Winners and Losers from Sovereign Debt Inflows

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This version: July 2020

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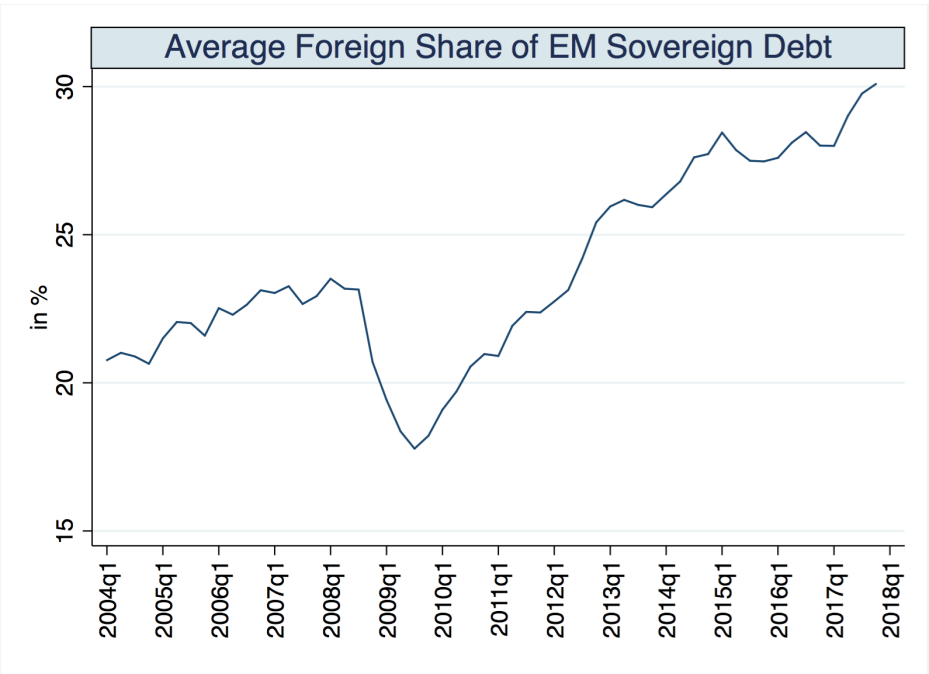
Motivation

- Cross-border **capital flows** grew in last 30 years
- Loosening of capital controls and search for yield led investors to enter **emerging markets**
- **Sovereign debt markets** are no exception:



Motivation: The Question

- How do these **sovereign debt inflows** affect the domestic economy?
- From a **theoretical** point of view effects are unclear
  - In textbook SOE model **without frictions**: No impact
  - **With frictions** these inflows might
    - Increase availability of financial resources (↓ **govt bond yields**)
    - Increase relative availability of tradable goods (**appreciate FX**)
    - Heterogeneous effects on firms (**financial, govt-related, financially dependent, tradable vs nontradable**)

Motivation: Identification Problems and Contribution

- Assessing these effects is **empirically** challenging
  - Sovereign debt inflows are **endogenous** to economic activity
  - **Ideal experiment** not possible
    - Directing sovereign debt inflows to randomly selected countries
- **Our solution**: exploit country inclusions to local currency sovereign debt indexes
  - Events **trigger large inflows** to local sovereign debt markets
  - **Not contemporaneous** to policy changes
  - Suitable for **event study methodology** to analyze
    - Sovereign yields and exchange rates
    - Domestic firms' stock returns

Preview of Main Findings

- Announcements are followed by **drop in sovereign yields** and **appreciation of domestic currency**
- **Domestic firms** are heterogeneously affected
  - Government-related, financial and financially dependent firms experience larger than average 2-day cumulative abnormal returns (CARs)
  - Tradable firms have lower than average CARs

- We build a **stylized model** to rationalize findings
  - Inflows reduce interest rate and benefit govt-related firms, financially dependent firms, and banks that hold sovereign bonds
  - Inflows increase availability of tradable goods, appreciating the exchange rate, relatively hurting tradable firms

Model Features

Outline

Local Currency Sovereign Debt Indexes

- **Global Benchmark indexes** composed of assets of different countries
  - Tracked closely by passive and active investors (Raddatz et al., 2017)
- Two main **local currency sovereign bond indexes**
  - Citigroup's **WGBI**
  - J.P. Morgan **GBI-EM**
- Exploit 6 episodes of **country inclusions**
  - Colombia 2014, Czech Republic 2017, Mexico 2010, Nigeria 2012, Romania 2013, South Africa 2012

Key Features of the Events

- Key properties of the rebalancing events for **identification**:
  - Trigger **massive sovereign debt inflows**
  - Announcement dates are **not anticipated**
  - **Not contemporaneous** to policy changes

  ▸ FIR ▸ Foreign Share ▸ Sov.Debt vs Private Inflows

- **Event study methodology** exploiting the unexpected timing of announcements
  - Analyze sovereign yields, exchange rates, and firms' stock returns

Data

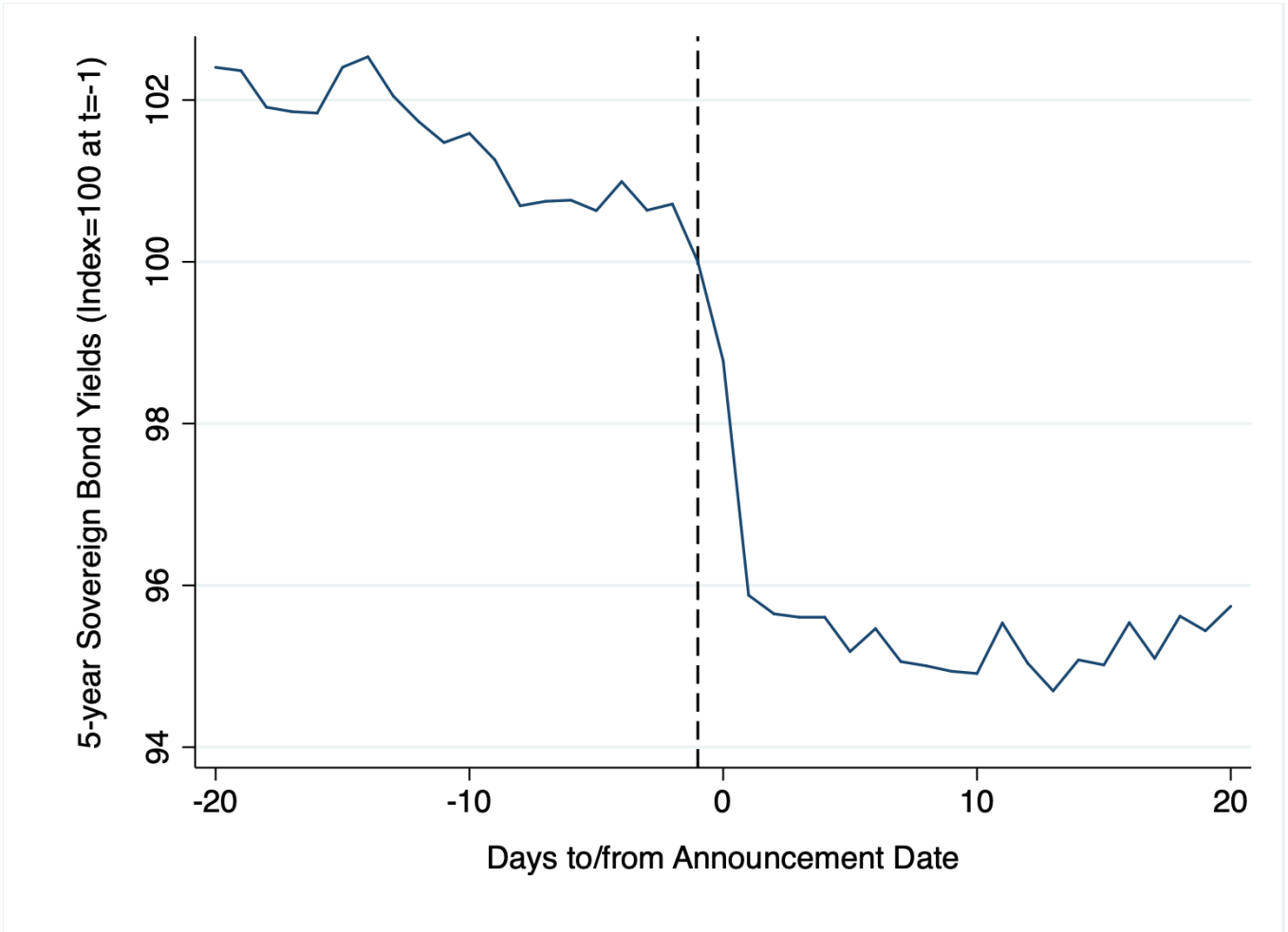
Multiple data sources:

1. Announcement dates, benchmark weights, and AUM from **J.P. Morgan Markets** and **Citigroup**
2. Daily stock prices, exchange rates, and returns on the MSCI World, the MSCI EM from **Datastream**
3. Balance sheet data from **Worldscope**
4. Local currency 5-year government bond yields from **Bloomberg**
5. State owned firms and firms issuing corporate debt from **Thomson Reuters SDC Platinum**

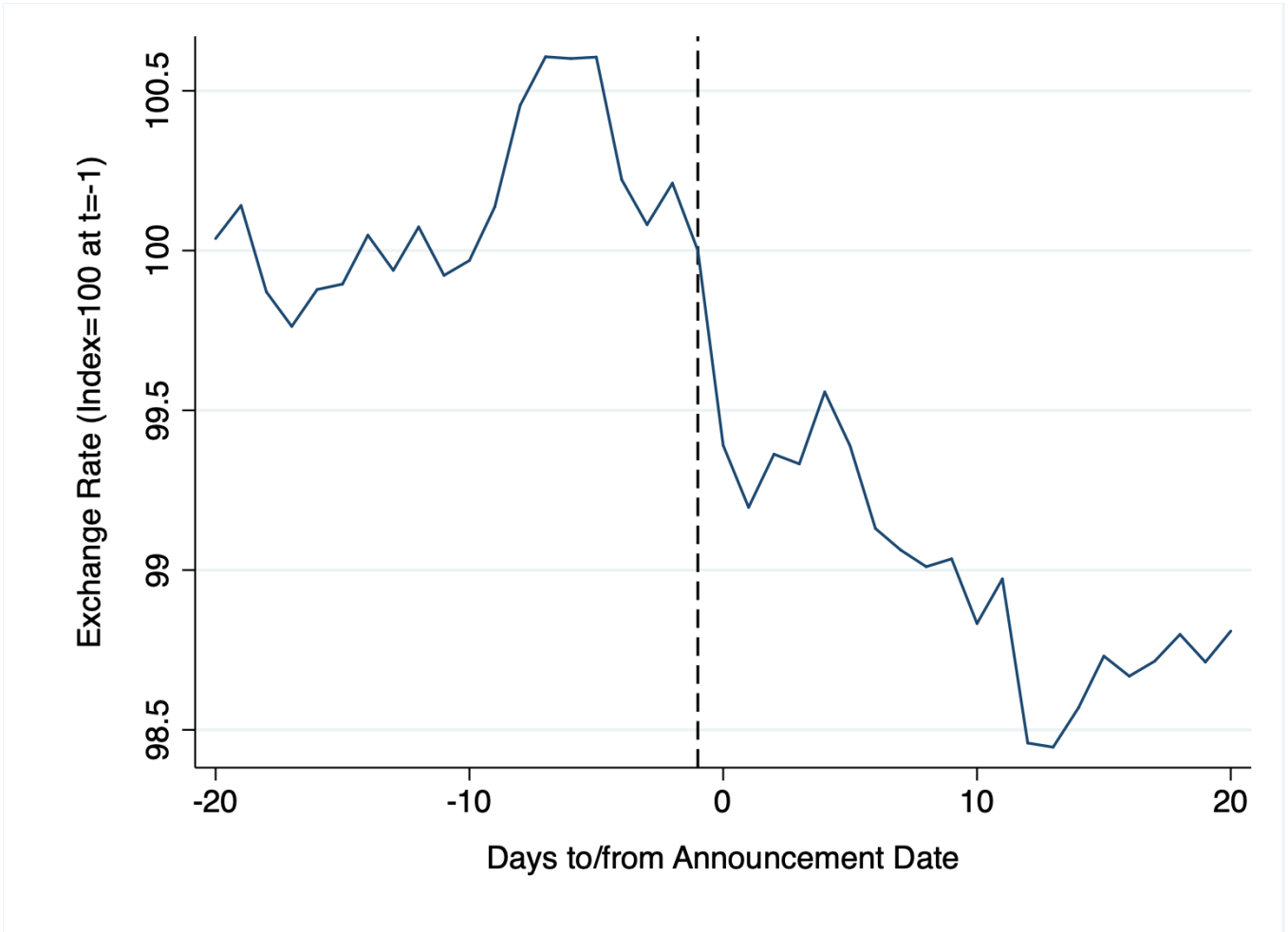
▶ Summary Statistics

Outline

Sovereign Bond Yields

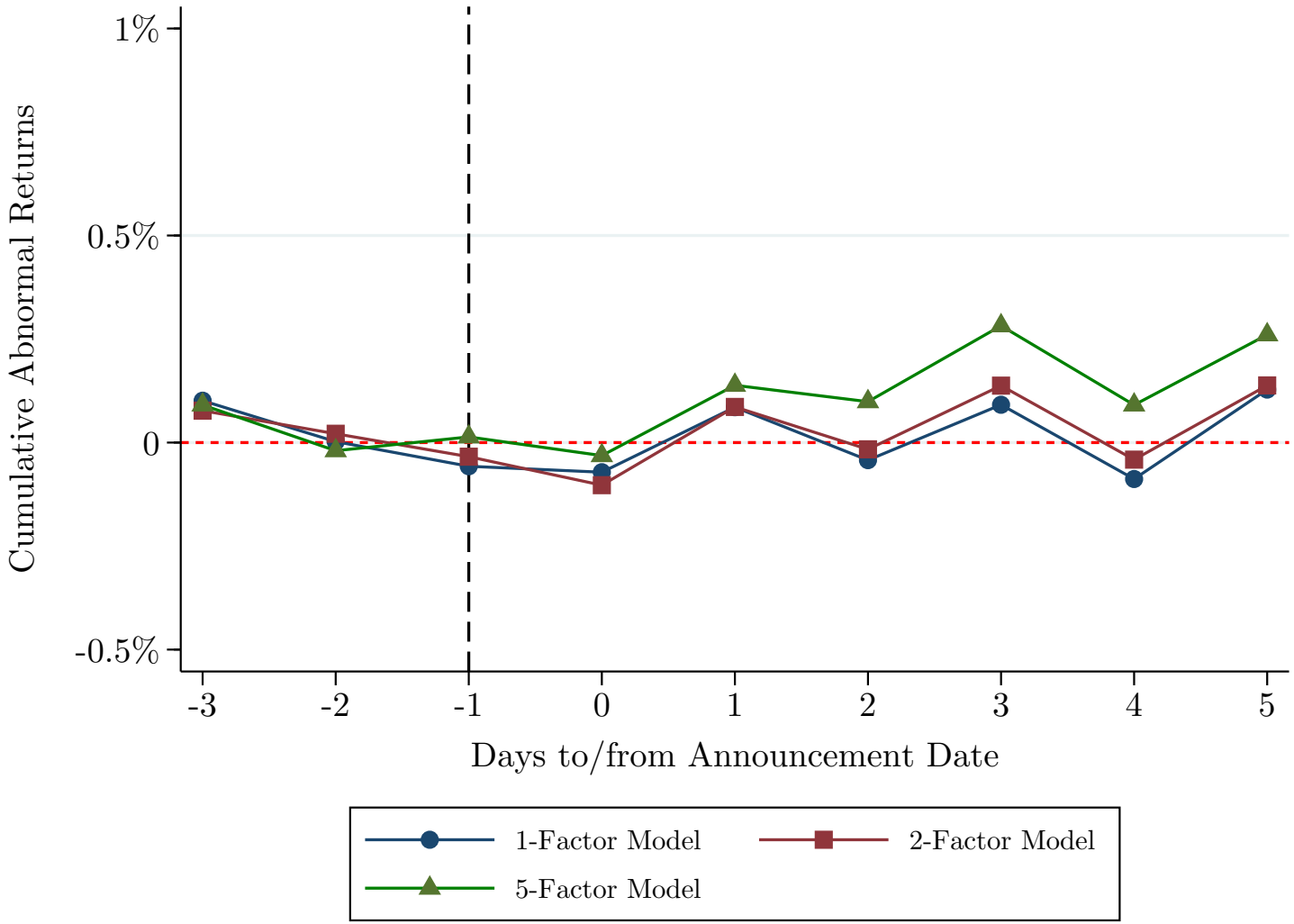


Exchange Rates

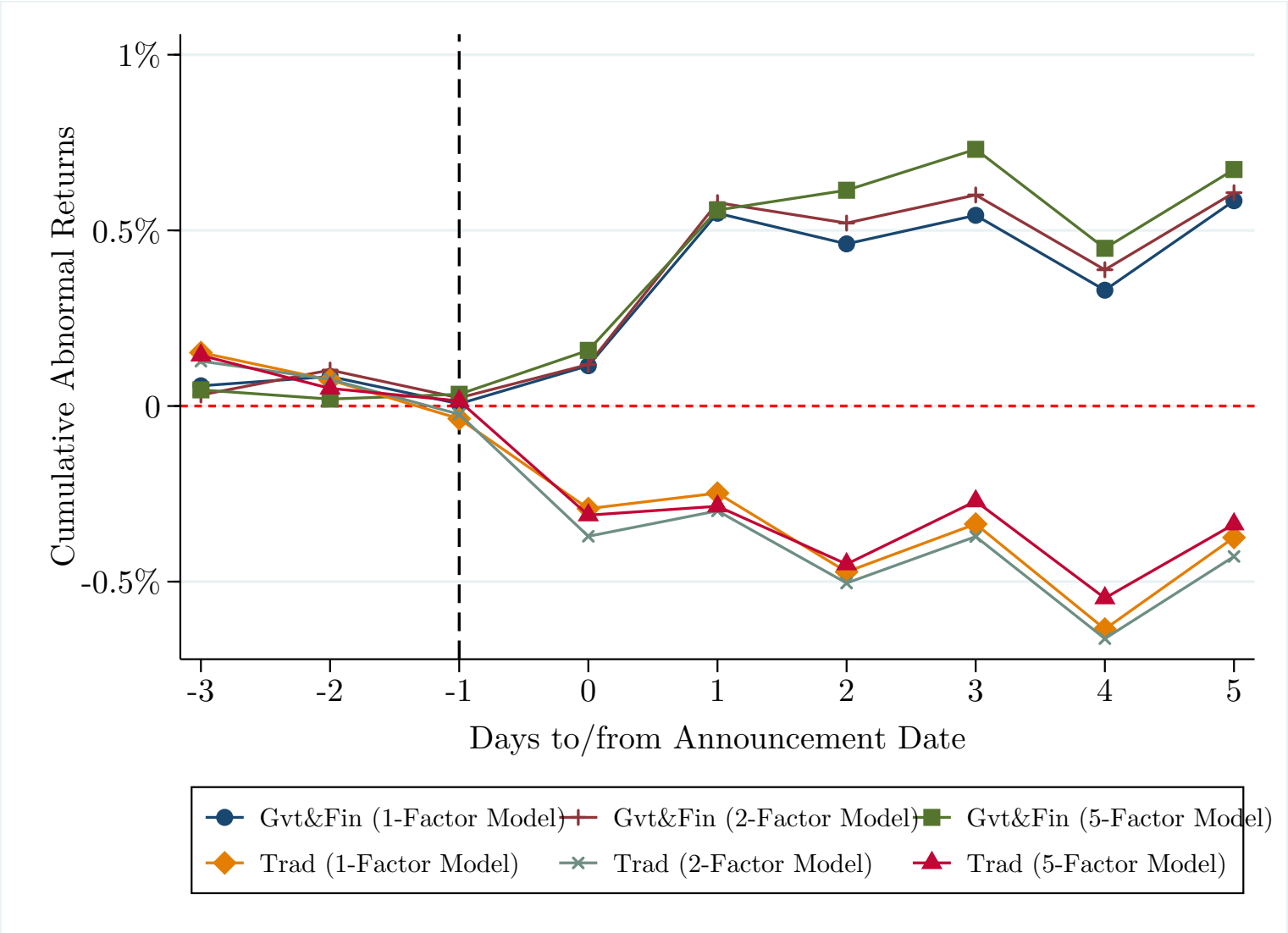


Outline

Aggregate CARs



Heterogeneous Effects on Firms



Empirical Strategy

$$CAR_i = \alpha + \beta_1 \mathbb{1}(\text{Fin}) + \beta_2 \mathbb{1}(\text{Govt}) + \beta_3 \mathbb{1}(\text{Trad}) + \beta_4 EFD + \varepsilon_i$$

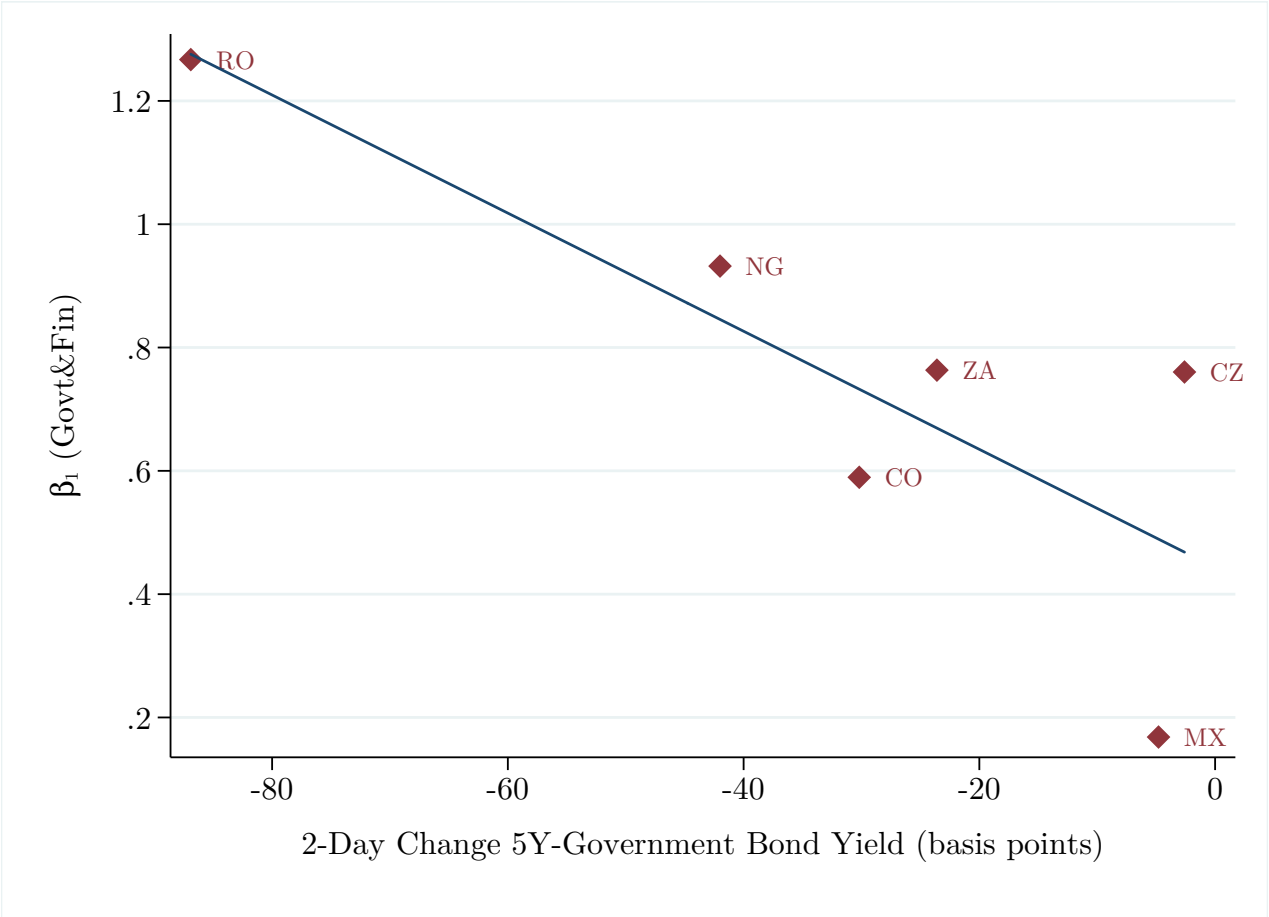
- CAR_i: CAR for firm i in 2-days following announcement
- Fin: Financial Firms
- Govt: Government-related Firms
- Trad: Tradable Firms (Mian and Sufi, 2014)
- EFD: External Financial Dependence Index (Rajan and Zingales, 1998)

Estimation Results

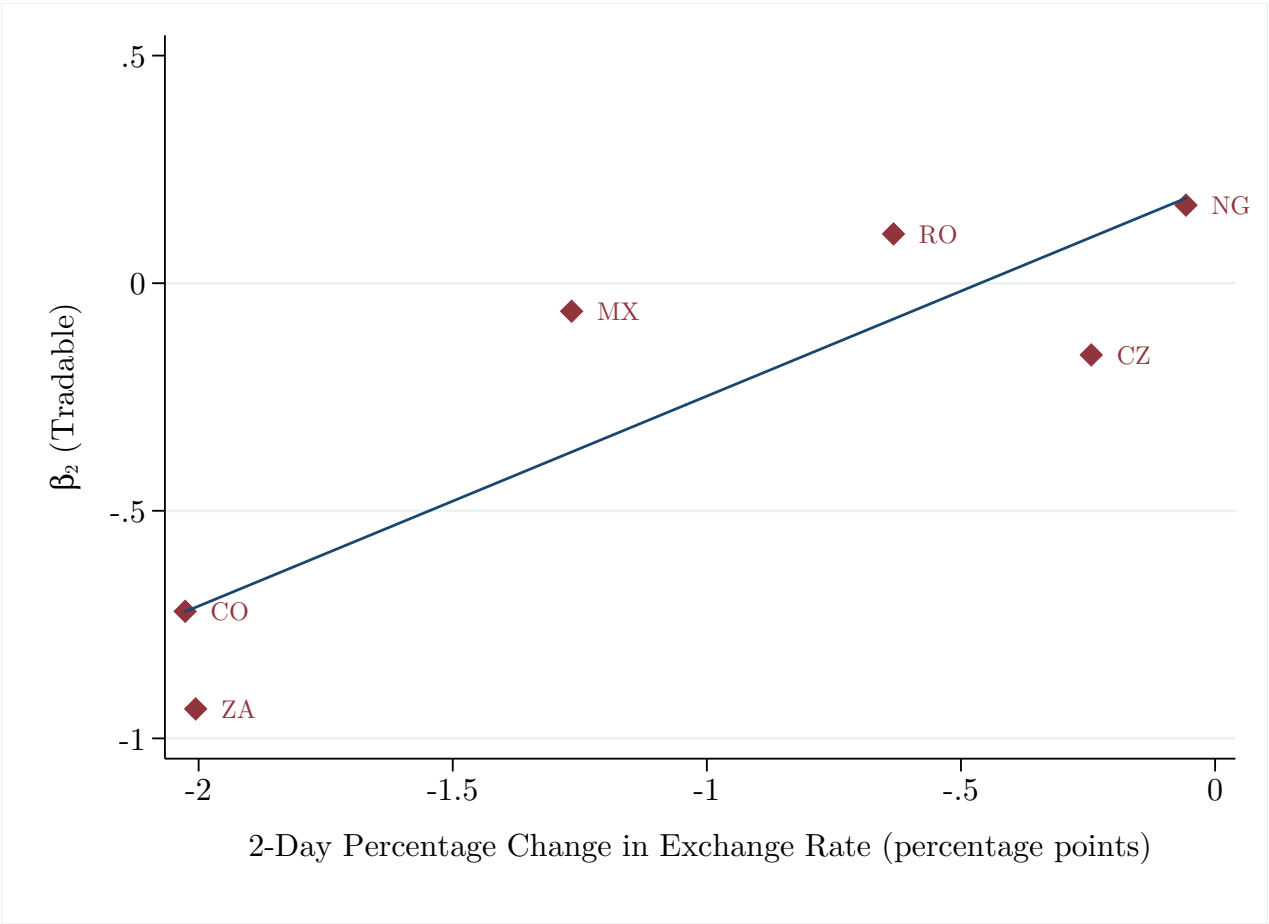
2-Day Cumulative Abnormal Returns after Announcement Dates				
	Demeaned Returns	1-Factor Model	2-Factor Model	5-Factor Model
Financial	0.525*	0.613**	0.614**	0.573*
	(0.290)	(0.285)	(0.280)	(0.302)
Government-Related	0.632***	0.598**	0.656***	0.700***
	(0.241)	(0.249)	(0.247)	(0.252)
Tradable	-0.514**	-0.472**	-0.495**	-0.450*
	(0.218)	(0.220)	(0.220)	(0.235)
External Financial Dependance	0.072*	0.070*	0.075*	0.073*
	(0.041)	(0.041)	(0.040)	(0.043)
Number of Countries	6	6	6	6
Observations	857	857	857	857
R^2	0.02	0.02	0.02	0.02

▸ Placebos ▸ Country Fixed Effects ▸ Additional Controls ▸ 3-5 CARs

CARs and Sovereign Bond Yields Shock

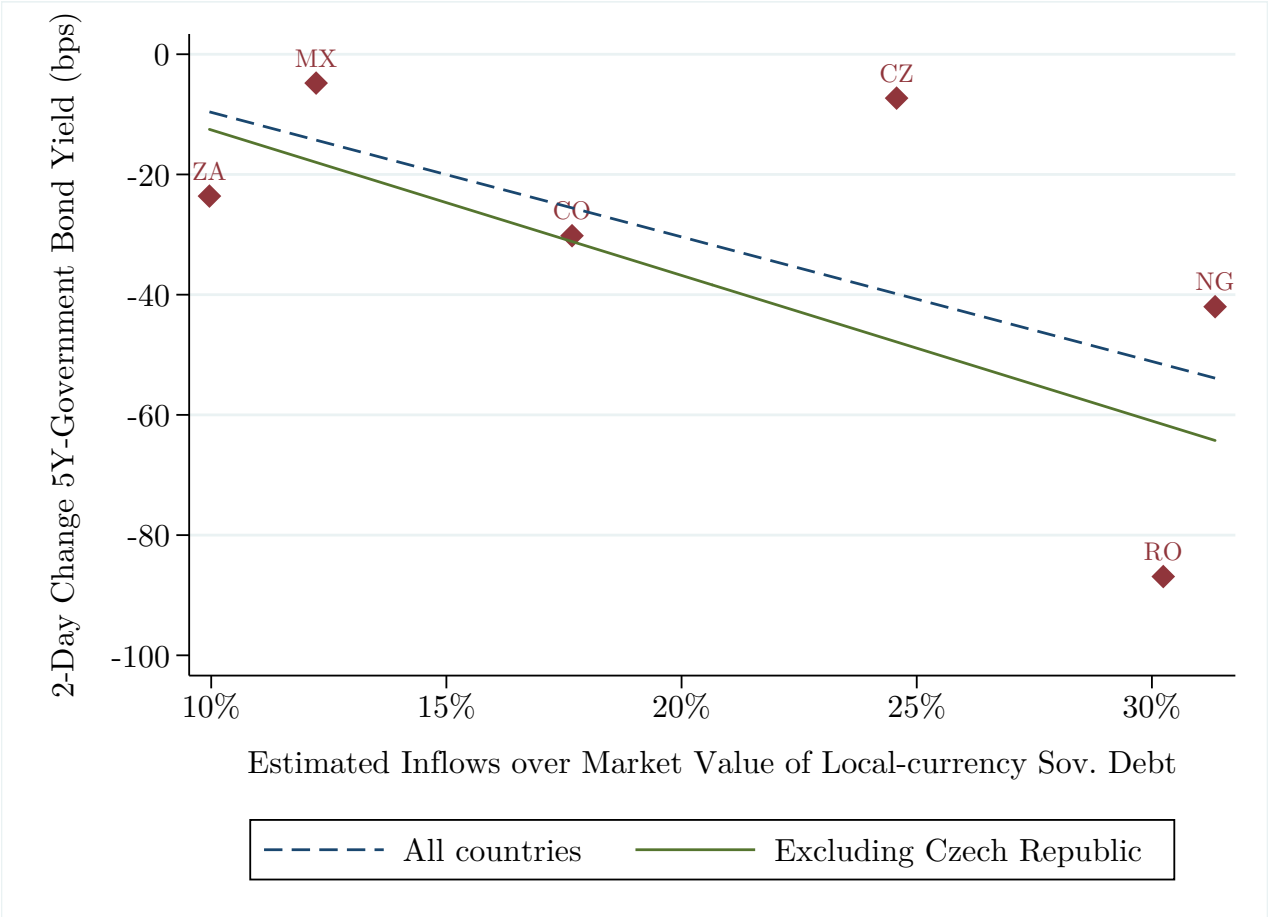


CARs and Exchange Rate Shock

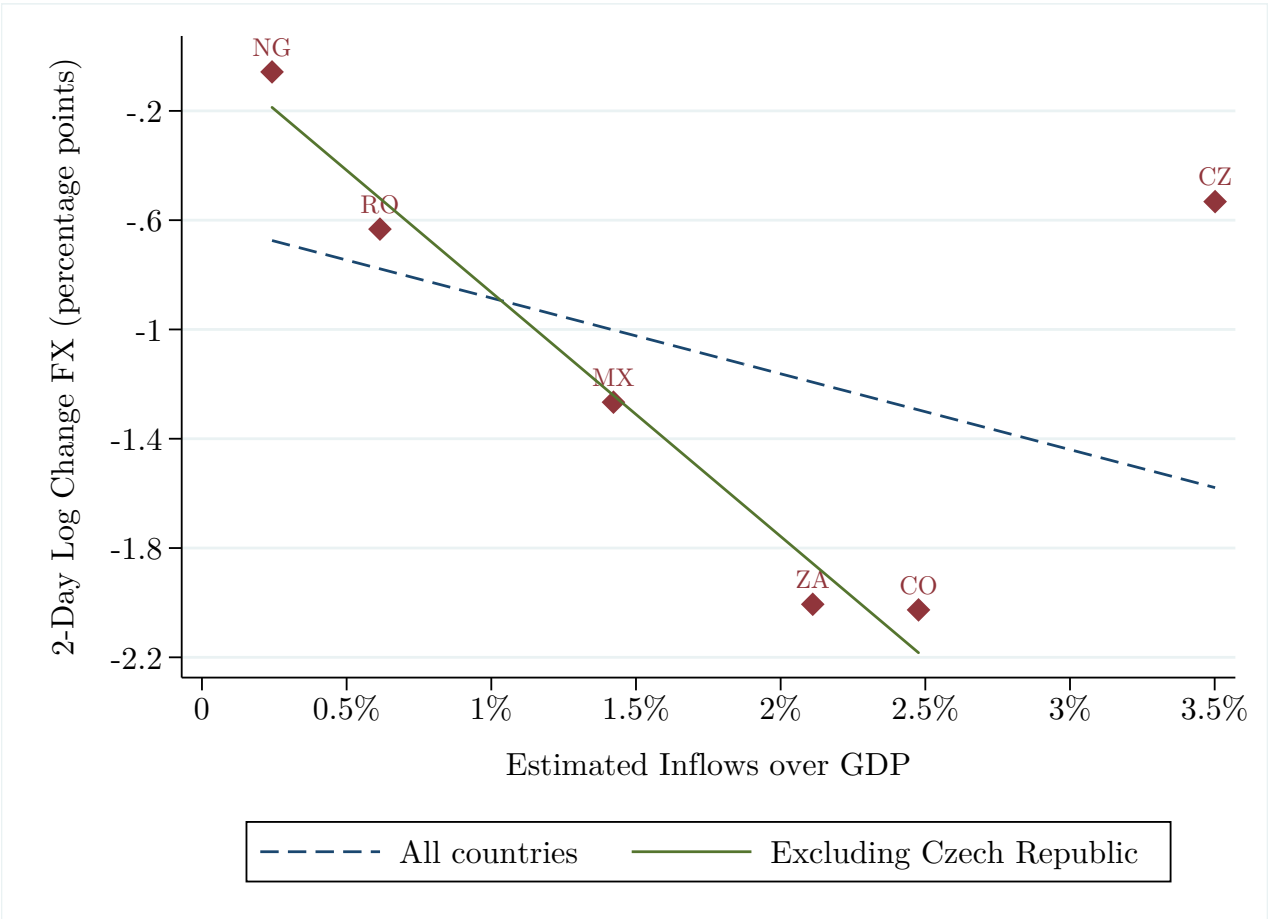


Estimation with Shocks

Sovereign Bond Yields and FIR



Exchange Rate and FIR



Outline

Final Remarks

- We shed novel light on the effects of **sovereign debt inflows**
  - ▷ Fall in interest rates benefits financial, govt-related, and financially dependent firms
  - ▷ Exchange rate appreciation benefits nontradable relative to tradable firms
- Build a stylized model that rationalizes these findings
- Results relevant for policy in light of large growth in sovereign debt inflows
- Implications for income and employment
  - ▷ Shift from tradable to non-tradable and financial sectors (Pandolfi and Williams, 2020) ▸ Employment and Income

Model Environment (1)

- SOE that lasts two periods $t = 0, 1$
- Consumer preferences

$$U(C_N, C_T) = \left[\nu \cdot C_N^{\frac{\eta-1}{\eta}} + (1-\nu) \cdot C_T^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

- C_T (C_N) consumption of tradable (non-tradable) goods at $t = 1$
- $\eta < 1$ (assumption) is the elasticity of substitution

Back

Model Environment (2)

- Continuum of firms of measure one in each sector (tradable and non-tradable)
- Firms may need to borrow funds in the credit market in order to produce
- Credit is intermediated by a continuum of competitive banks with measure one
- Firms and banks are all owned by the economy's residents
- Government that collects taxes from firms at $t = 1$ in order to repay pre-existing public debt and provide subsidies

Back

Tradable and Non-tradable Production

- Each tradable firm s is initially endowed with ω_{Ts} units of the tradable good
- Total tradable endowment is $\omega_T = \int_0^1 \omega_{Ts} \cdot ds$
- At $t = 1$, the tradable good is produced competitively by final good producers

$$Y_T = K^{\alpha} \cdot L^{1-\alpha},$$

- K is an aggregator of different varieties of capital

$$K = \left(\int_0^1 k_s^{\frac{\varepsilon-1}{\varepsilon}} \cdot ds \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

Back

Tradable and Non-tradable Production

- Each variety of capital s is produced through investment i_s that produces

$$k_s = A \cdot i_s.$$

- Each resident is endowed with 1 unit of labor supplied inelastically (competitive labor markets)$\Longrightarrow L = 1$
- In non-tradable sector, firm s endowed with ω_{Ns} units of the non-tradable good at $t = 1$
- The total non-tradable endowment is $\omega_N = \int_0^1 \omega_{Ns} \cdot ds$.

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Credit Markets and Public Sector

- Banks start $t = 0$ with b of public debt as assets and d (deposits by residents) as liabilities
- A fraction λ of b is "long" and matures at $t = 1$
- $1 - \lambda$ is "short" and matures at $t = 0$
- All d are "short"
- We assume that $d > (1 - \lambda) \cdot b$
- At $t = 0$, banks
  - ▷ Purchase public bonds
  - ▷ Extend loans to tradable firms that wish to invest in excess of their endowment
  - ▷ Repay maturing deposits

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Credit Markets and Public Sector

- Banks cannot borrow directly from the international financial market (IFM) but can sell public debt to the IFM
- The IFM spends an exogenous amount x^* in the secondary market for domestic public debt
- The level of x^* is key and summarizes the magnitude of sovereign debt inflows in the model
- We assume that $x^* \leq \omega_T$

Back

Credit Markets and Public Sector

- At $t = 0$, short-term public debt is rolled over at market interest rate
- At $t = 1$, the government taxes firms and banks in order to pay all outstanding debt
- We assume that the profits of all firms and banks are taxed at an exogenous rate τ
- Any fiscal surplus after debt repayment is transferred back as a subsidy to a subset of "related" firms and banks
- We assume that the same fraction θ of firms in each sector are related to the government
- Whether a firm is related to the government or not is independent of its endowment

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Credit Markets and Public Sector

- The fiscal surplus after debt repayment is given by

$$\tau \cdot (\pi_N + \pi_T + \pi_B) - b \cdot [\lambda + (1 - \lambda) \cdot R],$$

- The fiscal surplus is used to subsidize the subset of related firms and banks
- This subsidy is also proportional to profits
- Letting σ_s denote the rate of the subsidy of a related firm or bank s

$$\sigma_s = \frac{1}{\theta} \cdot \left[\tau - \frac{b \cdot (\lambda + (1 - \lambda) \cdot R)}{\pi_N + \pi_T + \pi_B} \right],$$

- We assume that the subsidy is the same for all related entities

Back

Equilibrium Prices

- Solving by backward induction
- Equilibrium interest rates

$$R = \frac{\varepsilon - 1}{\varepsilon} \cdot \alpha \cdot A^{\alpha} \cdot \left(\omega_T + x^*\right)^{\alpha - 1}.$$

- Equilibrium real exchange rate (price of non-tradable in terms of tradable)

$$P_N = \frac{\nu}{1-\nu} \cdot \omega_N^{-\frac{1}{\eta}} \cdot \left[A^{\alpha} \cdot \left(\omega_T + x^*\right)^{\alpha - 1} \cdot \left(\omega_T + \left(1 - \alpha \cdot \frac{\varepsilon - 1}{\varepsilon} \right) \cdot x^* \right) \right]^{\frac{1}{\eta}}.$$

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Equilibrium Profits

1. $\frac{1}{V_N} \cdot \frac{dV_N}{dx^*} > \frac{1}{V_T} \cdot \frac{dV_T}{dx^*}$

2. The value of firms that are related to the government increases with x^* more than the value of firms that are unrelated to the government

3. The valuation of banks increases with x^* due to the capital gains on their holdings of long-term government debt

4. In the tradable sector $\frac{1}{V_{Ts}} \cdot \frac{dV_{Ts}}{dx^*}$ is decreasing in ω_{Ts}

Back

The Environment

- SOE, lasts for two periods $t = 0, 1$
- For today: consumption and production at $t = 1$
- Representative agent with preferences:

$$U(C_N, C_T) = \left[\nu \cdot C_N^{\frac{\eta-1}{\eta}} + (1-\nu) \cdot C_T^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}},$$

  where $\eta < 1$.
- Firms:
  - ▷ Non-tradable
  - ▷ Tradable
  - ▷ Banks: hold government debt b, of which $1 - \lambda$ is ST
    - In paper also allow for deposits

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Tradable and non-tradable production

- Non-tradable firms: endowed with ω_N at $t = 1$
- Tradable firms $s \in [0, 1]$:
  - Endowed with ω_{Ts} at $t = 0$
  - Invest i_s to produce capital k_s
  - Tradable good production at $t = 1$

$$Y_T = K^{\alpha} \cdot L^{1-\alpha},$$

where L denotes labor and

$$K = \left(\int_0^1 k_s^{\frac{\varepsilon-1}{\varepsilon}} ds \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

Back

Value of Firms and Sovereign Inflows

- Sovereign inflows: foreigners spend x^* in purchasing publicdebt
- Value of firms:

$$V_{Ts} = \left[\frac{1}{\varepsilon - 1} \cdot \left(\omega_T + x^* \right) + \omega_{Ts} \right] \cdot \left(1 - \tau + \sigma_s \right),$$

$$V_{Ns} = \frac{\nu}{1-\nu} \cdot \frac{\left(\left(\omega_T + x^* \right)^{\alpha} - R \cdot x^* \right)^{\frac{\alpha}{\eta}} \cdot \omega_N^{1-\frac{1}{\eta}}}{R} \cdot \left(1 - \tau + \sigma_s \right),$$

$$V_{Bs} = b \cdot \left[\frac{\lambda}{R} + (1 - \lambda) \right] \cdot \left(1 - \tau + \sigma_s \right),$$

where where τ and σ_s denote taxes and subsidies and

$$R = \frac{\varepsilon - 1}{\varepsilon} \cdot \alpha \cdot \left(\omega_T + x^* \right)^{\alpha - 1},$$

is the equilibrium interest rate.

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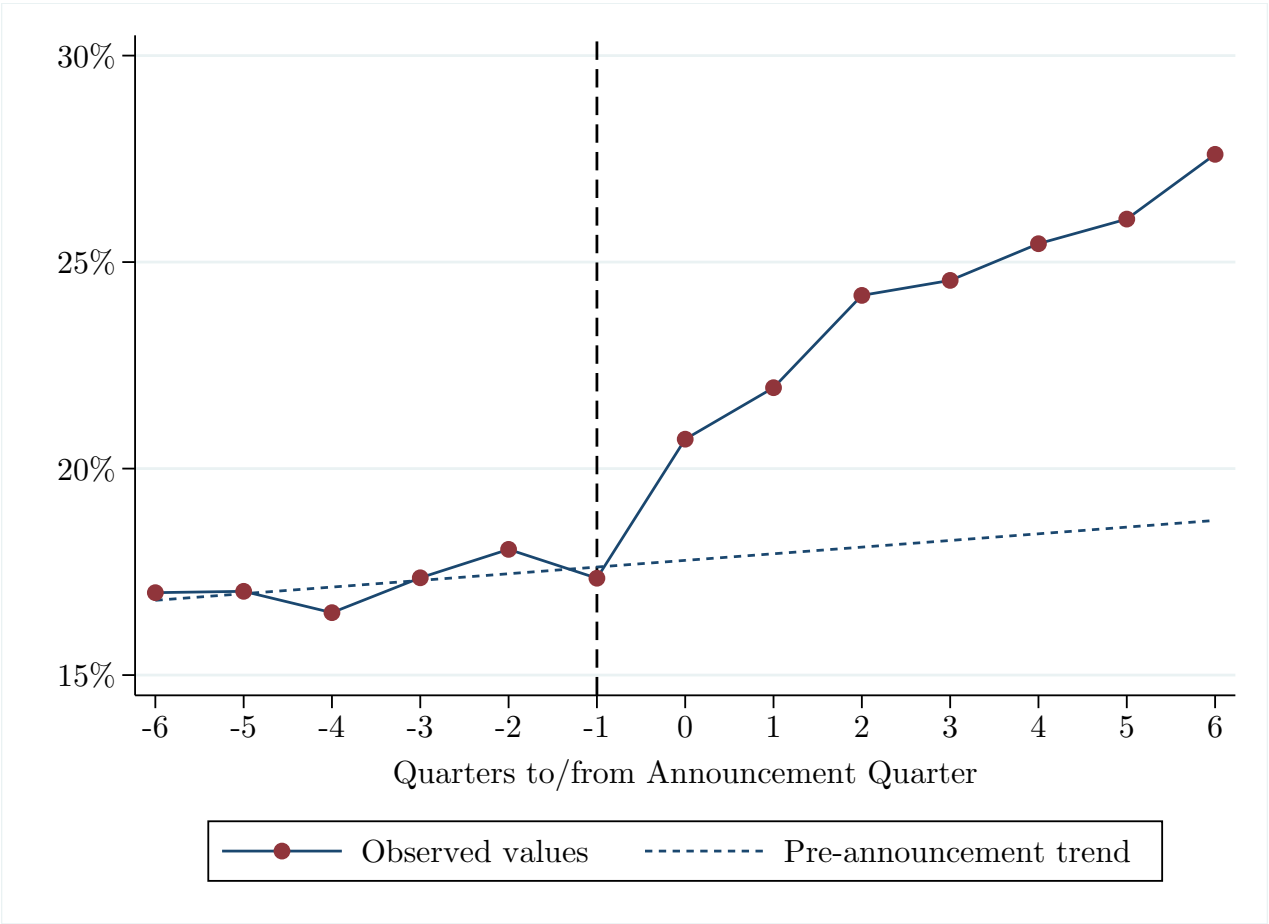
Median Foreign Share of Government Debt



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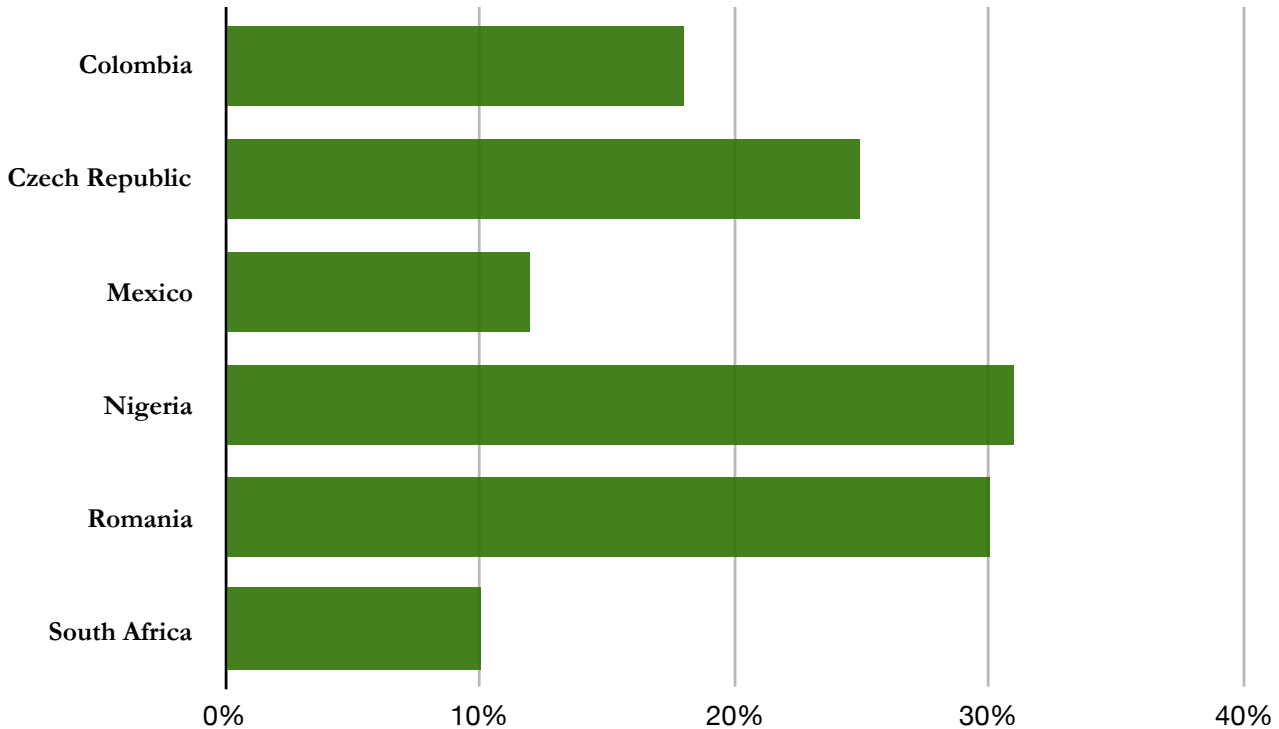
Flows Implied by Rebalancings (FIR, Pandolfi and Williams, 2019)



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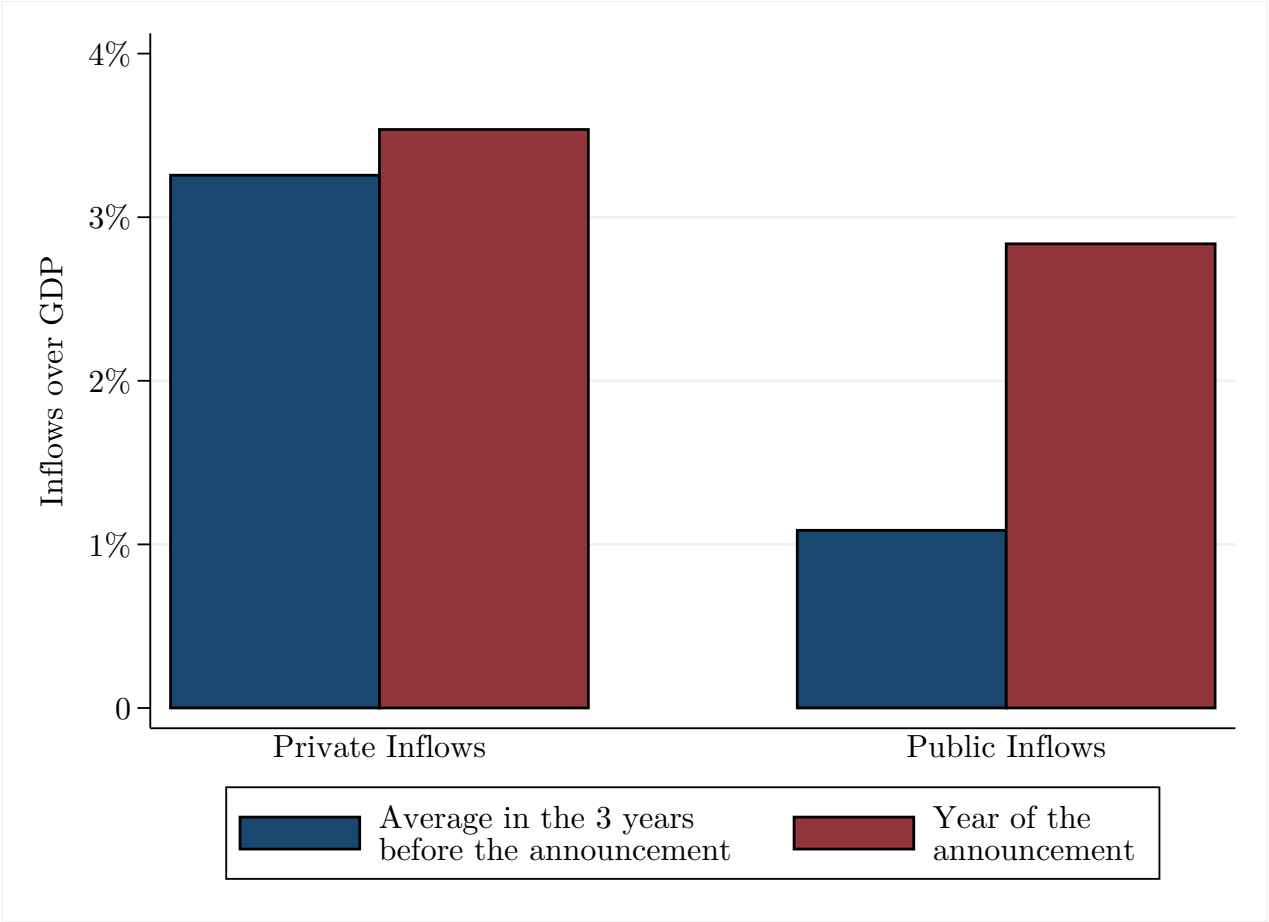
Sovereign Debt vs Private Inflows



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Summary Statistics

	Mean	St. Dev.	CO	CZ	MX	NG	RO	ZA
Financial	0.14	0.35	0.36	0.21	0.14	0.17	0.10	0.10
Government-Related	0.09	0.29	0.19	0.36	0.07	0.11	0.05	0.08
Tradable	0.35	0.48	0.19	0.21	0.23	0.42	0.54	0.32
External Financial Dependance	-2.04	2.91	-2.53	-1.88	-2.04	-2.19	-1.65	-2.05
Foreign Ownership	0.11	0.31	0.18	0.21	0.16	0.09	0.02	0.12
Issue Debt	0.16	0.36	0.38	0.36	0.47	0.04	0.05	0.09
Log(Assets)	15.44	3.25	21.68	16.57	16.43	17.41	12.18	14.33
Observations	909		72	14	137	170	155	361

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Placebo 1

Panel A: 2-Day Cumulative Abnormal Returns (2 Days before announcement)				
	Demeaned Returns	1-Factor Model	2-Factor Model	5-Factor Model
Financial	0.264	0.254	0.248	0.219
	(0.250)	(0.263)	(0.264)	(0.258)
Government-Related	-0.160	-0.227	-0.237	-0.227
	(0.232)	(0.245)	(0.249)	(0.242)
Tradable	0.402*	0.343	0.337	0.349
	(0.225)	(0.224)	(0.223)	(0.226)
External Financial Dependance	-0.041	-0.044	-0.046	-0.047
	(0.038)	(0.039)	(0.039)	(0.039)
Number of Countries	6	6	6	6
Observations	857	857	857	857
R^2	0.01	0.01	0.01	0.01

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Placebo 2

Panel B: 2-Day Cumulative Abnormal Returns (2 Days before announcement)

	Demeaned Returns		1-Factor Model		2-Factor Model		5-Factor Model	
ΔYield $\times$ Govt&Fin	0.003	0.001	0.002	-0.000	0.002	-0.000	0.002	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
%ΔExchRate $\times$ Tradable	0.118	0.158	0.068	0.110	0.067	0.112	0.068	0.112
	(0.149)	(0.155)	(0.150)	(0.156)	(0.151)	(0.156)	(0.152)	(0.157)
External Financial Dependance		-0.048		-0.052		-0.054		-0.053
		(0.036)		(0.037)		(0.038)		(0.037)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	6	6	6	6	6	6	6	6
Observations	861	857	861	857	861	857	861	857
R^2	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01

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Country Fixed Effects

2-Day Cumulative Abnormal Returns after Announcement Dates				
	Demeaned Returns	1-Factor Model	2-Factor Model	5-Factor Model
Financial	0.533*	0.595**	0.574**	0.579*
	(0.284)	(0.279)	(0.274)	(0.300)
Government-Related	0.576**	0.523**	0.579**	0.641**
	(0.241)	(0.245)	(0.244)	(0.248)
Tradable	-0.419*	-0.394*	-0.420*	-0.365
	(0.226)	(0.226)	(0.227)	(0.248)
External Financial Dependance	0.075*	0.072*	0.076*	0.075*
	(0.041)	(0.042)	(0.041)	(0.043)
Country FE	Yes	Yes	Yes	Yes
Financial – Tradable	0.95***	0.99***	0.99***	0.94***
	(0.30)	(0.29)	(0.28)	(0.31)
Govt-Related – Tradable	0.99***	0.92***	1.00***	1.01***
	(0.32)	(0.33)	(0.33)	(0.34)
Number of Countries	6	6	6	6
Observations	857	857	857	857
R^2	0.04	0.04	0.04	0.03

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Interaction with Shocks

2-Day Cumulative Abnormal Returns after Announcement Dates								
	Demeaned Returns		1-Factor Model		2-Factor Model		5-Factor Model	
ΔYield $\times$ Govt&Fin	0.015***	0.017***	0.015***	0.017***	0.015***	0.017***	0.015***	0.017***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)
%ΔExchRate $\times$ Tradable	-0.354**	-0.411***	-0.341**	-0.393***	-0.358**	-0.414***	-0.295*	-0.349**
	(0.147)	(0.144)	(0.145)	(0.144)	(0.146)	(0.144)	(0.166)	(0.162)
External Financial Dependance		0.070*		0.066		0.070*		0.068*
		(0.038)		(0.040)		(0.039)		(0.041)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	6	6	6	6	6	6	6	6
Observations	861	857	861	857	861	857	861	857
R^2	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04

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Additional Controls

2-Day Cumulative Abnormal Returns after Announcement Dates								
	Demeaned Returns		1-Factor Model		2-Factor Model		5-Factor Model	
Financial	0.497*	0.494	0.584**	0.618*	0.569**	0.557*	0.578*	0.539
	(0.276)	(0.339)	(0.275)	(0.336)	(0.271)	(0.329)	(0.297)	(0.364)
Government-Related	0.505**	0.451*	0.500**	0.441	0.569**	0.498*	0.641***	0.557**
	(0.237)	(0.264)	(0.244)	(0.270)	(0.243)	(0.271)	(0.245)	(0.271)
Tradable	-0.431*	-0.539**	-0.398*	-0.499*	-0.421*	-0.533*	-0.364	-0.431
	(0.226)	(0.273)	(0.226)	(0.279)	(0.227)	(0.279)	(0.246)	(0.307)
External Financial Dependance	0.074*	0.083*	0.072*	0.083*	0.076*	0.087*	0.076*	0.085*
	(0.041)	(0.048)	(0.042)	(0.050)	(0.041)	(0.049)	(0.043)	(0.051)
Foreign Ownership	0.222	0.112	0.073	0.002	0.049	-0.092	0.056	-0.089
	(0.243)	(0.262)	(0.255)	(0.278)	(0.249)	(0.277)	(0.249)	(0.283)
Issue Debt	0.133	0.087	0.040	0.010	0.008	-0.049	-0.042	-0.113
	(0.246)	(0.266)	(0.253)	(0.274)	(0.268)	(0.295)	(0.279)	(0.314)
Log(Assets)		0.026		0.013		0.039		0.046
		(0.046)		(0.046)		(0.049)		(0.060)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Financial – Tradable	0.93***	1.03***	0.98***	1.12***	0.99***	1.09***	0.94***	0.97**
	(0.29)	(0.37)	(0.29)	(0.36)	(0.28)	(0.35)	(0.31)	(0.39)
Govt-Related – Tradable	0.94***	0.99***	0.90***	0.94**	0.99***	1.03***	1.01***	0.99**
	(0.32)	(0.37)	(0.33)	(0.39)	(0.33)	(0.39)	(0.34)	(0.40)
Number of Countries	6	6	6	6	6	6	6	6
Observations	857	663	857	663	857	663	857	664
R^2	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03

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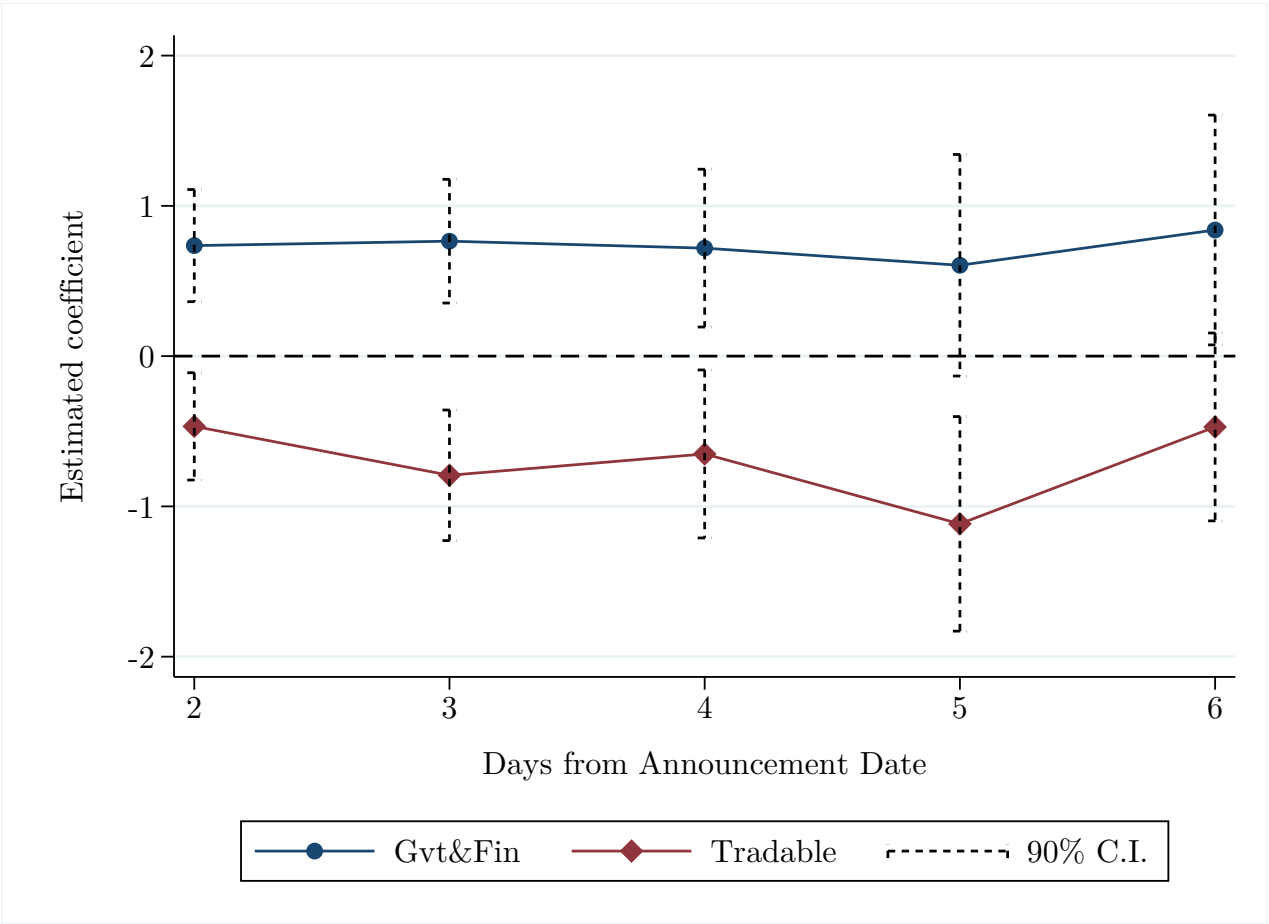
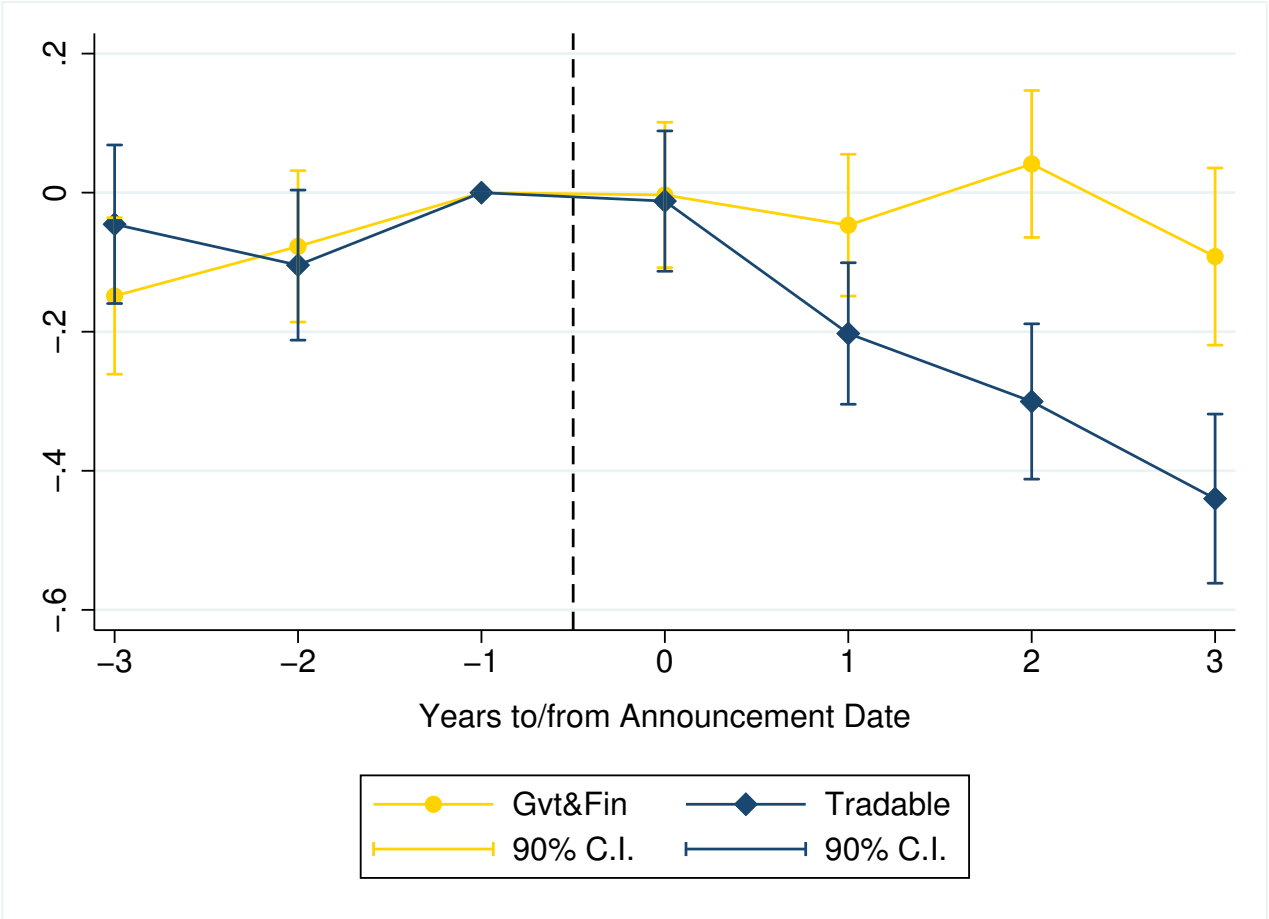
Extended Windows



Back

Income


.2
0
−.2
−.4
−.6
−3
−2
−1
0
1
2
3
Years to/from Announcement Date
Gvt&Fin
90% C.I.
Tradable
90% C.I.

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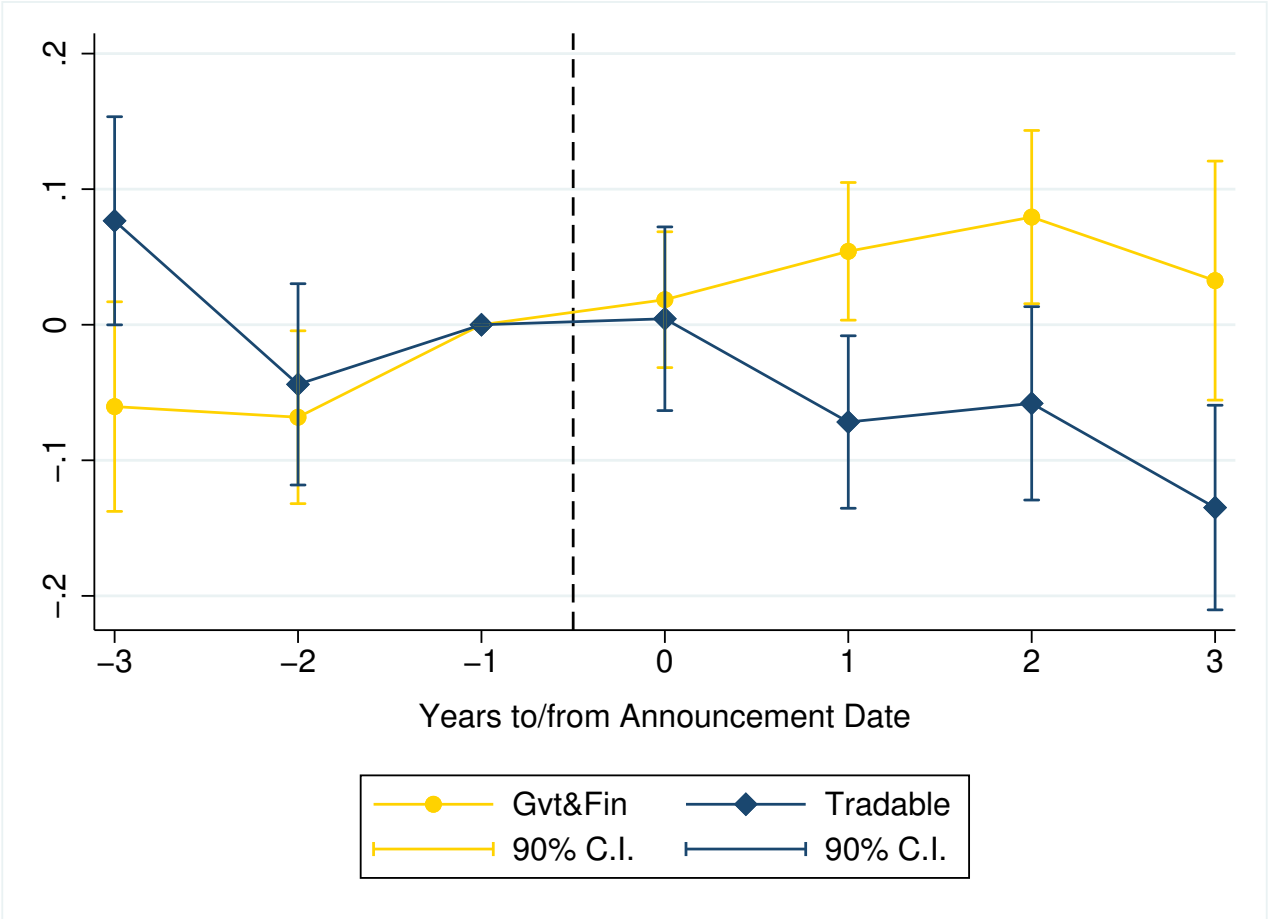
Employment



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