The Economics of International Sanctions

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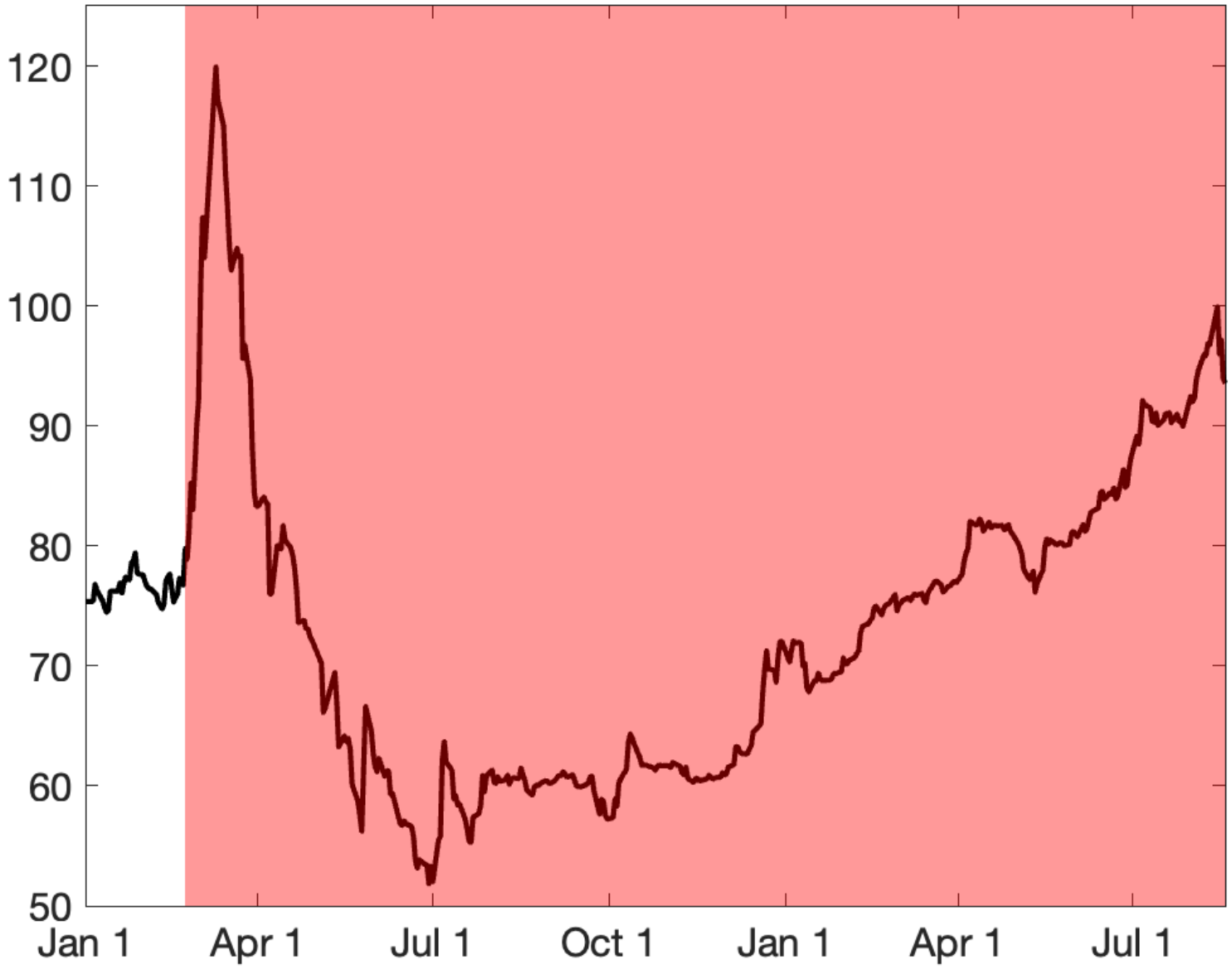
RUB/USD Exchange Rate



This Paper

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  - do sanctions work? why ruble appreciated? is the exchange rate "irrelevant"?
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- Dual role of exchange rate (sources of FX supply and demand):
  1. goods market: exports and imports
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- Dual role of exchange rate (sources of FX supply and demand):
  1. goods market: exports and imports
  2. asset markets: FX reserves and private savings
- Roadmap
  1. Equivalence of import, export and fin. sanctions: Lerner Symmetry
  2. When Lerner Symmetry fails? Optimal sanctions mix
  3. Equilibrium Dynamics under Financial Sanctions

Equivalence. Lerner Symmetry

1. country's budget constraint:

$$\frac{F^*_{t+1}}{R^*_t} - F^*_t = Y^*_t - P^*_t C_{Ft}$$

   — in steady state: $(1-\beta)F^* + Y^* = P^* C_F$

2. import demand (expenditure switching):

$$\frac{C_{Ft}}{Y_t} = \frac{\gamma}{1-\gamma}\left(\frac{\mathcal{E}_t P^*_t}{P_t}\right)^{-\theta}$$

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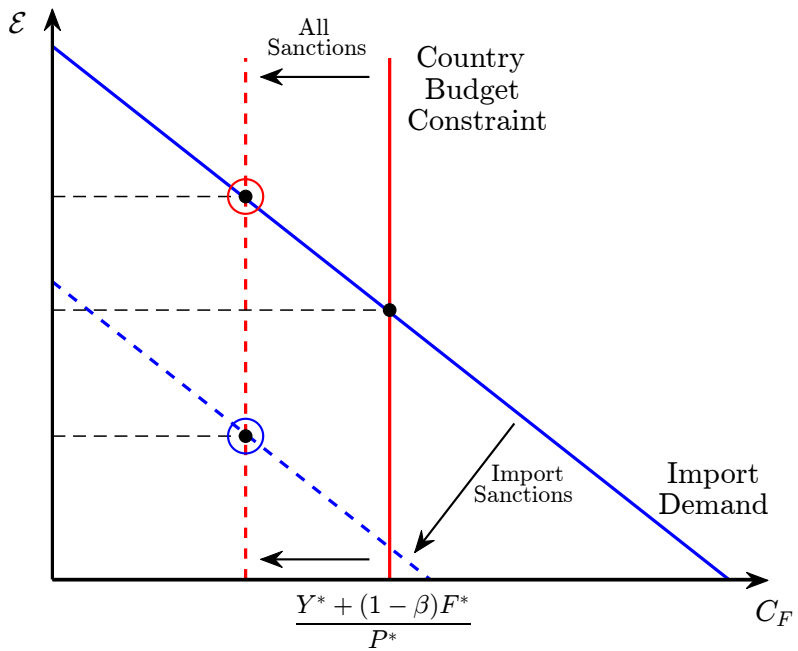
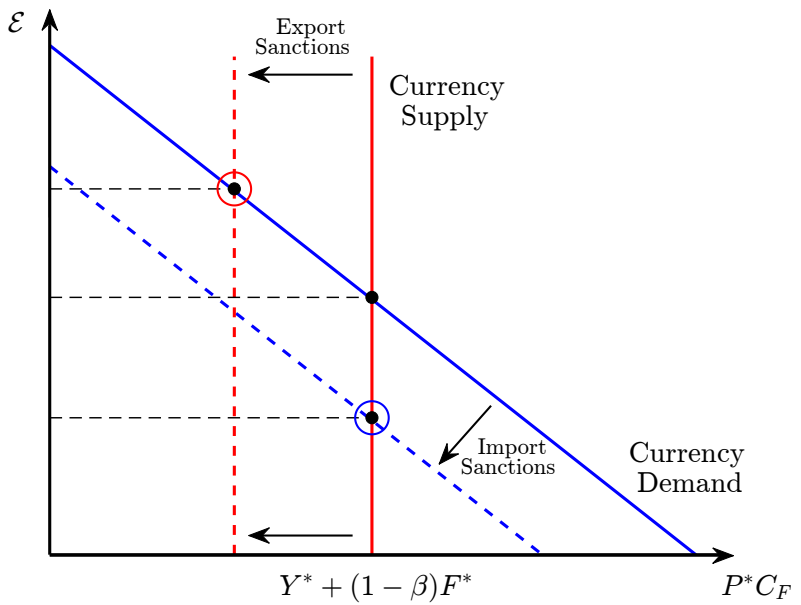
- Import, Export and Financial sanctions are equivalent in their effect on allocations, but have a differential effect on the exchange rate
  - — Macro manifestation of Lerner Symmetry: equivalence between an export tax and an import tariff
  - — Extends to fiscal effects and cost of living (inflation)
  - — Sanctions are complementary

Illustration

(a) Goods market equilibrium



(b) Currency market equilibrium



Limits of Lerner Symmetry

1. Temporary sanctions or pre-announced sanctions
   - break uniformity requirement of Lerner symmetry
   - temporary import sanctions encourage savings/avoid need to borrow, and undo the effect of financial sanctions and borrowing constraints
   - in case of Russia: financial sanctions combined with import sanctions and commodity export boom

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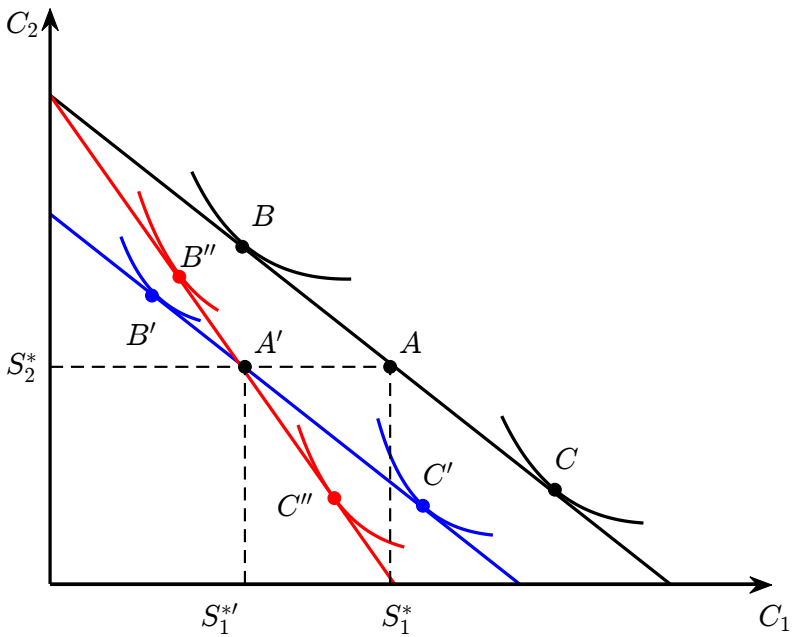
2. Financial + export sanctions can trigger a credit crunch when domestic contracts are written in foreign currency (dollarization)
   - exchange rate depreciates increasing FX debt burden
   - may trigger tightened borrowing constraints and defaults on FX debt
   - in case of Russia: little dollarization of the economy or external debt

Illustration 1

(a) Wealth and income effects



(b) Substitution effect

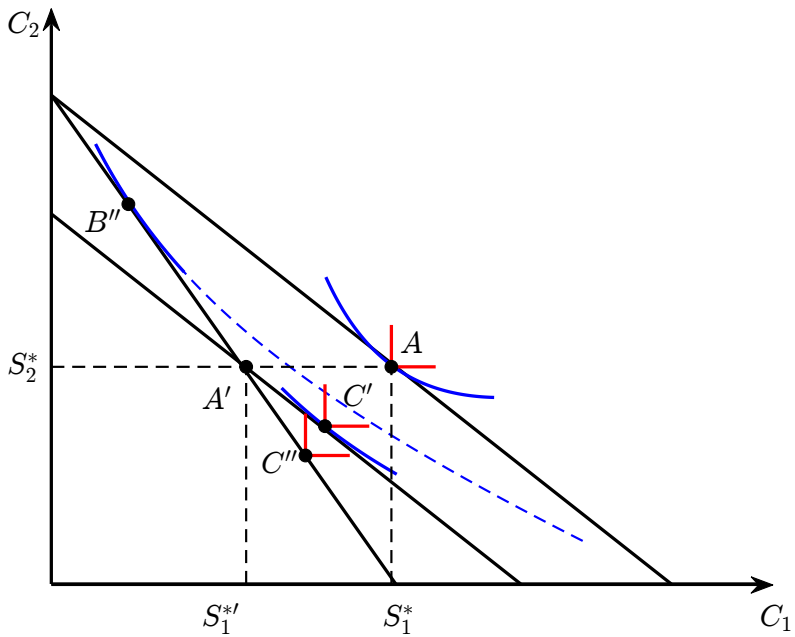
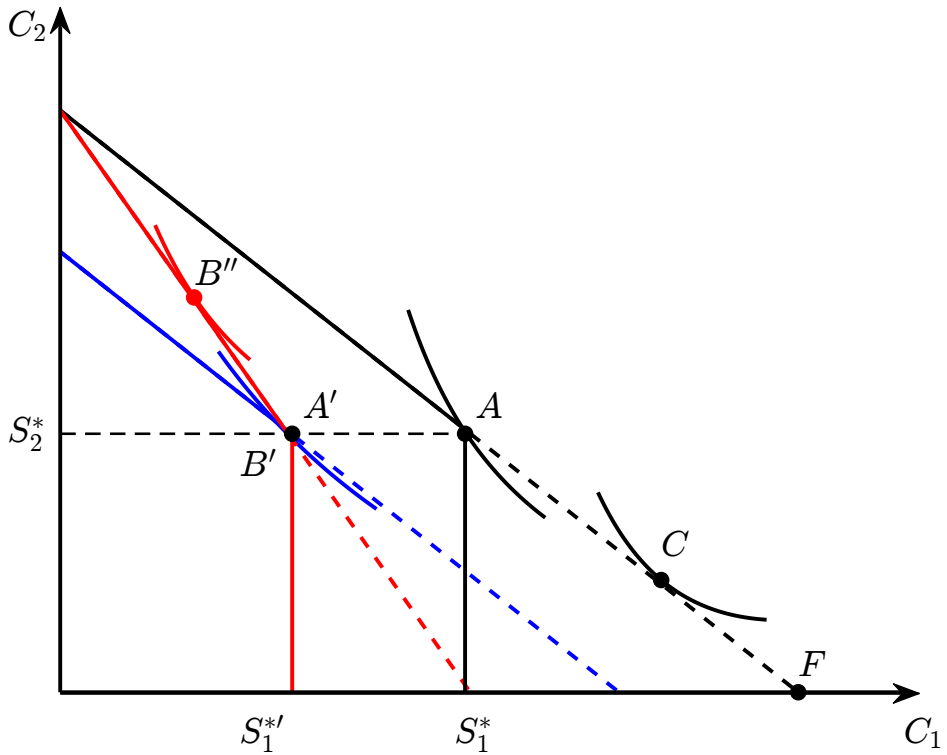


Illustration 2

- Complementarity between financial and export sanctions



- TFP effect from foreign currency debt: $Y_t = Y\left(\frac{D_{t-1}+\mathcal{E}_t D^*_{t-1}}{P_t}\right)$

Dynamics under Financial Sanctions

Demand for currency:

$$\beta R^*_{Ht}\mathbb{E}_t\left\{\frac{P^*_t}{P^*_{t+1}}\left[\underbrace{\left(\frac{C_{Ft}}{C_{Ft+1}}\right)^{1/\theta}}_{\text{imports}}+\tilde{\kappa}C_{Ft}^{1/\theta}\underbrace{\left(\Psi_t-\frac{B^*_{t+1}}{P^*_{t+1}}\right)}_{\text{savings}}\right]\right\}=1$$

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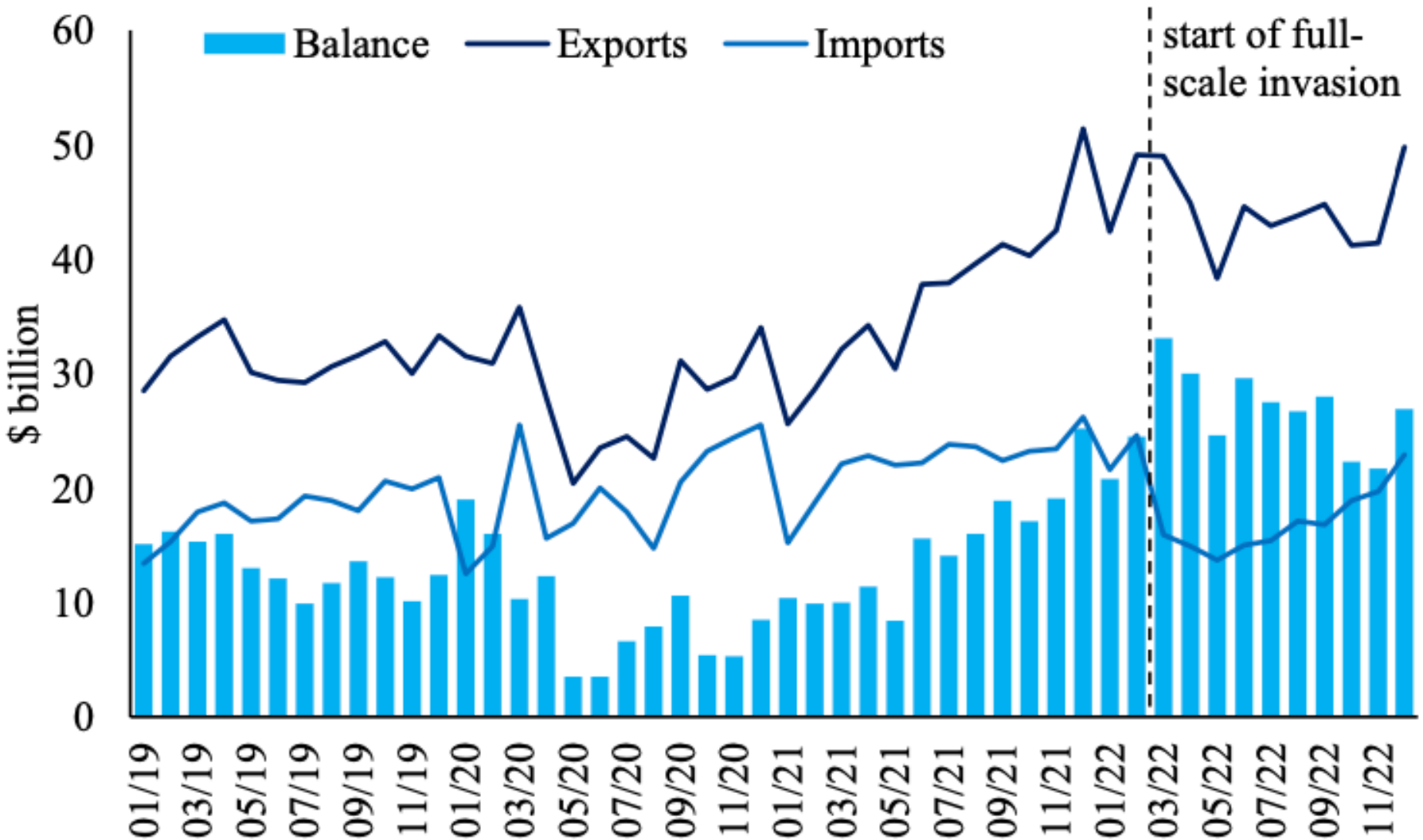
3. Financial repression: capital controls or taxes on FX, $R^*_{Ht} < R^*_t$
   - — prevents depreciation; redistributes from savers to consumers
   - — in Russia: a full spectrum of financial repression ▸ show

Quantitative Evaluation

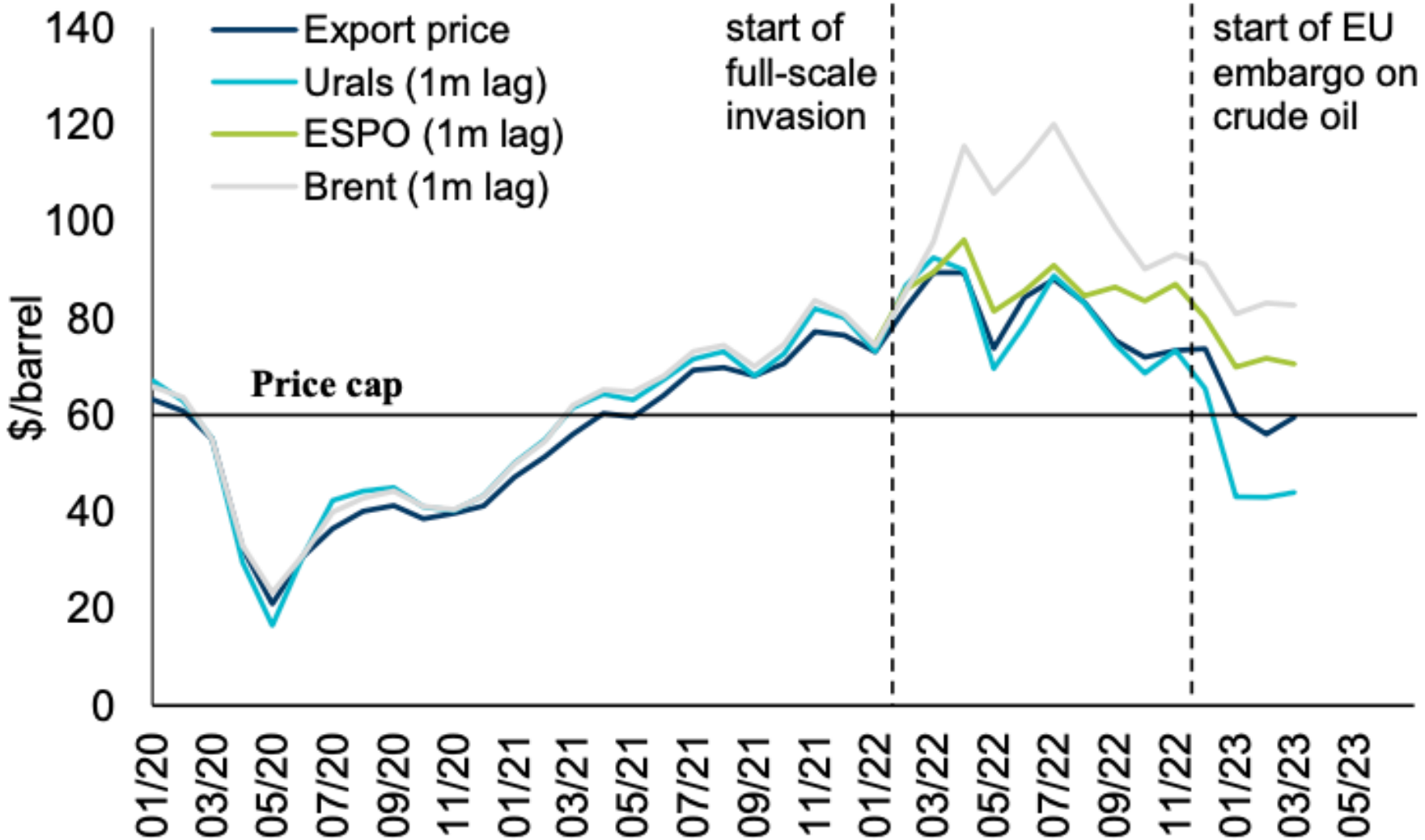
Russian Trade in 2022



Source: Babina, Hilgenstock, Itskhoki, Mironov, and Ribakova (2023)

Quantitative Evaluation

Russian Crude Discount



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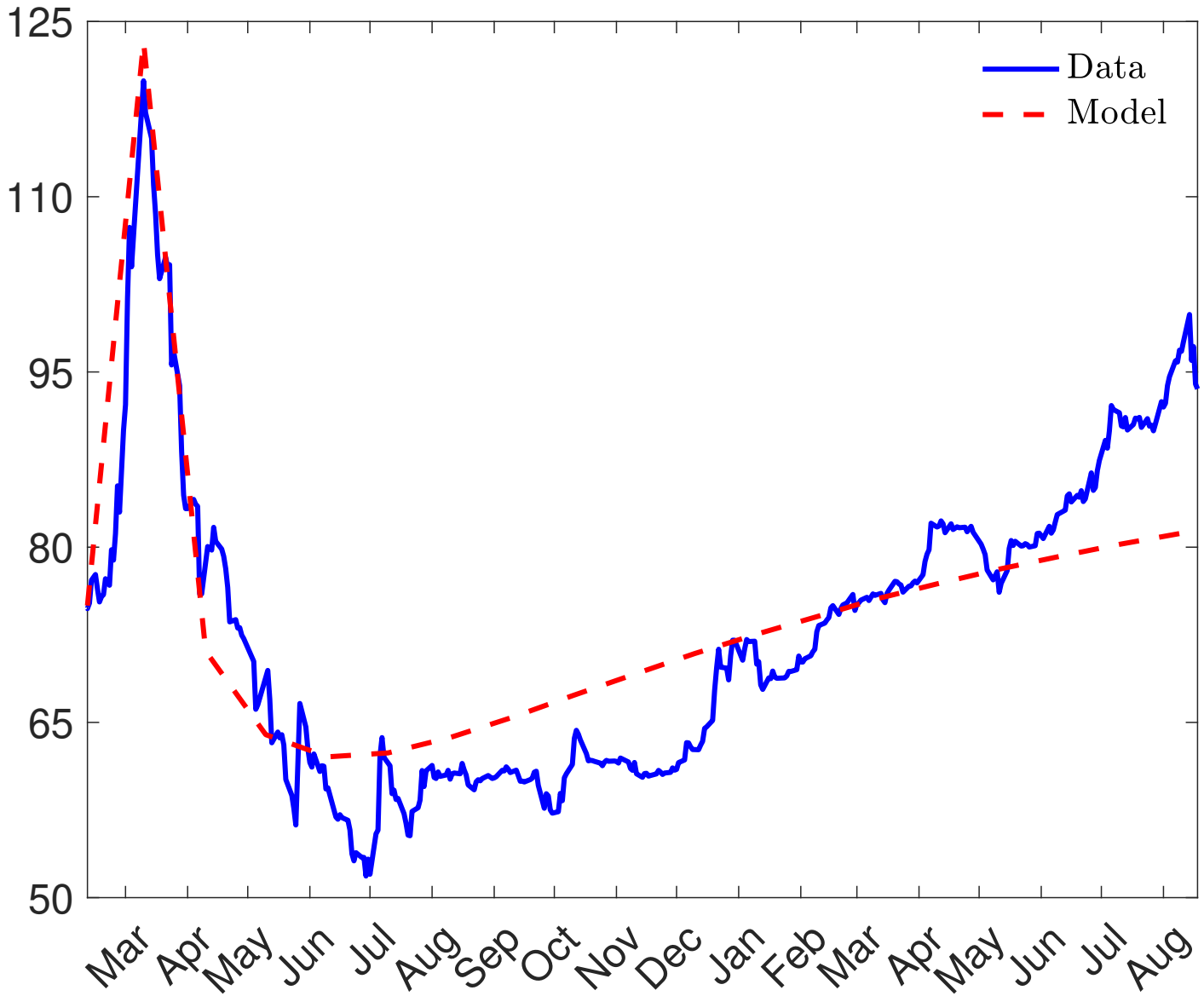
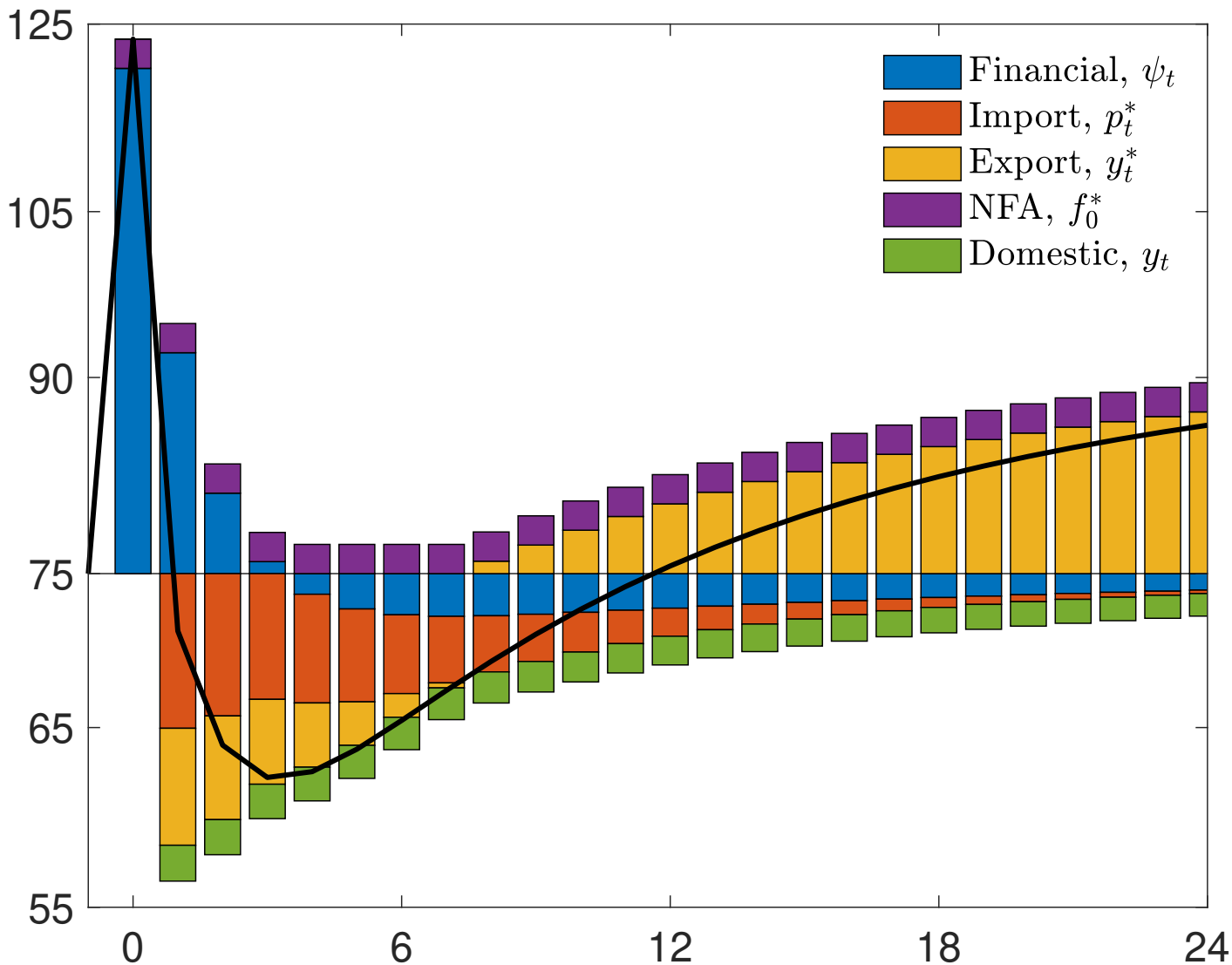
Model vs Data: USD/RUB Exchange Rate



Exchange Rate Decomposition



▸ trade ▸ data

Conclusion

- Economics sanctions are working, but have limited capacity without more decisive export restrictions
- Exchange rate is allocative, even under financial sanctions and financial repression, yet it is not a sufficient statistic
- Export, import and financial sanctions can have equivalent effects, yet they are complementary
- Combination of financial and export sanctions maximizes the chance of a currency and financial crisis, in particular in FX debtor countries
  - import sanctions can undo this effect of financial sanctions by relaxing the need for borrowing/borrowing constraints/FX debt burden
  - can a financial crisis be triggered in a country without government and external debt and no dollarization of domestic debt contracts?
- Financial sanctions complicate FX management and force the use of financial repression, a crude and costly policy tool

APPENDIX

Model

- SOE w/ T & NT endowment and demand for foreign currency
- **Households**:

$$\max \quad \mathbb{E}\sum_{t=0}^{\infty}\beta^t\left[u(C_{Ht},C_{Ft})+v\left(\frac{B^*_{t+1}}{P^*_{t+1}};\psi_t\right)\right]$$

$$\text{s.t.} \quad P_tC_{Ht}+\mathcal{E}_tP^*_tC_{Ft}+\frac{\mathcal{E}_tB^*_{t+1}}{R^*_{Ht}}+\frac{B_{t+1}}{R_t}\leq W_t+\mathcal{E}_tB^*_t+B_t$$

— precautionary savings (Diamond'65, Aiyagari'94, CFG'08)

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— $u(C_H,C_F)=(1-\gamma)^{\frac{1}{\theta}}C_H^{\frac{\theta-1}{\theta}}+\gamma^{\frac{1}{\theta}}C_F^{\frac{\theta-1}{\theta}}, \quad v(b;\psi)=-\frac{\kappa}{2}\cdot(b-\psi)^2$

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- **Market clearing**: $C_{Ht}=Y_t$ and $\frac{F^*_{t+1}}{R^*_t}-F^*_t=Y^*_t-P^*_tC_{Ft}$

Shocks

- **Sanctions**:
  - export sanctions $Y_t^* \downarrow$
  - import sanctions $P_t^* \uparrow$
  - exit of multinationals $Y_t \downarrow$
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- **Policy**:
  - fiscal W_t, B_t
  - monetary R_t, P_t
  - FX reserves $F_t^* - B_t^*$
  - financial repression R_{Ht}^*

Stationary Equilibrium

- Assume $R^*_{Ht} = R^*_t = 1/\beta$ and $\psi_t = 0$
- Import expenditure (FX demand) & country budget constr.(FX supply):

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- Equilibrium exchange rate – allocative, but not a sufficient statistic:

$$\mathcal{E}^\theta = \frac{\gamma - \delta}{1 - \gamma} \left(\frac{\bar{P}^*}{P} \right)^{1-\theta} \frac{P Y}{Y^* + (1 - \beta) F^*}$$

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$\Rightarrow$ **$\mathcal{E}_t$ is not sufficient statistic for effectiveness of sanctions**

Gov't Revenues and CPI

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- Other implications (Itskhoki and Mukhin AEA'2023): ▸ figure
  - import & export sanctions are **complements** as both have limited scope
  - **frontloading** of $Y_t^* \downarrow$ has larger effect than $P_t^* \uparrow$ for countries w/ CA> 0
  - **frontloading** of $Y_t^* \downarrow$ has larger effect than $P_t^* \uparrow$ if combined w/ $F_t^* \geq 0$

Multiple Foreign Currencies

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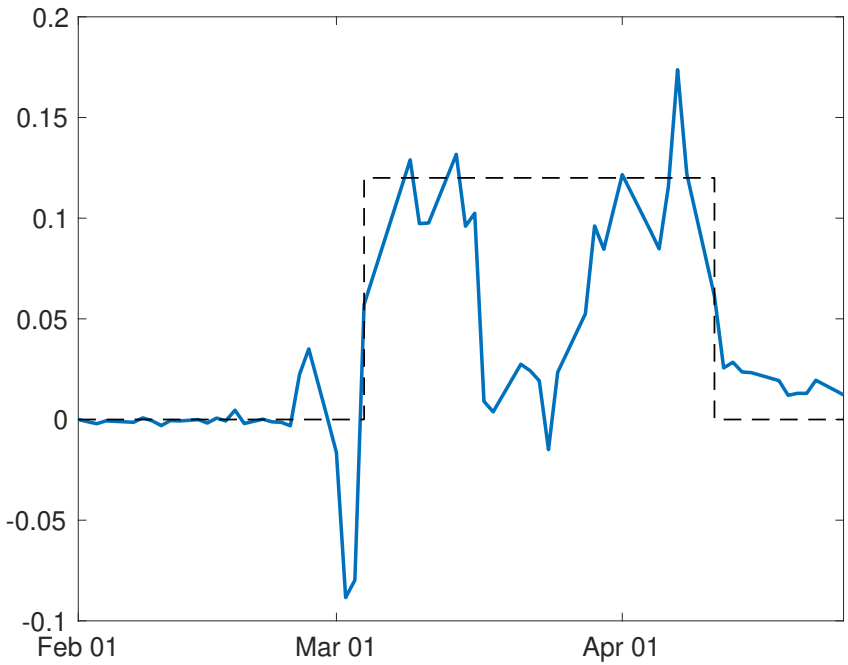
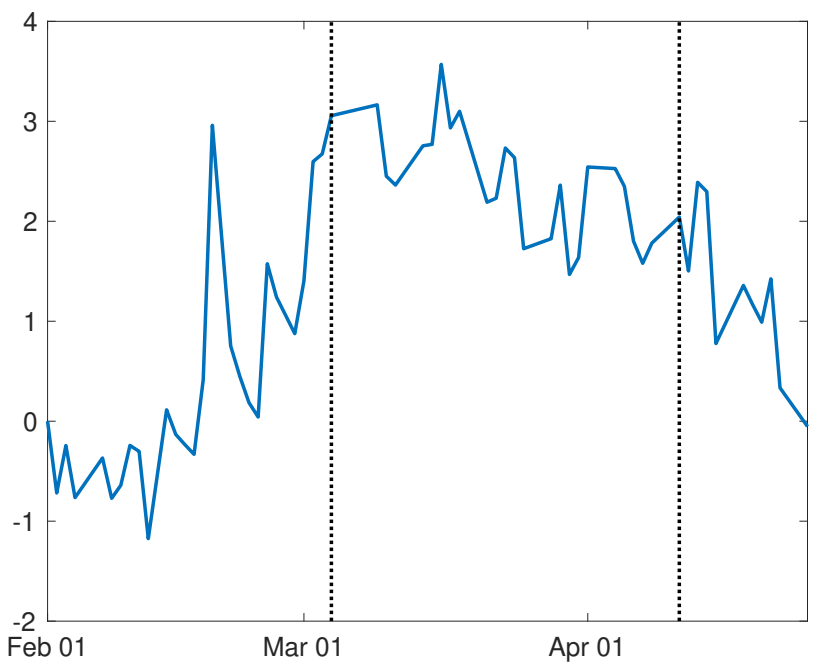
Figure: Swiss franc vs U.S. dollar

(a) Exchange rates



(b) Relative turnover



Note: (a) exchange rate at the Moscow Exchange relative to its international value, (b) Swiss franc turnover relative to the dollar at the Moscow Exchange.

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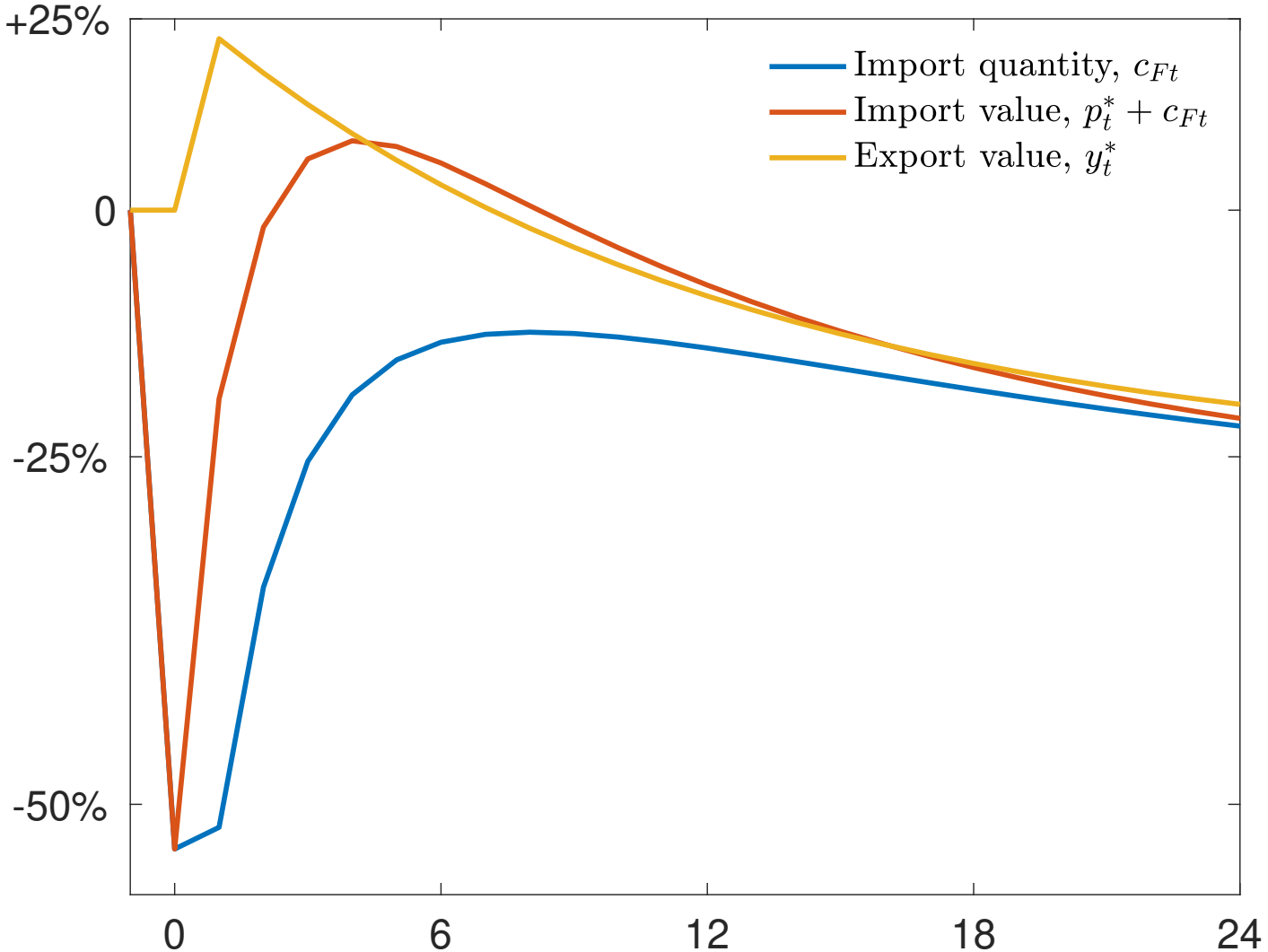
Trade Balance



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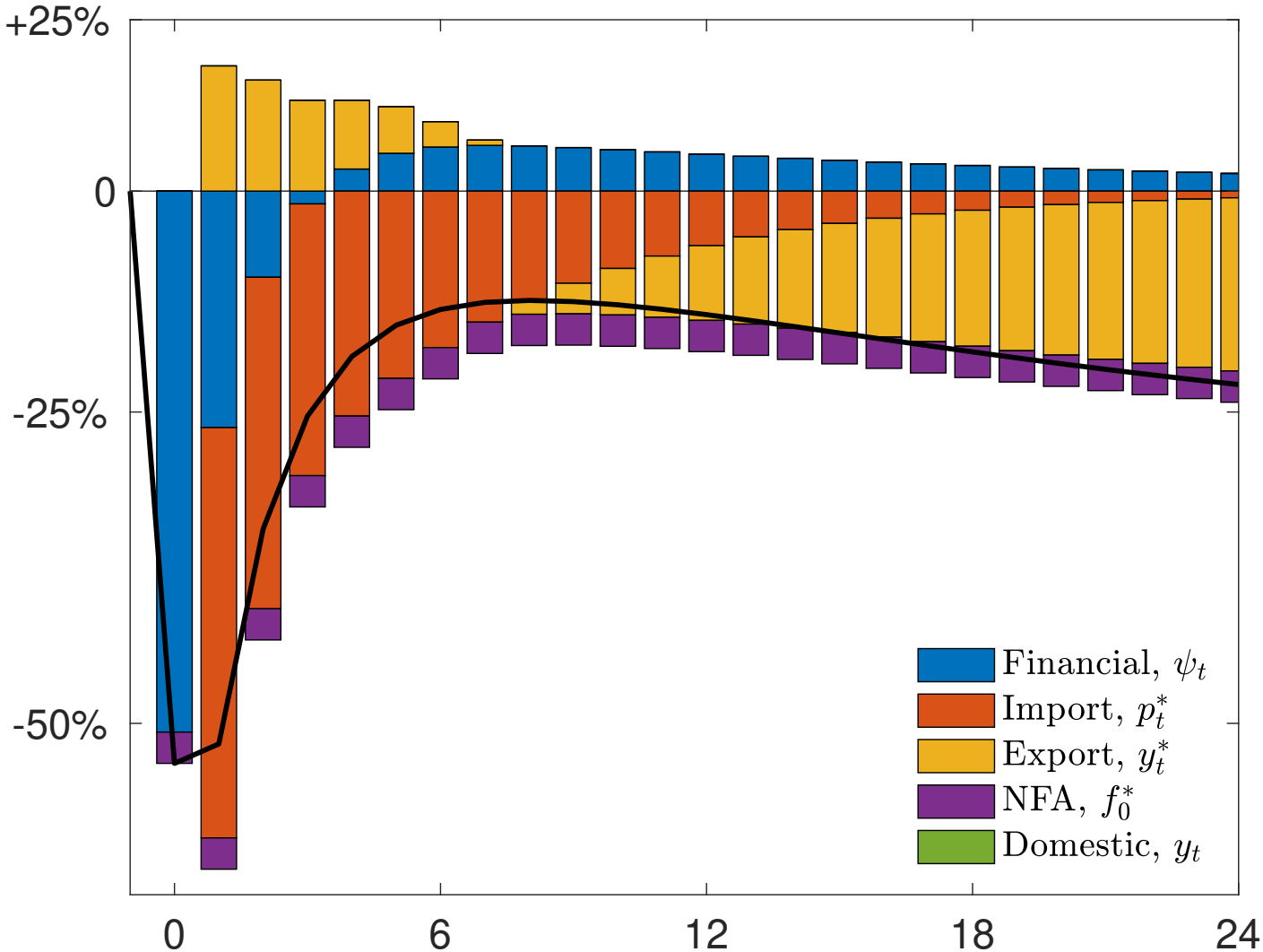
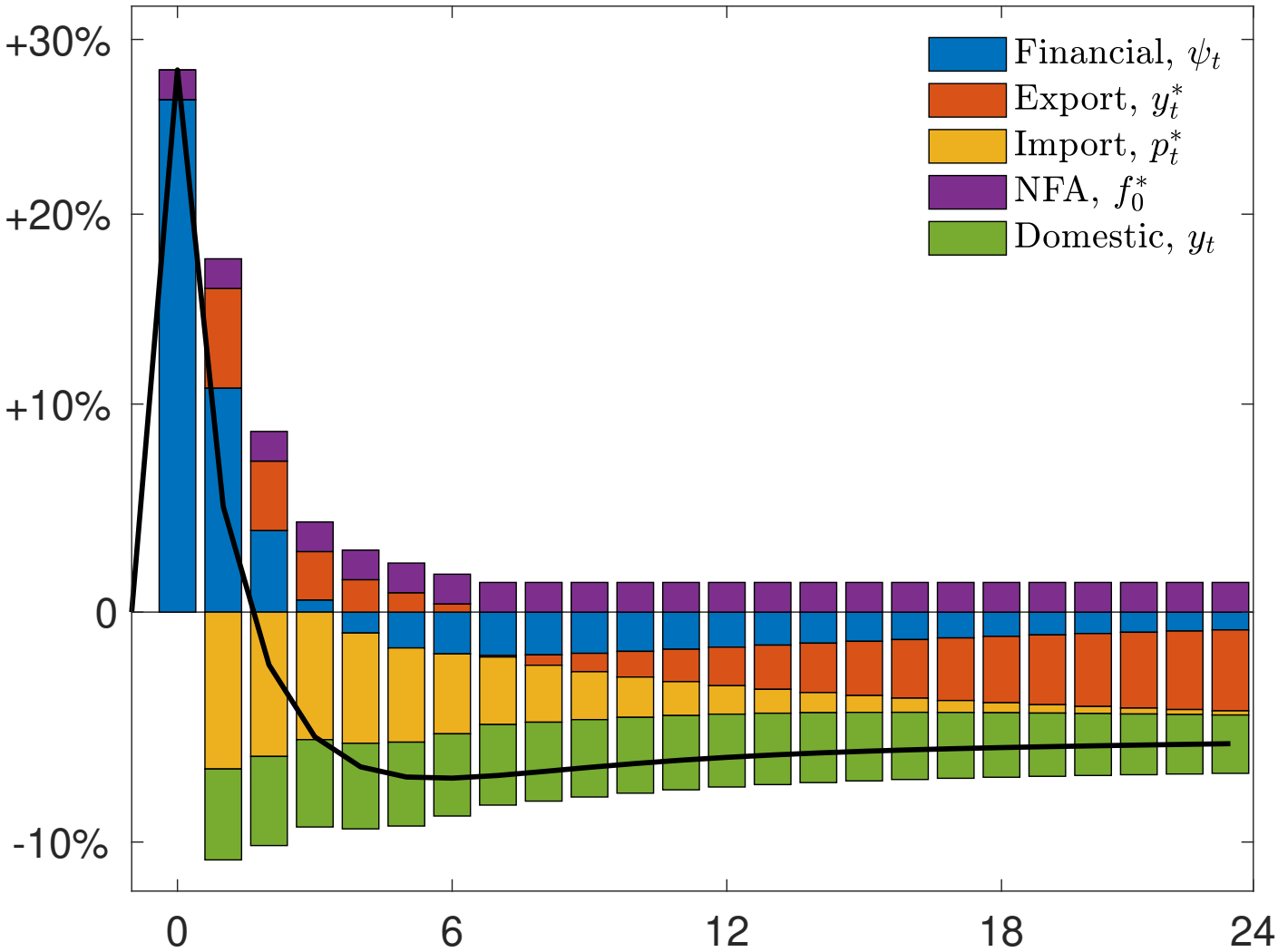
Trade Balance



FISCAL REVENUES

Fiscal Revenues



Fiscal Deficit and FXI

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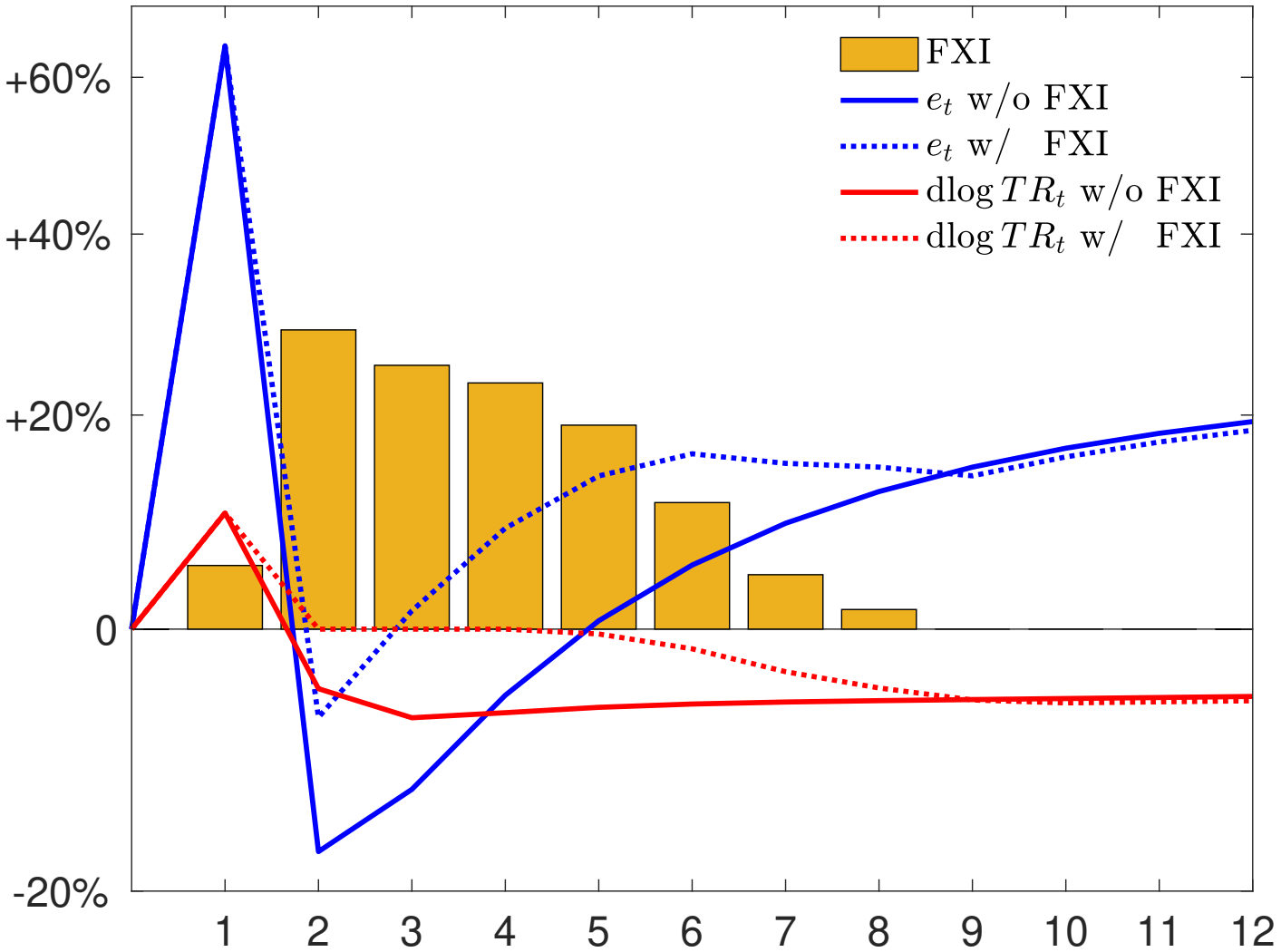
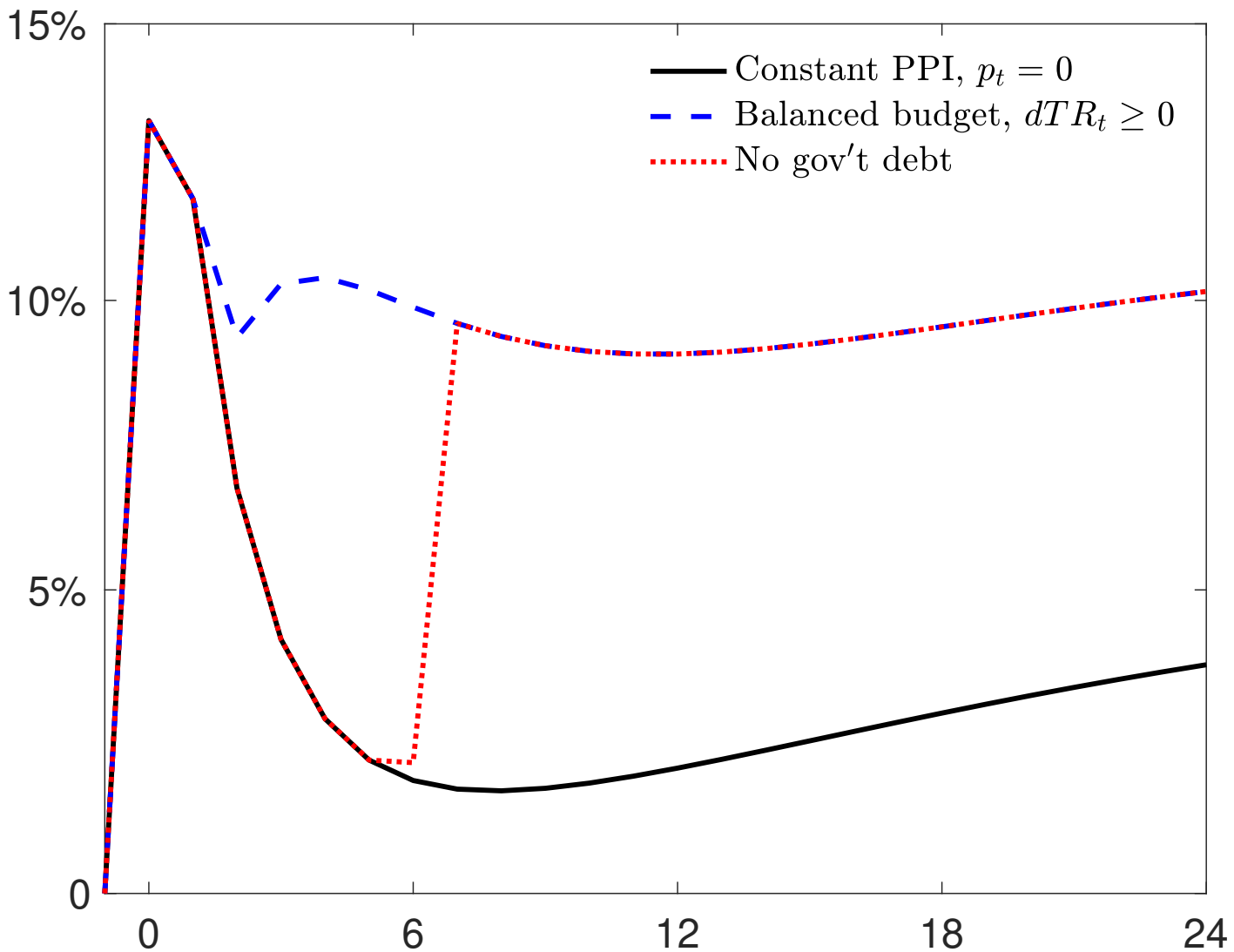
- **Proposition**: FXI can temporary increase gov't revenues, but do not change permanent revenues $\sum_{t=0}^{\infty} \beta^t TR_t$
  - — FXI require borrowing in local currency
  - — accumulating FX reserves might be risky

Government Revenues



Note: FXI close the budget deficit over the first year and gradually increase the deficit over the second year. One period corresponds to a quarter. ▸ inflation

CPI Inflation



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Policy Ranking

- Which exchange rate policy is **optimal**?
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  3. financial repression redistributes from RA to HtM (*cf*. Fanelli-Straub'21)

$$R_{Ht}^* < R_t^* \quad \Rightarrow \quad \mathcal{E}_t \downarrow \quad \Rightarrow \quad C_t^{HtM} \uparrow$$

Calibration

- **Parameters**: $\beta = 0.96^{\frac{1}{12}}$, $\theta = 1.5$, $\bar{\kappa} = 0.5$

- **Shocks**:

	Financial		Import	Export		Domestic
	f_0^*	ψ_t	p_t^*	Temp., y_{1t}^*	Perm., y_{2t}^*	recession, y_t
Initial shock, ε_{t_0}	-12	1.5	0.5	0.5	-0.3	-0.05
— arrives in period, t_0	0	0	1	1	1	1
Persistence, ρ	1	0.94	0.84	0.92	1	0.98
— half life (months)	∞	12	4	8	∞	36

Conclusion

- Why did the ruble depreciate initially?
  - overnight freeze of gov't reserves + threat of blocking exports
  - high home demand for foreign currency as a store of value
- Why did the exchange rate reverse in mid-March?
  - tougher sanctions on imports than exports $\Rightarrow$ **supply of FC** $\uparrow$
  - capital controls + financial repression $\Rightarrow$ **demand for FC** $\downarrow$
- Are sanctions "not working"?
  - effectiveness cannot be inferred from exchange rate dynamics
  - **equivalence** of import & export sanctions for welfare & gov't revenues
- Is the exchange rate "irrelevant"?
  - affects **imports** and **gov't revenues**
  - financial repression benefits consumers at the expense of savers