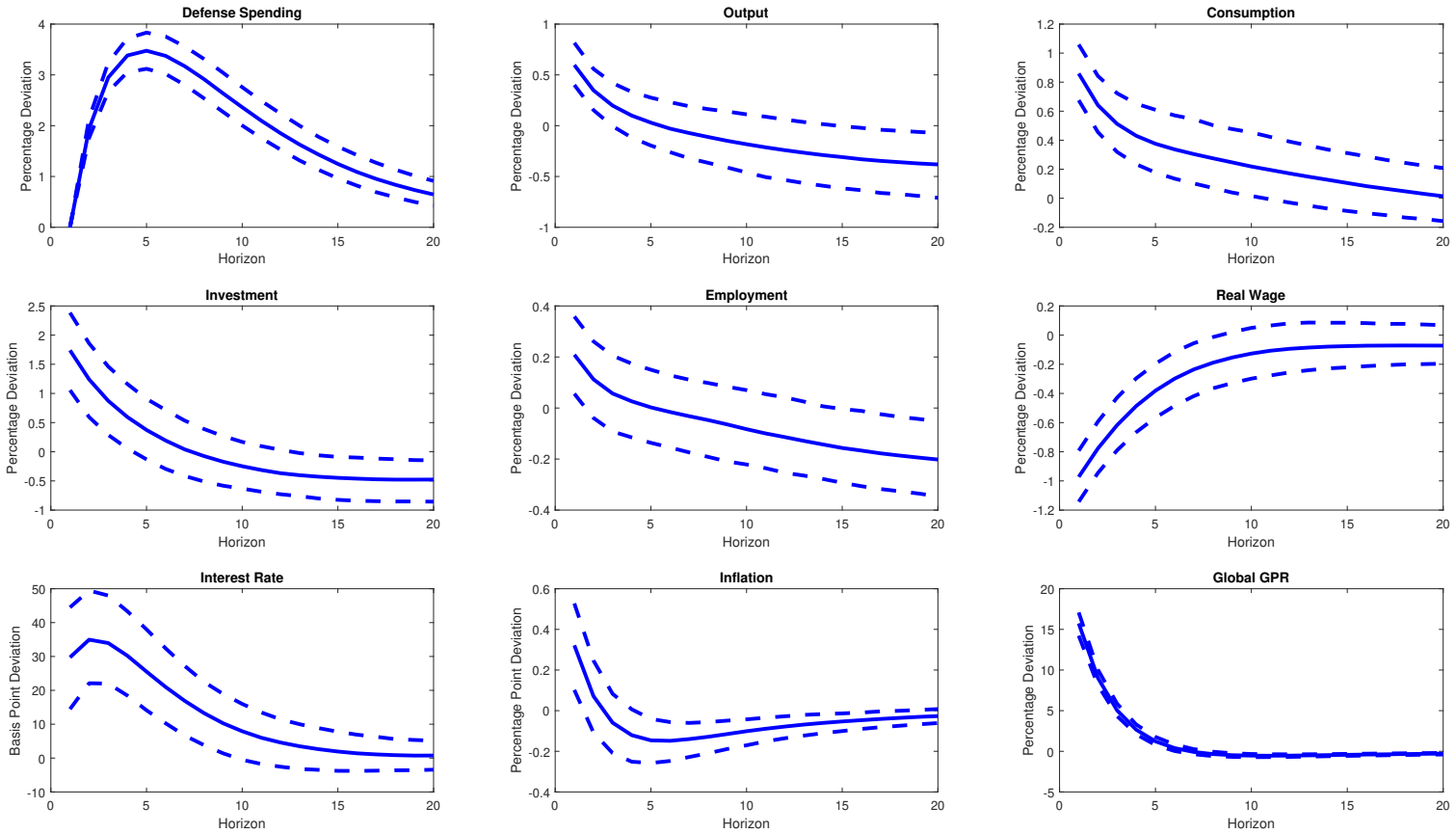

Figure 18: IRFs Defense News Shock: GPR Inclusive Panel VAR

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Measuring the Multiplier

Back-loaded nature of defense news shocks: These shocks induce a strong and immediate output response, but defense spending rises only gradually, peaking several years later.
Solution: discount future defense spending responses over a 20-year horizon and use this present value as the basis for computing the multiplier.

$$\mathbb{M}_{h,n} \approx \frac{\sum_{i=1}^{h} \frac{\partial \ln Y_{t+i-1}}{\partial \epsilon_{t,n}}}{h \sum_{i=1}^{20} \frac{\partial \ln DF_{t+i-1}}{\partial \epsilon_{t,n}} \frac{1}{(1+r)^{i-1}}} \frac{\overline{Y}}{\overline{DF}}. \tag{12}$$

▸ Back ▸ More

Measuring the Multiplier: Addressing Timing Mismatch

$$\mathbb{M}_{h,n} \approx \frac{\sum_{i=1}^{h} \frac{\partial \ln Y_{t+i-1}}{\partial \epsilon_{t,n}}}{\sum_{i=1}^{h} \frac{\partial \ln DF_{t+i-1}}{\partial \epsilon_{t,n}}} \frac{\overline{Y}}{\overline{DF}}. \quad \Rightarrow \quad \mathbb{M}_{h,n} \approx \frac{\sum_{i=1}^{h} \frac{\partial \ln Y_{t+i-1}}{\partial \epsilon_{t,n}}}{h \sum_{i=1}^{20} \frac{\partial \ln DF_{t+i-1}}{\partial \epsilon_{t,n}} \frac{1}{(1+r)^{i-1}}} \frac{\overline{Y}}{\overline{DF}}.$$

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Multipliers: Outlier Check

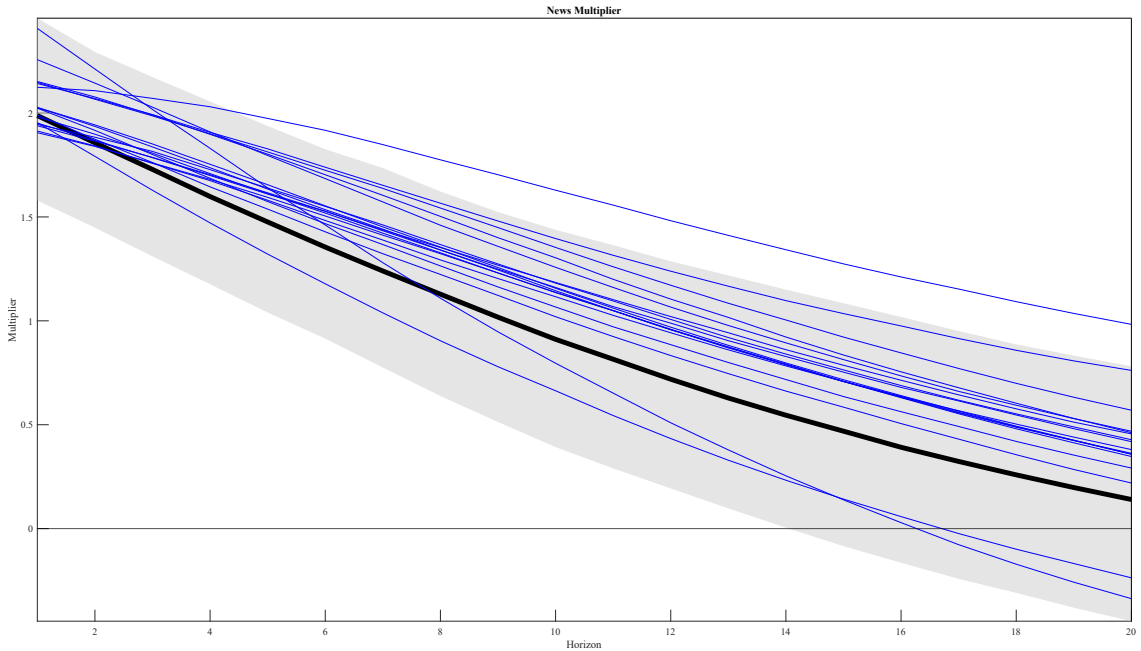

Figure 19: Multipliers of Defense News Shocks: One-by-One Country Removal

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Excluding Coincident Technology Shocks

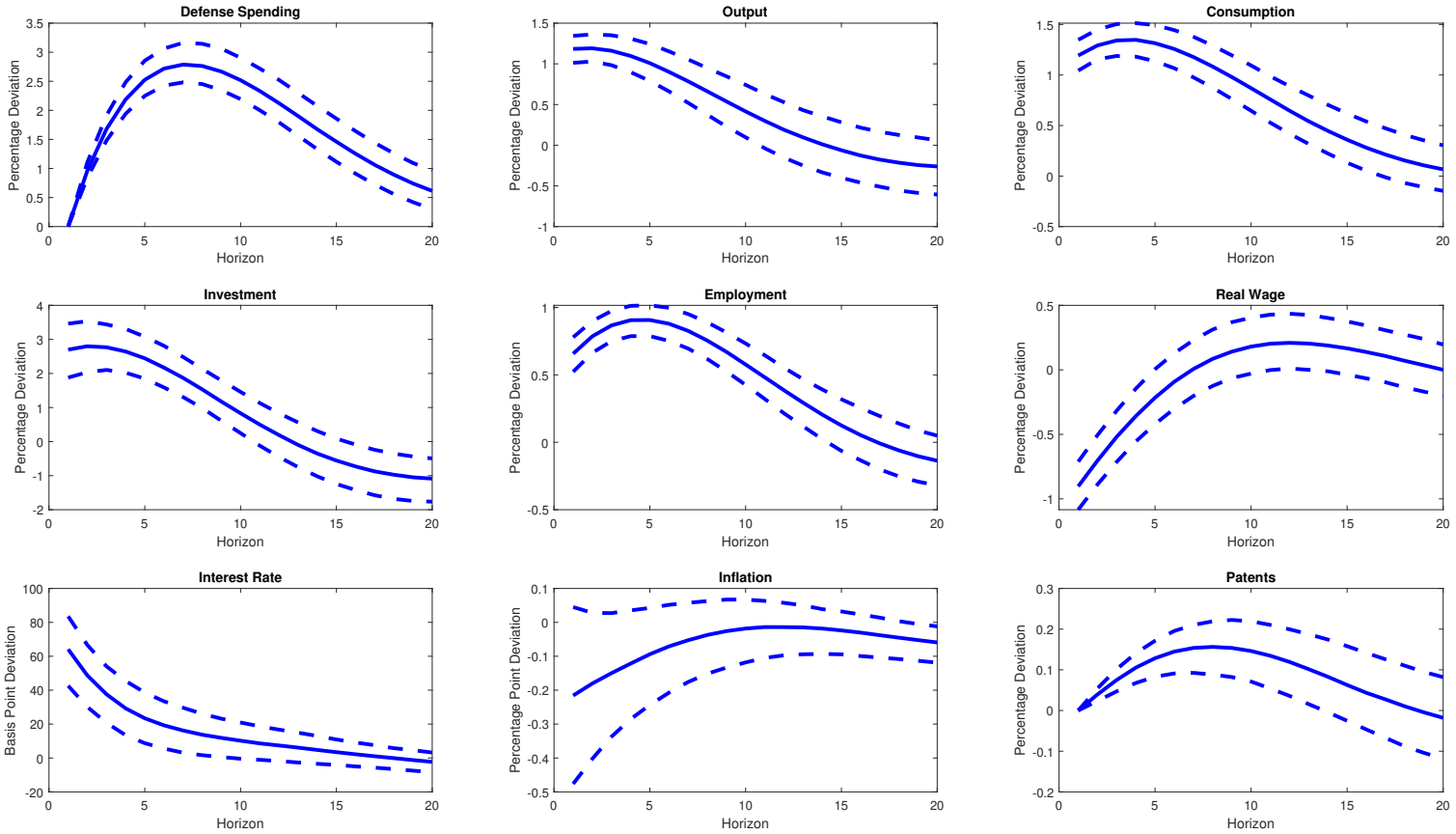

Figure 20: IRFs Defense News Shock: Orthogonal Patents

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More Multipliers

Specification	H1	H2	H4	H8	H10
US	0.66	0.71	0.72	0.61	0.55
Baseline	**2.00**	**1.86**	**1.60**	**1.13**	**0.92**
COFOG Data	8.15	6.33	3.44	0.44	-0.25
TFP-Inclusive	1.77	1.87	1.94	1.76	1.58
Pre-EMU	1.31	1.42	1.54	1.49	1.39
Post-EMU	4.27	2.91	0.68	-1.52	-1.94
Low Debt	2.22	1.80	1.04	-0.12	-0.55
High Debt	1.39	1.58	1.79	1.83	1.77
NATO	1.94	1.87	1.72	1.36	1.19
Non-NATO	2.08	1.65	0.68	-0.96	-1.49
H=8 Discounting	3.65	3.40	2.94	2.07	1.69

Table 2: Multipliers of Defense News Shocks Across Specifications and Horizons

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FEV Contributions

Specification	D	OUT	CONS	INV	EMPL	R	INFL	W	GI	TFP	P
US NIPA	0.57	0.20	0.23	0.20	0.14	0.15	0.14	0.15			
US SIPRI	0.48	0.13	0.14	0.18	0.11	0.20	0.13	0.18			
Baseline	**0.12**	**0.06**	**0.22**	**0.15**	**0.15**	**0.12**	**0.02**	**0.17**			
COFOG	0.14	0.12	0.27	0.12	0.34	0.40	0.28	0.04			
Pre-COVID-19	0.14	0.14	0.26	0.29	0.13	0.12	0.01	0.08			
Oil-Inclusive	0.13	0.05	0.19	0.11	0.13	0.12	0.03	0.20			
H=2 Truncation	0.11	0.07	0.22	0.18	0.16	0.15	0.02	0.15			
H=10 Truncation	0.12	0.06	0.23	0.10	0.13	0.09	0.02	0.21			
Terrorism-Incl.	0.16	0.19	0.30	0.28	0.15	0.03	0.10	0.09			
TFP-Inclusive	0.15	0.17	0.37	0.24	0.15	0.07	0.04	0.08		0.06	
Patents-Inclusive	0.16	0.19	0.34	0.24	0.16	0.07	0.12	0.09			0.02
GovInv-Inclusive	0.14	0.07	0.25	0.15	0.14	0.06	0.01	0.17	0.22		
Pre-EMU	0.15	0.13	0.23	0.13	0.03	0.02	0.04	0.10			
Post-EMU	0.28	0.23	0.26	0.06	0.31	0.39	0.43	0.04			
Low Debt	0.10	0.08	0.12	0.06	0.06	0.23	0.24	0.26			
High Debt	0.22	0.39	0.35	0.36	0.20	0.05	0.11	0.12			
NATO	0.14	0.16	0.21	0.22	0.23	0.14	0.02	0.14			
Non-NATO	0.18	0.06	0.23	0.04	0.07	0.07	0.03	0.07			

Table 3: Proportion of FEV Attributable to Defense News Shocks Across Specifications (h=10)

Back

Heterogeneity

- Structural change with EMU
- Fiscal space
- Military Alliances.

Back

Pre- vs Post- EMU

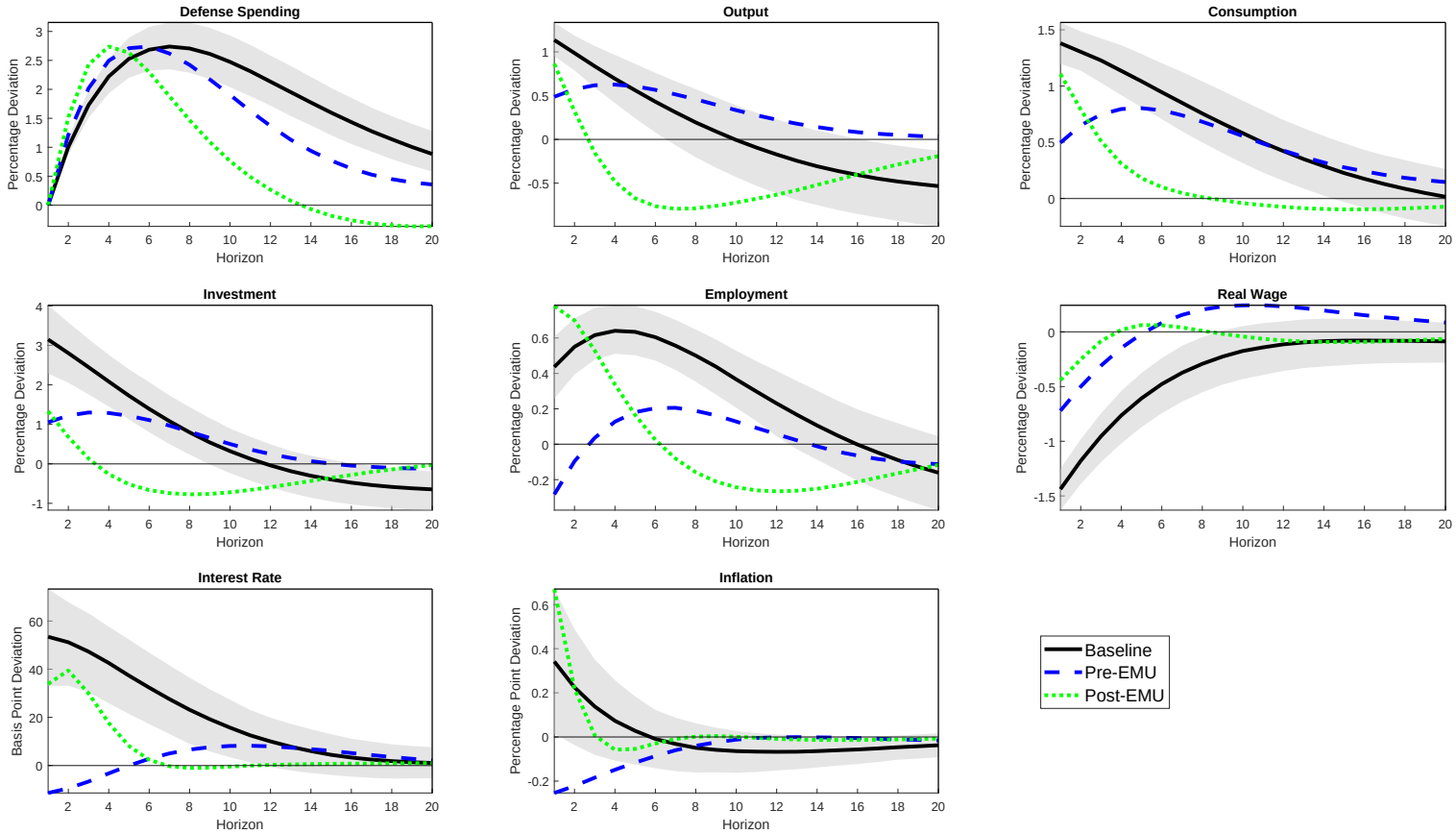

Figure 21: IRFs Defense News Shock: Baseline, Pre and Post-EMU VARs

NATO vs. Non-NATO

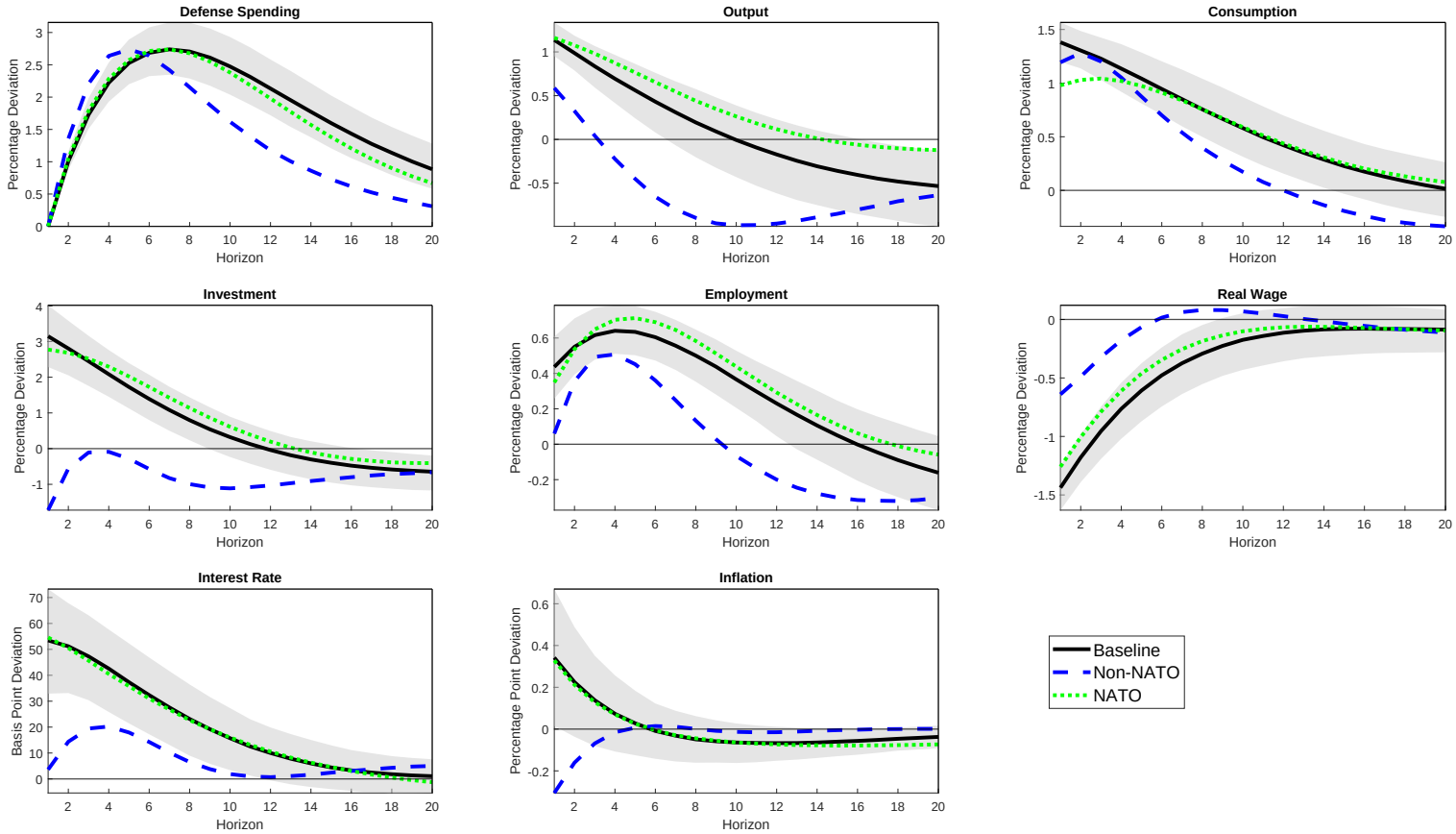

Figure 22: IRFs Defense News Shock: NATO vs. Non-NATO Countries

Fiscal Stress Level: High- vs Low-Debt Economies

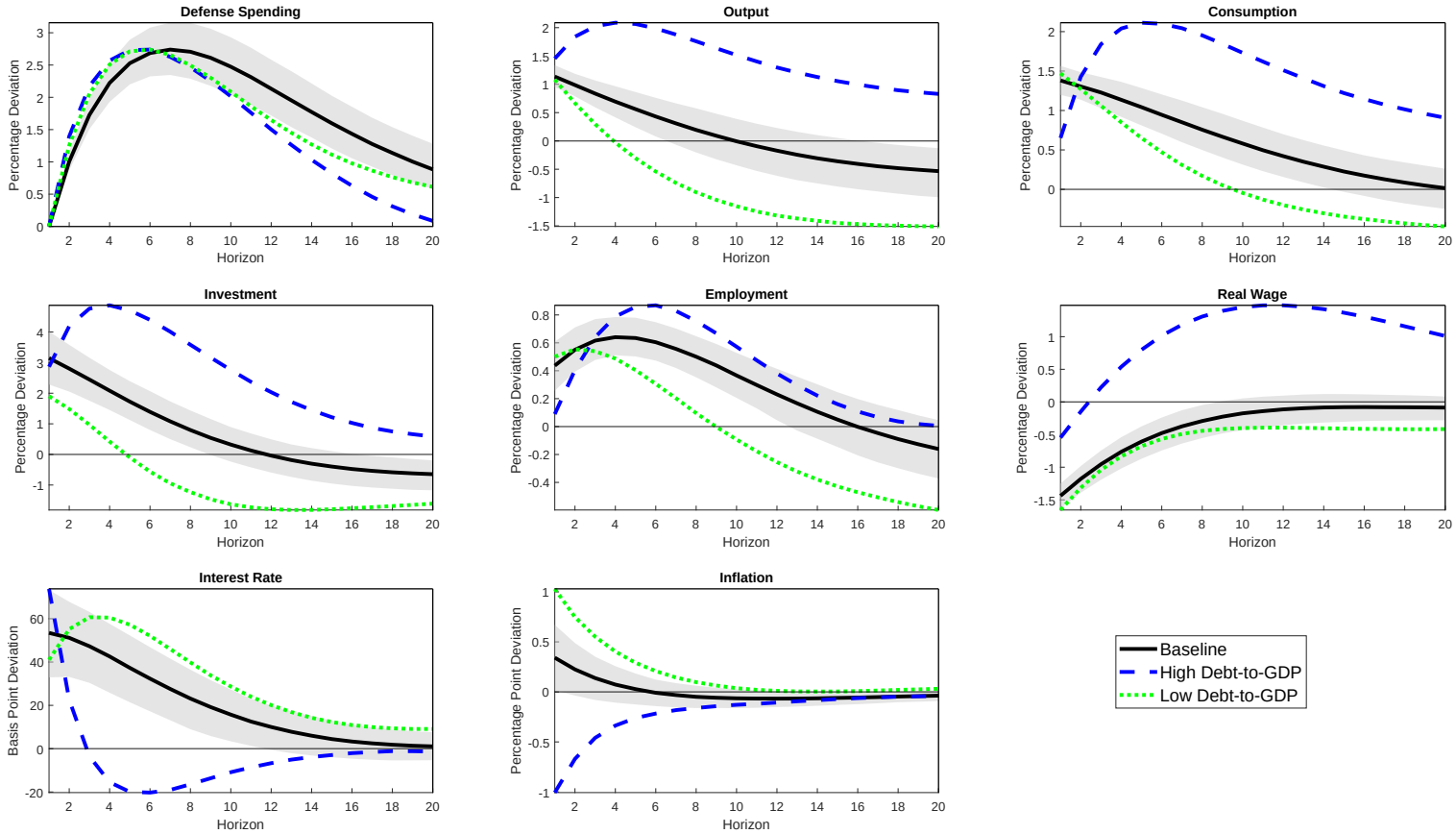

Figure 23: IRFs Defense News Shock: Low vs High levels of Fiscal Stress