Dominant Current Account Drivers

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Motivation

The current account is pivotal in international economics and politics:

- Mercantilism and trade policies
- Predictor of financial crises
- Global imbalances and tensions

What are the dominant shocks that drive current account movements?

- Exports vs. Imports
- Savings vs. Investment
- Outflows vs. Inflows

Our Approach

- Exploit an 'agnostic' SVAR-based approach to uncover the statistical comovements associated with surprise changes in the current account.
  - Expenditure switching not dominant in the short run.
  - Reduced expenditure in the short to medium term
  - Some country heterogeneity.
- Build a DSGE model to discern the dominant current account driver obtained from the SVAR.
  - A distinct role taken by a foreign demand shock to domestic goods.
- Compare the empirical and the model-implied results.
  - Dominant CA shocks as foreign demand shocks to domestic goods and assets.
  - High correlation between the SVAR-revealed shocks and the model-implied shocks.

Our Contribution

- Identify the dominant CA shock (at business cycle frequency and over the long run) for three countries with a max-share SVAR identification.

  Angeletos et al. 2020; Chahrour et al. 2021; Miyamoto et al. 2023

- Relate the dominant CA shocks to typical structural shocks in DSGE models via a comparison of impulse responses, forecast error variance decompositions and shock series.

  Adolfson et al. 2007; Bergin 2006, Kim and Lee 2015; Itskhoki and Mukhin 2021

- Provide evidence that at business cycle frequencies the current account is not determined by a self-correcting exchange rate adjustment.

Outline

Empirics

Max-Share SVAR

- Identify one dominant shock that is the largest contributor to the volatility of a single variable at a particular frequency (Faust, 1998; Uhlig, 2003; Angeletos et al., 2020).
- Structural VAR $\mathbf{B}_0\mathbf{y}_t = \mathbf{b} + \mathbf{B}_1\mathbf{y}_{t-1} + ... + \mathbf{B}_p\mathbf{y}_{t-p} + \varepsilon_t$
  where the structural shocks are related to the reduced-form residuals as $\mathbf{u}_t = \mathbf{B}_0^{-1}\varepsilon_t$
- Interest in the structural impact multiplier matrix $\mathbf{B}_0^{-1}$
- Rewrite it as $\mathbf{B}_0^{-1} = \mathbf{\Sigma}_{u,tr}\mathbf{Q}$ where $\mathbf{\Sigma}_{u,tr}$ denotes the unique lower triangular Cholesky matrix with non-negative diagonal coefficients of $\mathbf{\Sigma}_u$ and $\mathbf{Q}$ an orthogonal matrix, i.e., $\mathbf{Q}\mathbf{Q}' = I$ and $\mathbf{Q}^{-1} = \mathbf{Q}'$
- Relation between structural shocks and reduced-form residuals $\mathbf{u}_t = \mathbf{\Sigma}_{u,tr}\mathbf{Q}\varepsilon_t$

Max-Share SVAR cont'd

- Max-share identification: Leverage the $\mathbf{Q}$ matrix: pick column $\mathbf{q}$ from $\mathbf{Q}$ which relates to the structural shock that is the dominant driver of the current account balance at the business cycle frequency (6-32 quarters) or in the long run (80-∞ quarters).

- Reduced-form VAR in MA representation: $\mathbf{y_t} = \mathbf{B}(\mathbf{L})\mathbf{u}_t$

- Insert for u_t: $\boldsymbol{y_t} = \boldsymbol{B(L)\Sigma}_{u,tr}\mathbf{Q}\varepsilon_t = \boldsymbol{\Gamma(L)}\varepsilon_t$
  where $\boldsymbol{\Gamma(L)}$ represents the IRFs of the variables to the structural shocks

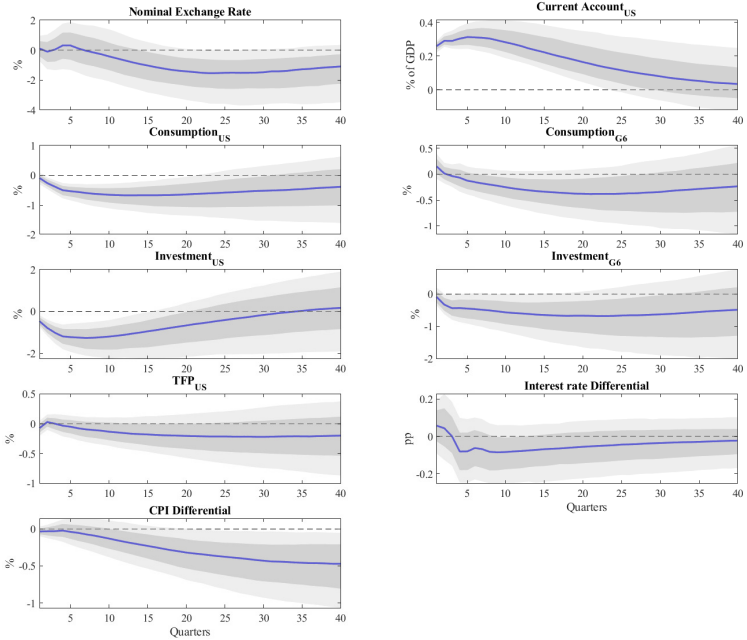
- Maxmize contribution in frequency domain, by taking the integral of the spectral density
  $f_X(y) = \frac{1}{2\pi}\boldsymbol{C(e^{-iw})QQ'C(e^{-iw})}'$
  which gives the volatility of y, where $\boldsymbol{C(L)} = \boldsymbol{B(L)\Sigma}_{u,tr}$.

- The column vector q that corresponds to the dominant shock is the eigenvector associated with the largest eigenvalue of the integral of the spectral density

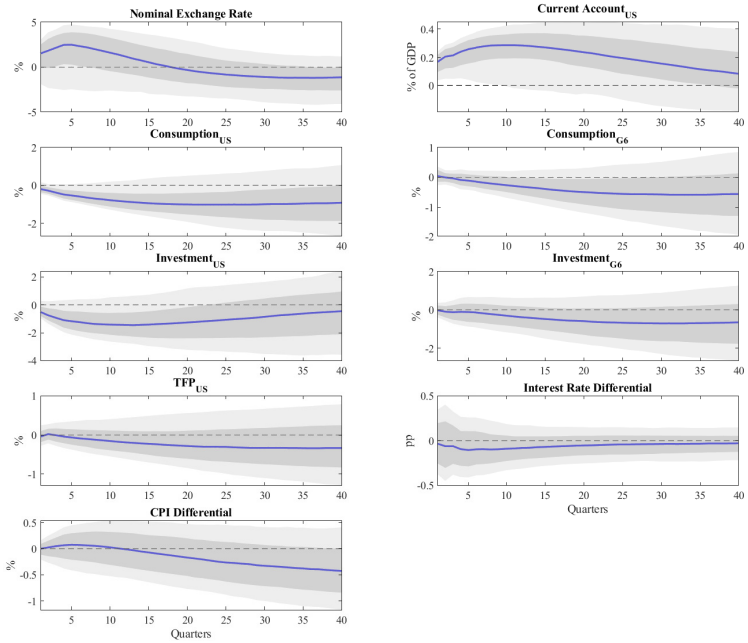
Data

- Country of Interest:
  - US, Germany, or the UK
  - A trade-weighted aggregate of G6 economies (Engel 2016).
- Quarterly macroeconomic data:
  - Current account to GDP ratio.
  - Nominal exchange rate (increase indicates domestic currency depreciation).
  - Domestic real consumption and investment.
  - Foreign real consumption and investment.
  - Consumer price index differential.
  - Interest rate differential (1-year deposit rate).
  - Domestic total factor productivity (TFP).
- Sample Period:
  - Main: 1975:Q1 - 2022:Q3.
  - With TFP for Germany & UK: 1991:Q1 - 2019:Q4.

US dominant CA shock at business cycle frequency

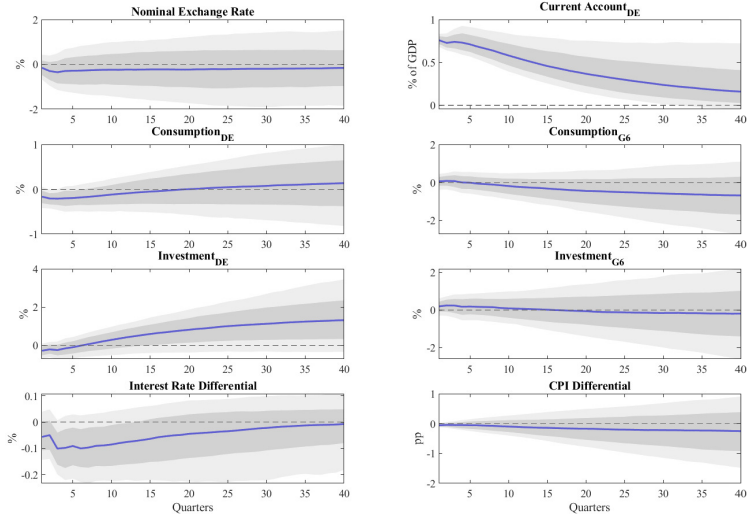


US dominant long-run CA shock



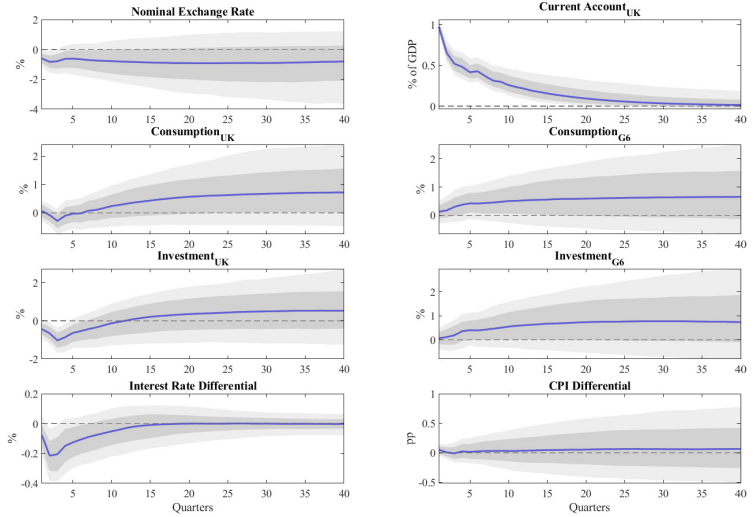
FEVD

Germany: dominant CA shock at business cycle frequency



⏩ w/ TFP ⏩ FEVD

UK: dominant CA shock at business cycle frequency



⏩ w/ TFP ⏩ FEVD

Model

Overview

- A New Keynesian model (Itskhoki and Mukhin 2021)
  - ∞ period representative agent model
  - Open economy with two goods: home (H) and foreign (F)
  - Segmented international bond markets
  - Production function with working capital and intermediaries
  - Calvo sticky prices
- Shocks
  - Productivity shock
  - Monetary policy shock
  - Capital flow shock
  - Domestic demand shock
  - Foreign demand shock
  - Import price shock

Households

- Period utility: $\left(\frac{C_t^{1-\sigma}-1}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi}\right)\Omega_t$
- Borrow and save in local currency bonds
- Invest in work capital
- The domestic demand shifter Ω_t:

$$\log(\Omega_t) = \rho_\Omega \log(\Omega_{t-1}) + \epsilon_{\Omega,t}$$
$$\epsilon_{\Omega,t} \sim iid\left(0, \sigma_\Omega^2\right)$$

Exports

- Foreign demand for Home goods:

$$Y^*_{Ht} \equiv C^*_{Ht} + Z^*_{Ht} + X_{Ft} = \gamma \left(\mathcal{P}^*_{Ht}\right)^{-\epsilon} AD^*_t$$

γ: the weight of Home goods in Foreign final goods.
$\mathcal{P}^*_{Ht} = \frac{P^*_{Ht}}{P^*_t}$: the relative price of Home goods to Foreign final goods.

- The aggregate foreign demand AD^*_t, :

$$\log\left(AD^*_t\right) - \log\left(AD^*_{SS}\right) = \rho_{AD^*}\left(\log\left(AD^*_{t-1}\right) - \log\left(AD^*_{SS}\right)\right) + \epsilon_{AD^*,t}$$
$$\epsilon_{AD^*,t} \sim \text{iid}\left(0, \sigma^2_{AD^*}\right)$$

Import Price

- $\mathcal{P}_{Ft} \equiv \frac{P_{Ft}}{P_t}$: the relative price of foreign goods relative to Home final goods
- For the US,

$$\mathcal{P}_{Ft} = \alpha \xi_t + (1 - \alpha)\mathcal{Q}_t$$

  - ξ_t: The exogenous component of the import price

$$\log(\xi_t) = \rho_\xi \log(\xi_{t-1}) + \epsilon_{\xi,t}$$
$$\epsilon_{\xi,t} \sim iid(0, \sigma_\xi^2)$$

  - $\mathcal{Q}_t \equiv \frac{P_t^* \mathcal{E}_t}{P_t}$: the real exchange rate
- $\alpha = 0$ for the UK and Germany.

Other Blocks

- The production function is $Y_t = \left(e^{a_t} K_t^{\vartheta} L_t^{1-\vartheta}\right)^{1-\phi} X_t^{\phi}$, with the TFP a_t:

$$a_t = \rho_a a_{t-1} + \epsilon_{a,t}, \quad \epsilon_{a,t} \sim iid\left(0, \sigma_a^2\right)$$

- The modified UIP condition is $i_t - i_t^* - E_t \Delta e_{t+1} = \psi_t - \chi b_t$, with the noise trader's demand ψ_t:

$$\psi_t = \rho_\psi \psi_{t-1} + \epsilon_{\psi,t}, \quad \epsilon_{\psi,t} \sim iid(0, \sigma_\psi^2)$$

- The monetary policy rule is $i_t = \rho_m i_{t-1} + (1-\rho_m)\phi_\pi \pi_t + v_t$, with the nominal interest rate innovation v_t:

$$v_t = \rho_v v_{t-1} + \epsilon_{v,t}, \quad \epsilon_{v,t} \sim iid(0, \sigma_v^2)$$

Intricate Current Account Determination

The current account surplus, or the net export, is given by

$$nx_t = \gamma(y^*_{Ht} - y_{Ft} - s_t) \tag{1}$$

where s_t is the log-deviation of the **terms of trade** $\frac{P_{Ft}}{P^*_{Ht}\mathcal{E}_t}$.

(1) can translate into

$$nx_t = \gamma\Big(\underbrace{-(\epsilon-1)p^*_{Ht} + \alpha(\epsilon-1)\log(\xi_t) + (\epsilon(1-\alpha)+\alpha)q_t}_{\text{expenditure switching}} + \underbrace{\log(\frac{AD^*_t}{AD_t})}_{\text{expenditure changing}} \Big)$$

AD_t (AD^*_t) is the sum of consumption, working capital investment, and intermediate good input for Home (Foreign).

Estimation

Calibration

Parameter	Meaning	Value	Source
β	Subjective discount factor	0.99	Conventional value
ϵ	Demand elasticity between Home and Foreign goods	1.5	Conventional value
$\frac{1}{\varphi}$	Macro Frisch elasticity	1	Conventional value
ϕ	Share of intermediate goods	0.5	Conventional value
θ	Capital share in the effective labor-capital combination	0.3	Conventional value
δ	Depreciation rate	0.02	Conventional value
κ	Parameter in the adjustment cost function	6.8	Conventional value
λ	Probability that firms cannot adjust their prices	0.75	Conventional value
χ	Stationarity parameter in the modified UIP condition	0.001	Itskhoki and Mukhin 2021

Note: These parameters are calibrated based on micro and macro data and align with values widely accepted in the international macroeconomics literature.

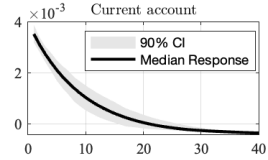
Bayesian Estimation

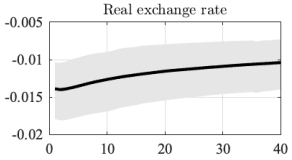
Parameters	Prior Mean	Post. Mean	Mode	90% HPD Interval		Prior	Prior stdev
α	0.500	0.4633	0.4723	[0.3152,	0.5975]	Beta	0.1000
γ	0.070	0.0228	0.0240	[0.0165,	0.0290]	Beta	0.0200
ϕ_π	2.150	1.8935	1.8767	[1.7304,	2.0523]	Norm	0.1000
ρ_a	0.600	0.9406	0.9426	[0.9242,	0.9579]	Beta	0.1000
ρ_ψ	0.600	0.8992	0.9049	[0.8686,	0.9300]	Beta	0.1000
ρ_{AD^*}	0.600	0.8935	0.9085	[0.8472,	0.9384]	Beta	0.1000
ρ_m	0.600	0.4448	0.4448	[0.3774,	0.5105]	Beta	0.1000
ρ_v	0.600	0.1754	0.1724	[0.1268,	0.2187]	Beta	0.1000
ρ_Ω	0.600	0.5346	0.5348	[0.4530,	0.6134]	Beta	0.1000
ρ_ξ	0.600	0.7236	0.7255	[0.6898,	0.7587]	Beta	0.1000
$std(\epsilon_a)$	0.010	0.0114	0.0111	[0.0100,	0.0127]	Invg	Inf
$std(\epsilon_\psi)$	0.005	0.0049	0.0046	[0.0034,	0.0062]	Invg	Inf
$std(\epsilon_{AD^*})$	0.100	0.1851	0.1718	[0.1382,	0.2261]	Invg	Inf
$std(\epsilon_v)$	0.010	0.0045	0.0044	[0.0040,	0.0050]	Invg	Inf
$std(\epsilon_\Omega)$	0.010	0.0183	0.0182	[0.0168,	0.0199]	Invg	Inf
$std(\epsilon_\xi)$	0.100	0.3291	0.2833	[0.1908,	0.4658]	Invg	Inf

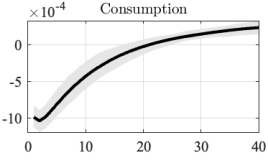
Note: The posterior distribution is obtained using the Metropolis-Hastings algorithm.

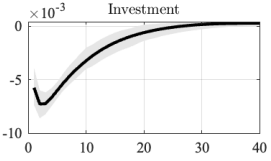
Quantitative Results

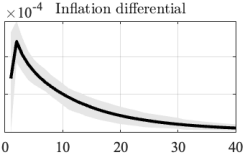
Impulse-Responses: Foreign Demand Shock

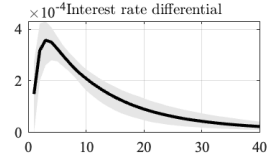




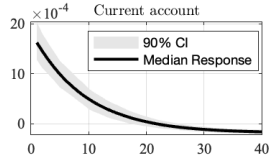


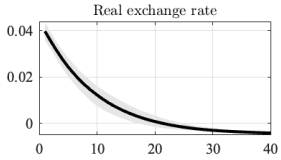


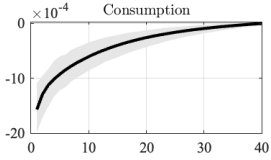


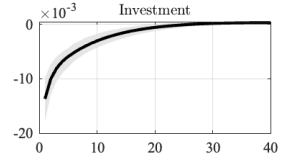


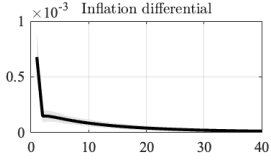
Impulse-Responses: Capital Flow Shock

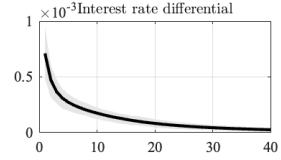




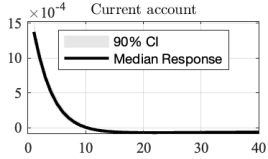


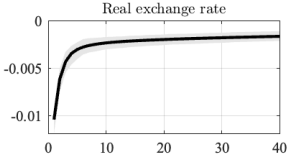


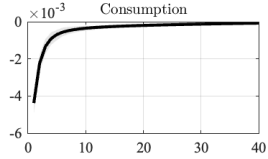


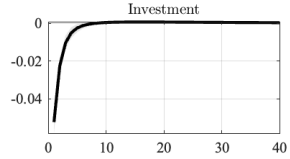


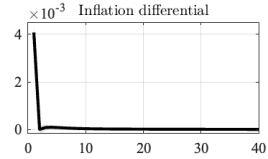
Impulse-Responses: Import Price Shock

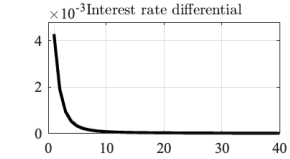




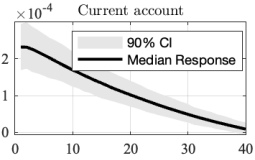


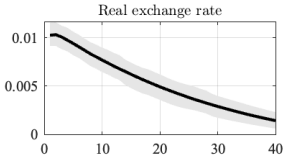


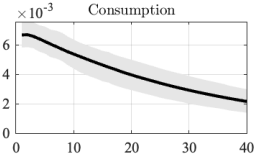


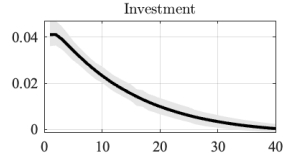


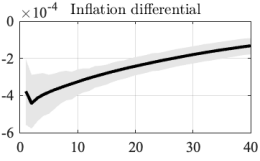
Impulse-Responses: TFP Shock

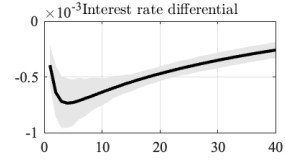




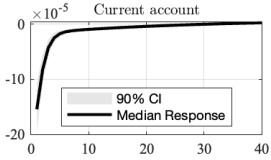


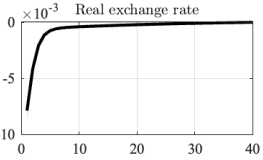


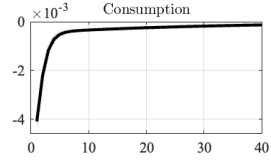


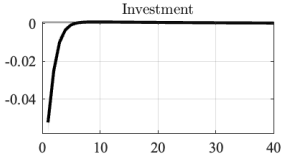


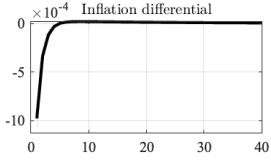
Impulse-Responses: Monetary Policy Shock

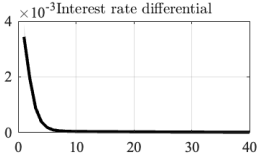




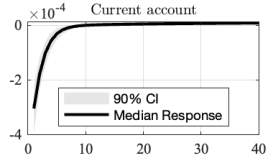


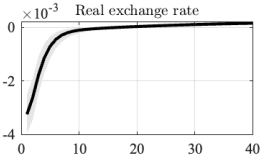


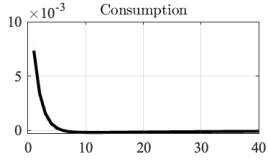


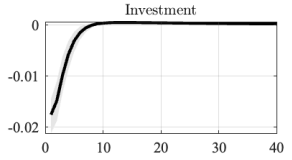


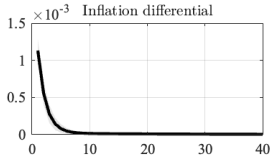
Impulse-Responses: Domestic Demand Shock

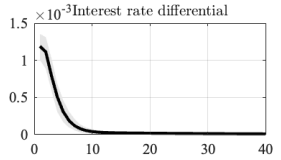




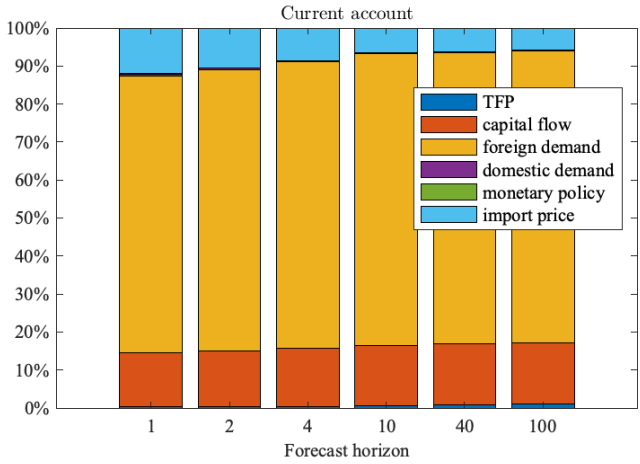








Forecast Error Variance Decomposition



UK/Germany

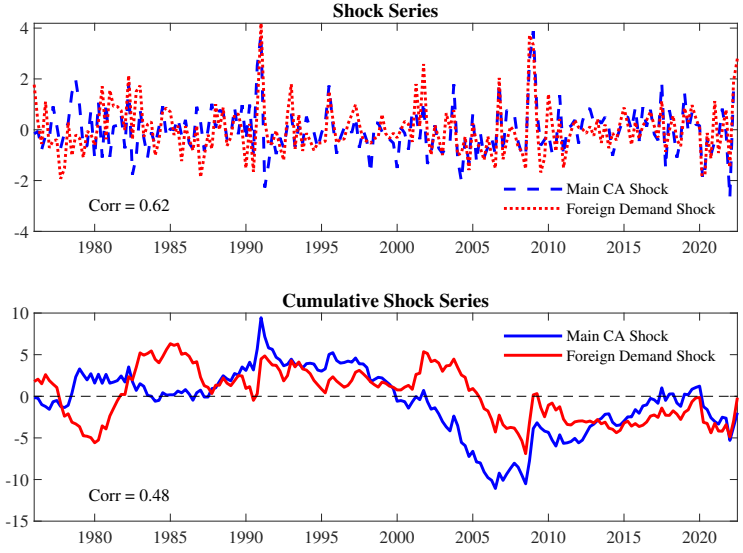
Dominant CA Shock and Model Shocks

Loadings of Various Shocks onto the Dominant CA Shock

	US	DE	UK
VARIABLES	Dominant CA	Dominant CA	Dominant CA
TFP	0.0792	-0.0551	-0.0110
	(0.0658)	(0.0430)	(0.0649)
capital flow	0.477***	0.343***	0.113**
	(0.0610)	(0.0340)	(0.0542)
foreign demand	0.852***	0.845***	0.847***
	(0.0614)	(0.0336)	(0.104)
domestic demand	-0.0547	-0.230***	-0.0464
	(0.0664)	(0.0461)	(0.0654)
monetary policy	0.0861	-0.0544	-0.00855
	(0.118)	(0.0454)	(0.0776)
import price	0.407***		
	(0.111)		
Observations	187	187	187
R-squared	0.642	0.826	0.711

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

Empirical to Model Shock Series Comparision: US



Germany UK

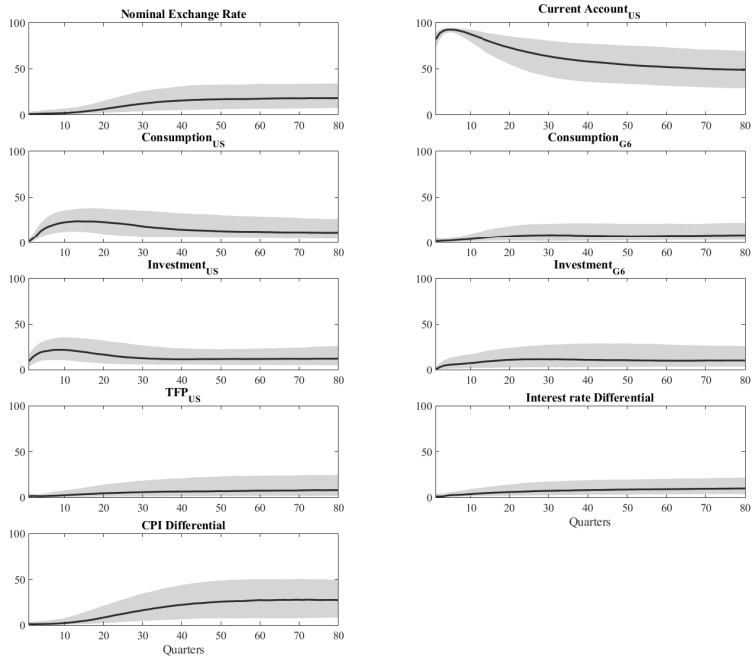
Conclusion

Conclusion

- We document the statistical properties of the dominant drivers of the current account at business cycle frequency and over the long run for 3 countries
- We interpret the empirical evidence using an open-economy DSGE model with financial frictions
- At business cycle frequencies the current account is mainly driven by foreign demand with some role for capital flow shocks
- Over the long run we observe expenditure switching where the current account improves while the exchange rate depreciates

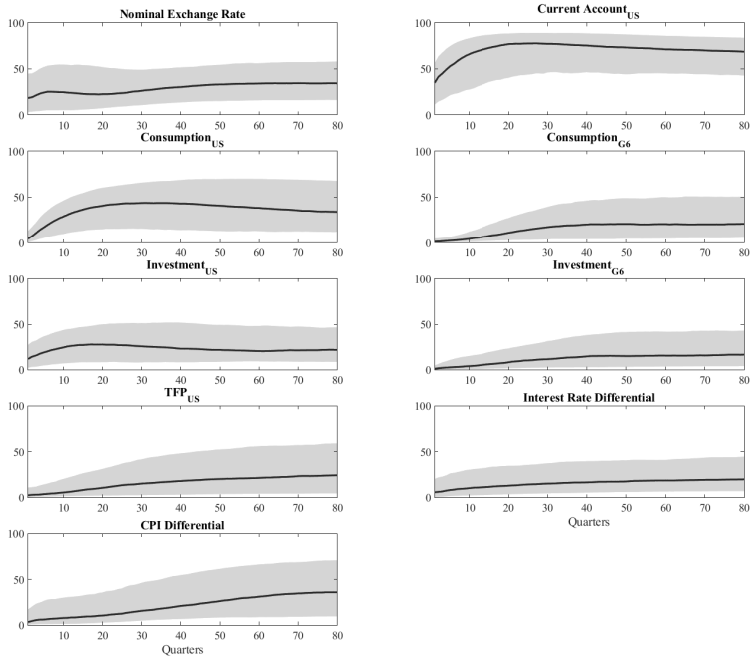
Appendix

US dominant CA shock at business cycle frequency: FEVD



back

US dominant CA shock in the long run: FEVD



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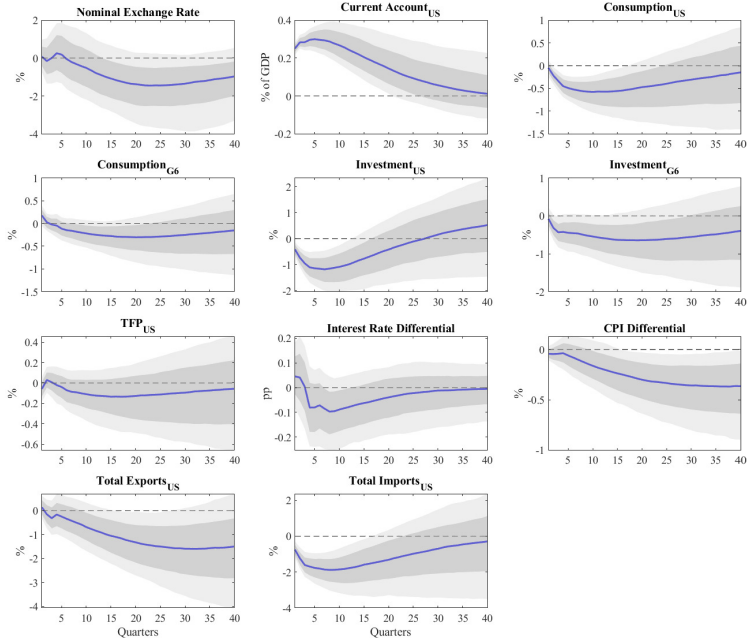
US dominant CA shock at business cycle frequency: Exports and Imports



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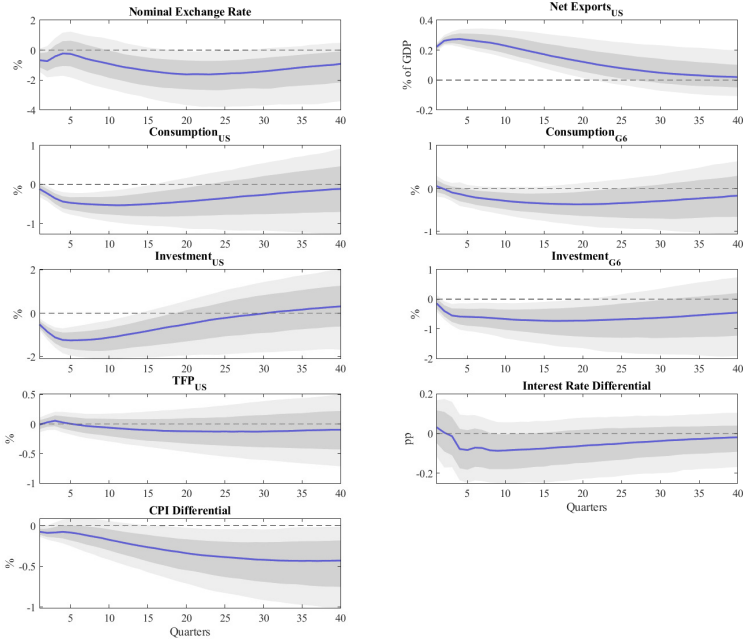
US dominant net exports shock at business cycle frequency



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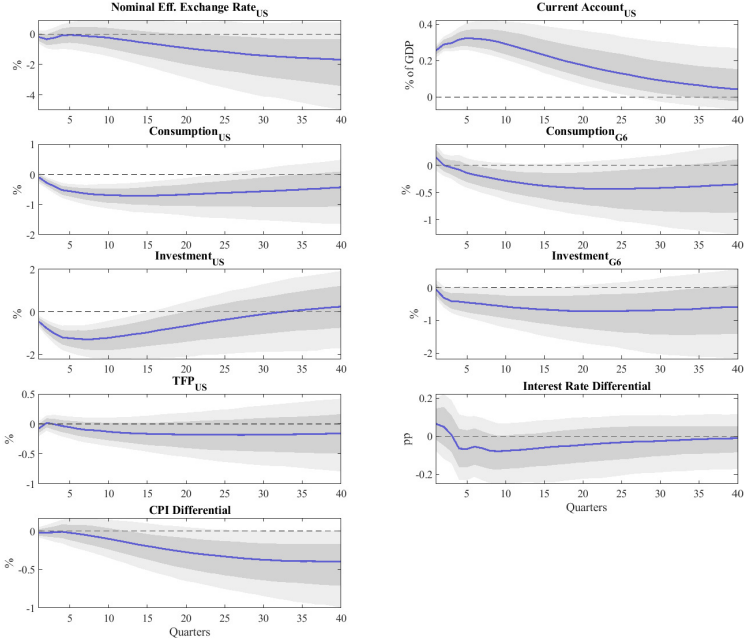
US dominant income balance shock at business cycle frequency



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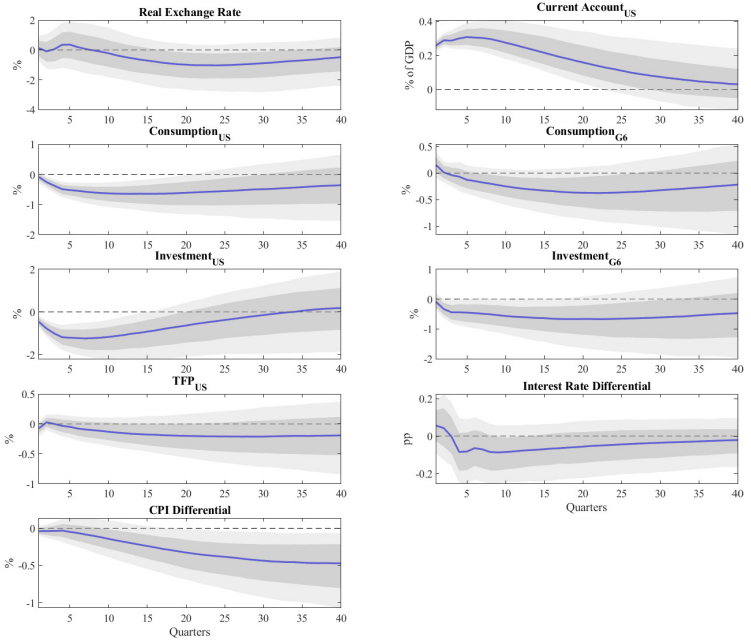
US dominant CA shock at business cycle frequency: Real ex. rate



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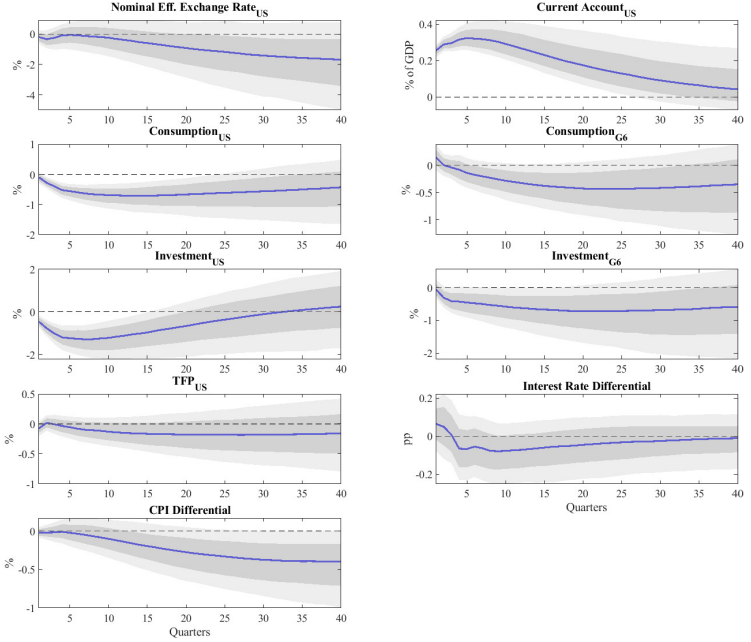
US dominant CA shock at business cycle frequency: Nom. eff. ex. rate



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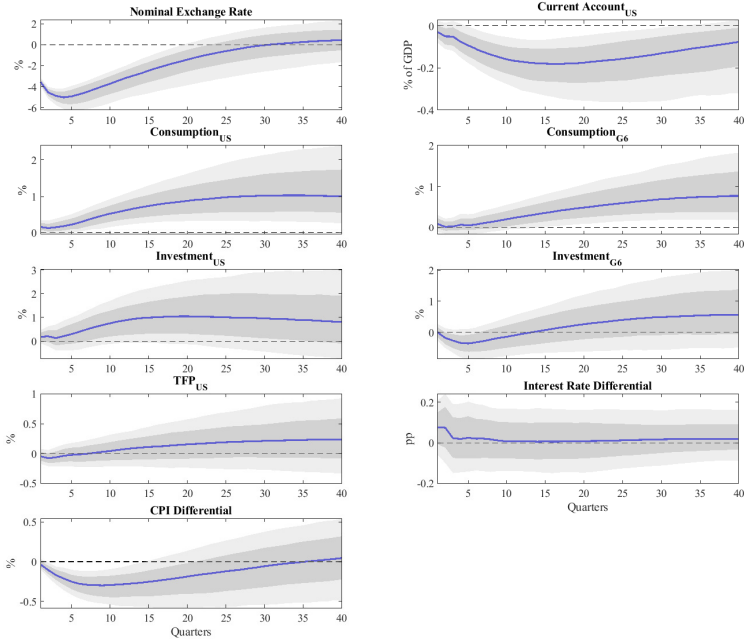
US dominant exchange rate shock at business cycle frequency



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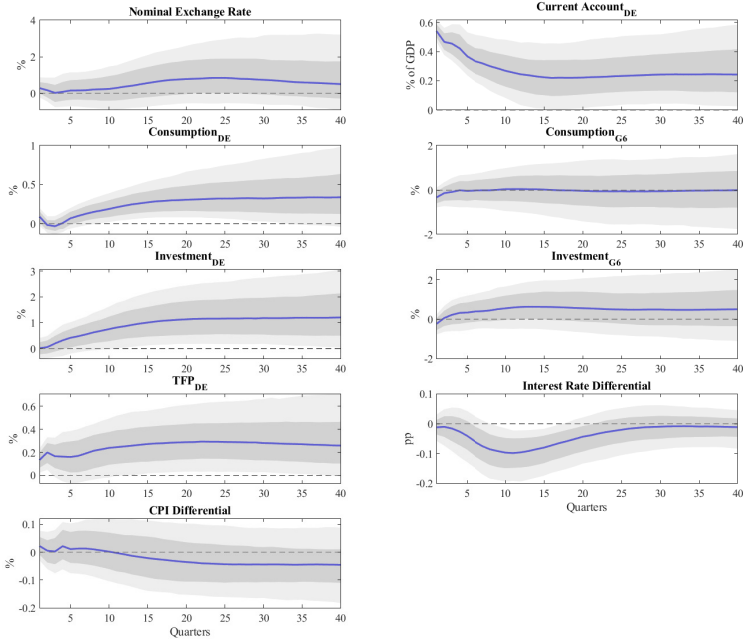
Germany: dominant CA shock at business cycle frequency w/ TFP



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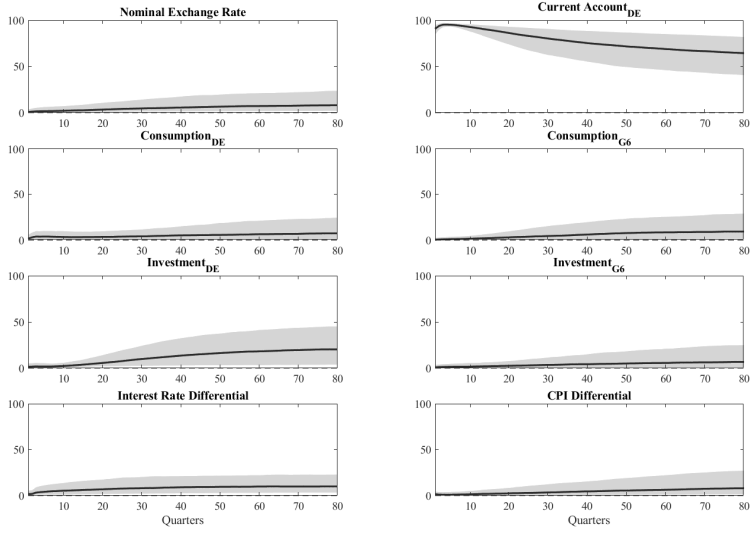
Germany: dominant CA shock at business cycle frequency: FEVD



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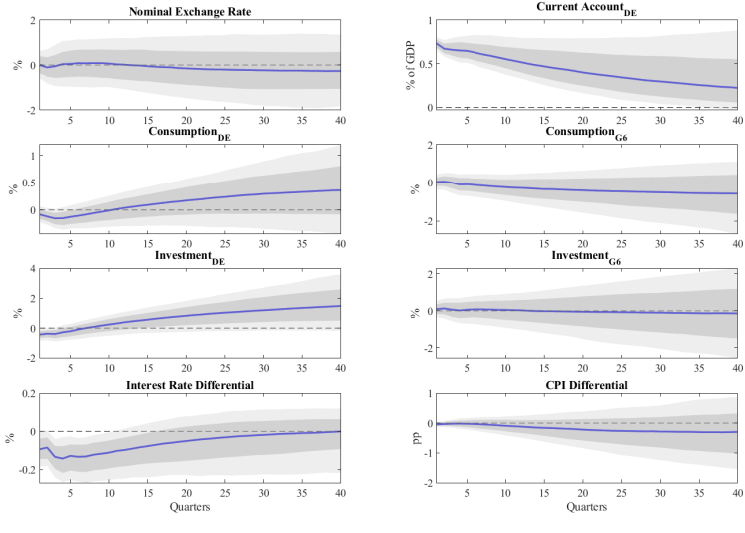
Germany: dominant CA shock at business cycle frequency w/o TFP 1991-2019



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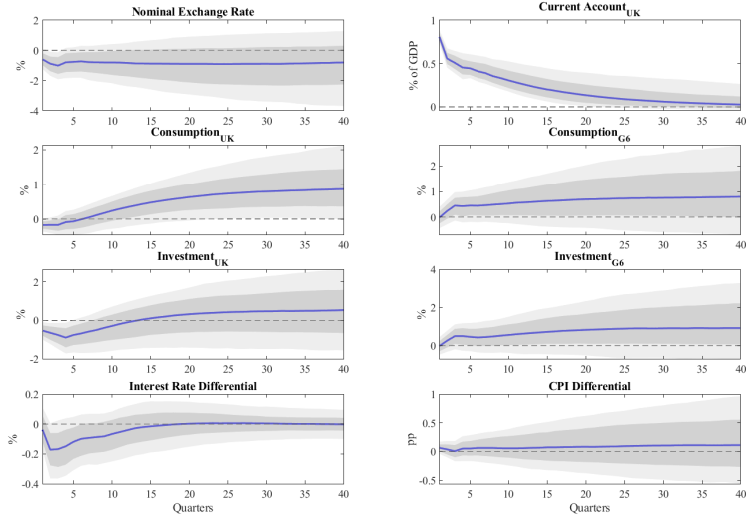
UK: dominant CA shock at business cycle frequency w/ TFP



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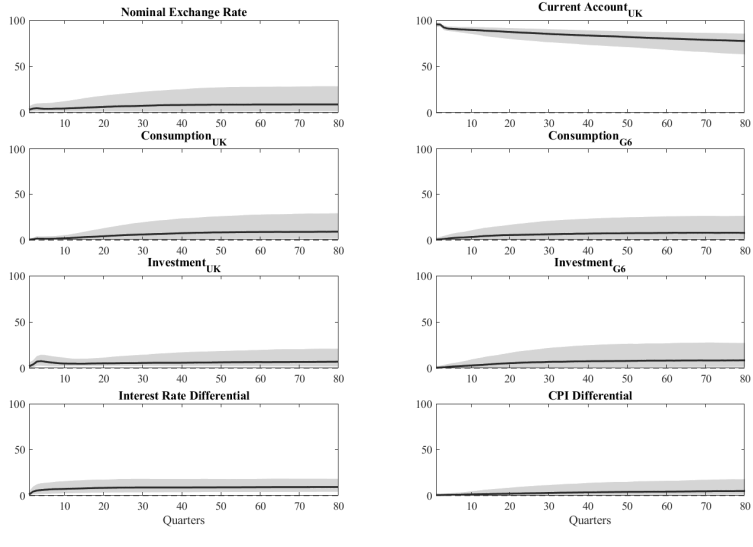
UK: dominant CA shock at business cycle frequency: FEVD



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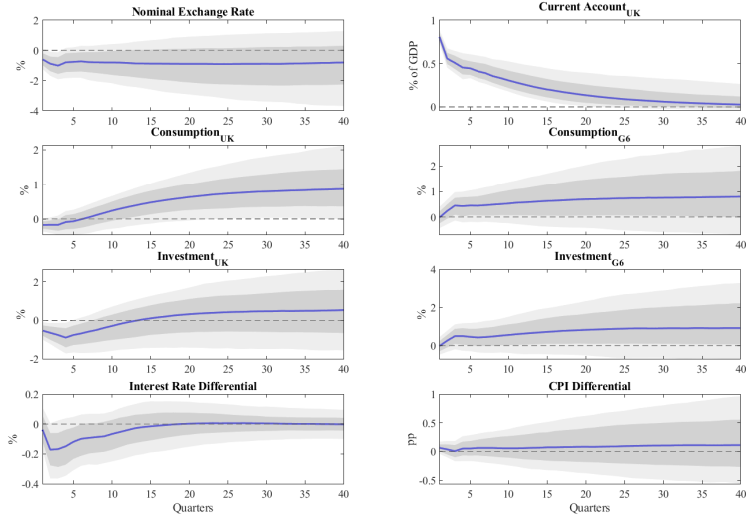
UK: dominant CA shock at business cycle frequency w/o TFP 1991-2019



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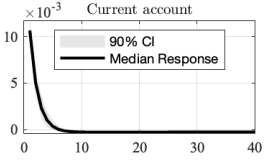
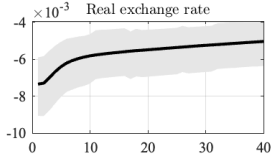
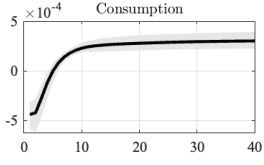
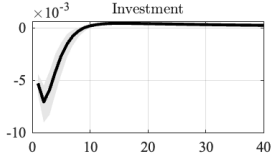
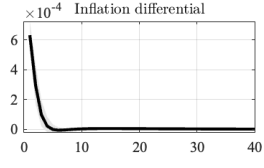
Impulse-Responses for UK: Foreign Demand Shock

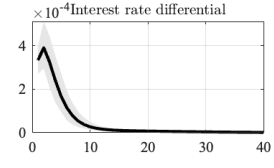




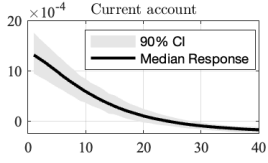


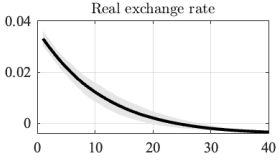


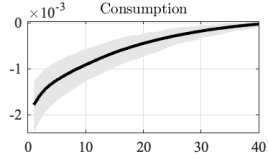


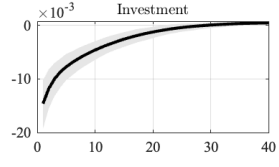


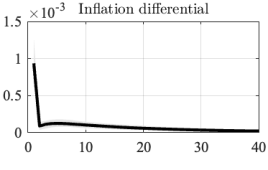
Impulse-Responses for UK: Capital Flow Shock

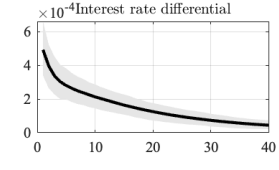




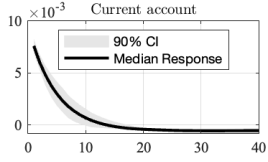


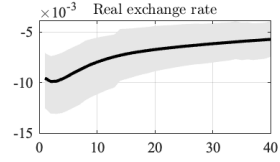


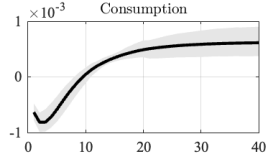


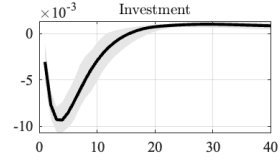


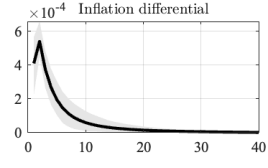
Impulse-Responses for Germany: Foreign Demand Shock

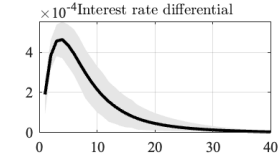




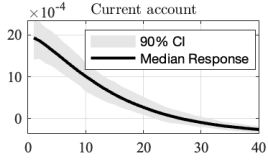


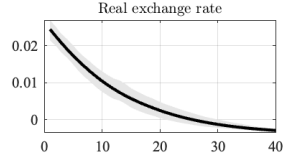


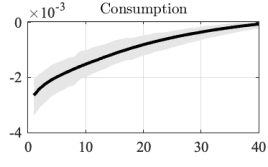


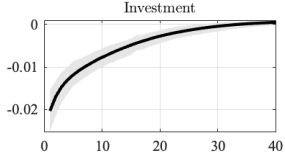


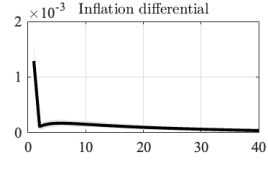
Impulse-Responses for Germany: Capital Flow Shock

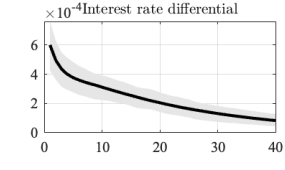




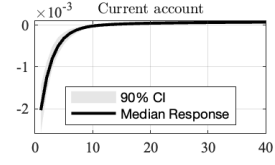


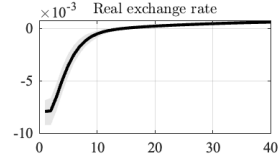


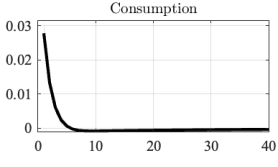


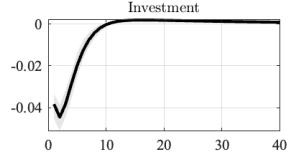


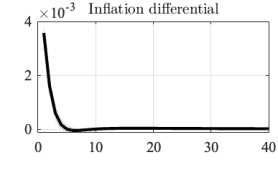
Impulse-Responses for Germany: Domestic Demand Shock

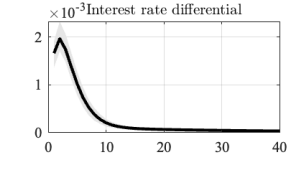




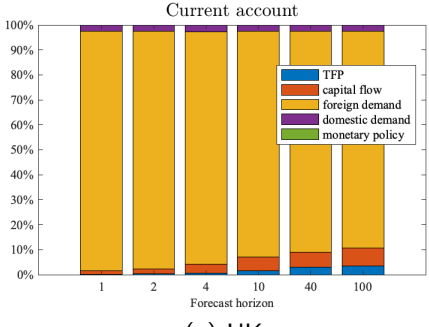




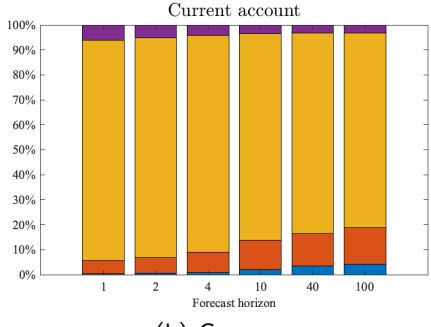




FEVD: UK & Germany



(a) UK



(b) Germany

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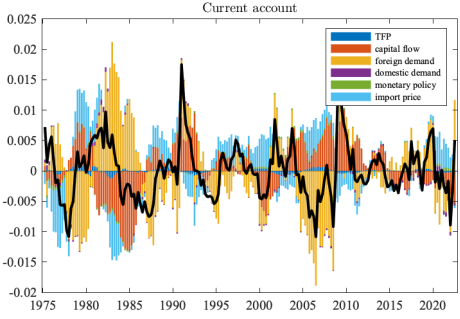
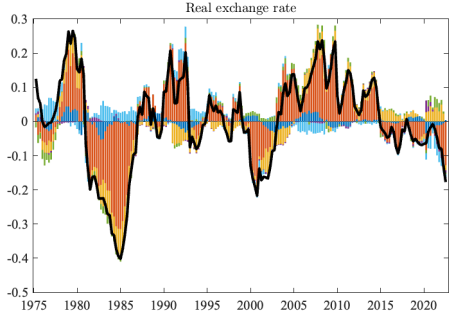
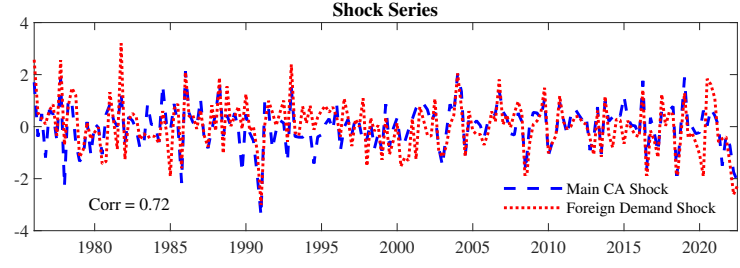
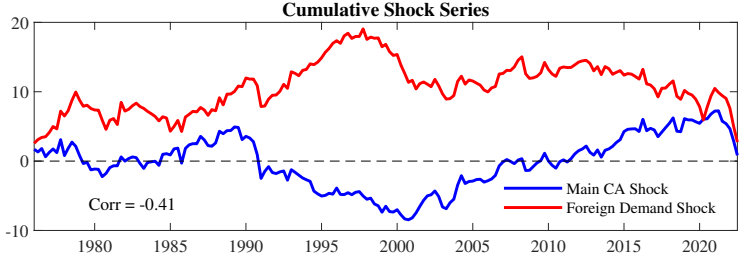
Historical Decomposition: US





Empirical to Model Shock Series Comparision: Germany





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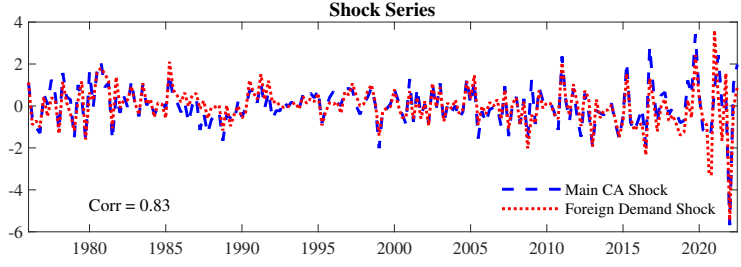
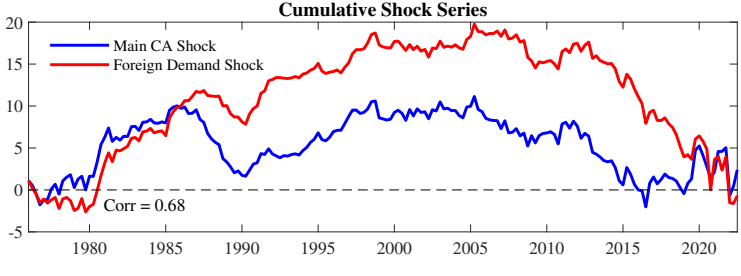
Empirical to Model Shock Series Comparision: UK





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