

# Protectionism and the Business Cycle

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- Debate about costs and benefits of trade policy as a macroeconomic policy tool
  - ▶ Boost output, rebalance external accounts, or address distributional effects of trade
  - ▶ Influential scholars argued that temporary tariffs may be beneficial in a liquidity trap, thanks to the inflationary effect of higher import costs (e.g., Eichengreen, 2016)
- We study the short-run effects of protectionism on macroeconomic fluctuations both empirically and theoretically

# Contribution

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  - ▶ Quarterly/monthly data on product-level antidumping investigations (which typically lead to the imposition of tariffs)
  - ▶ Annual data on applied tariff rates

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  - ▶ Baseline scenario mirrors the empirical analysis: **normal times** under a **flexible exchange rate**
  - ▶ Model counterfactuals where protectionism advocated as potentially beneficial:  
(i) **liquidity trap** and (ii) **fixed exchange rate regime**

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  - ▶ Micro level: reallocation of market shares towards less efficient domestic producers
- 3 **Protectionism remains contractionary even in a liquidity trap or under a peg**

# Literature

- Empirical work on the cyclicity of temporary trade barriers
  - ▶ Bown (2013) and Bown and Crowley (2013, 2014)
- Earlier theoretical literature on the macro effects of trade policy
  - ▶ Mundell's (1961), Krugman (1982), Eichengreen (1981, 1983)
- Border adjustment tax and departures from Lerner's symmetry
  - ▶ Farhi, Gopinath, and Itskhoki (2014), Barbiero, Farhi, Gopinath, and Itskhoki (2017), Costinot and Werning (2017), Erceg, Prestipino, and Raffo (2017), Lindé and Pescatori (2017)
- Dynamic consequences of trade integration (permanently lower trade costs)
  - ▶ Trefler (2005), Barattieri (2014), Cacciatore (2014) among many others

# Empirical Analysis

# Temporary Trade Barriers

- On average, exporters face low applied tariffs but frequently changing temporary trade barriers (TTBs)
  - ▶ Antidumping duties, global safeguards, and countervailing duties
- Antidumping (AD) duties are the primary policy exceptions to WTO rules
  - ▶ Account for 80%-90% of all TTBs across countries

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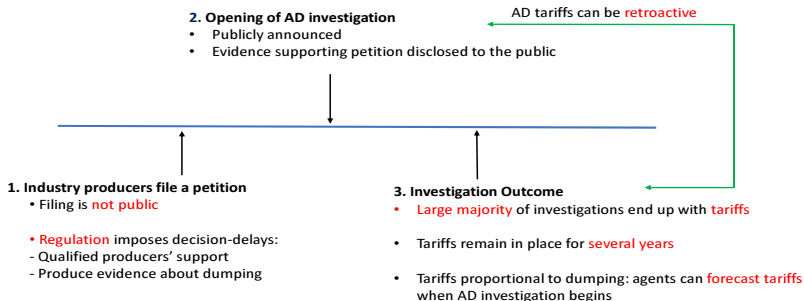
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- **Turkey and India:** largest and most active users; **Canada** among developed SOE
  - ▶ Up to 6% of imported products affected by TTBs in Turkey ( $\simeq$  1% of GDP)
  - ▶ 2% in Canada (0.5% of GDP; higher prior to 2001)



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- **GAD** (Bown, 2016): product-level data on AD investigations and related tariffs:
  - ▶ Possible to build time series data at any time frequency since the late 1980s

# Antidumping Investigations



# Empirical Strategy

- Quarterly and monthly VARs for Canada and Turkey (India for robustness)

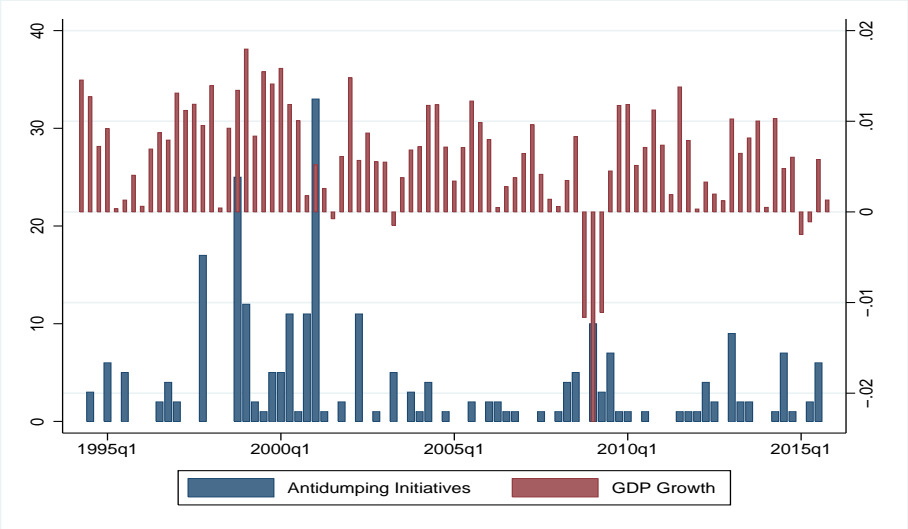
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- **Quarterly and monthly VARs** for Canada and Turkey (India for robustness)
- **Baseline trade-policy measure** : # of HS-6 digits products for which an AD investigation begins in a given month or quarter
- **Standard macro variables** :
  - ▶ **Quarterly data**: real GDP growth, inflation, and trade balance/GDP
  - ▶ **Monthly data**: also include nominal interest rate and nominal exchange rate growth (IP rather than GDP)

# Data: New Antidumping Initiatives in Canada



# Understanding Magnitudes

- Three peaks of AD initiatives in Canada (1997:Q4, 1999:Q3, 2001:Q1)
- Consider 2001:Q1
  - ▶ AD initiatives in the steel sector worth  $\simeq 30\%$  of sectoral imports
  - ▶ Steel sector output was 1.1% of GDP (including IO linkages)
- All AD initiatives led to the imposition of tariffs
- Median imposed tariff equal to 56%

# Empirical Strategy

- Structural VAR

$$Y_t = \Theta + \sum_{i=1}^p \Phi_i Y_{t-i} + Au_t$$

- $p$  determined with standard information criteria
- Identification (matrix  $A$ ): # of AD investigations is predetermined within a month/quarter
  - ▶ Decision lags reflect costly petitioning process: regulation and coordination issues among producers



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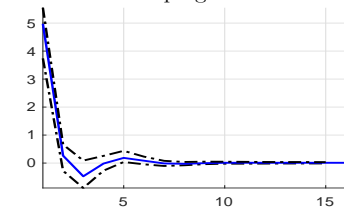
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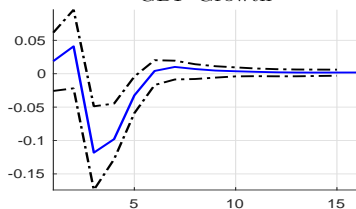
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- Not a challenge for identification :
  - ① Analysis at monthly frequencies (decision lags realistically exceed a quarter)
  - ② VAR lag structure captures AD response to previous macro shocks
  - ③ IRFs not consistent with demand/financial shocks (realistic drivers of business cycles in our sample period)

# Quarterly VAR: Canada

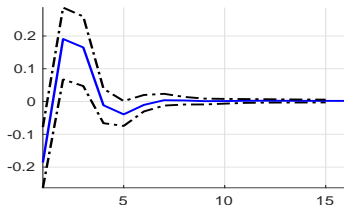
### Antidumping Initiatives



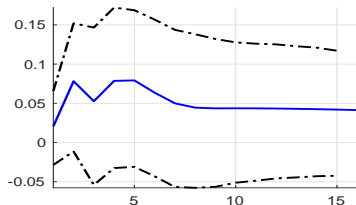
### GDP Growth



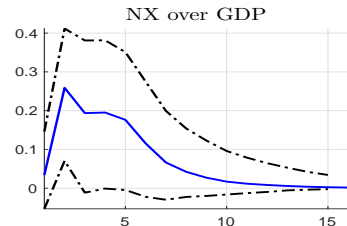
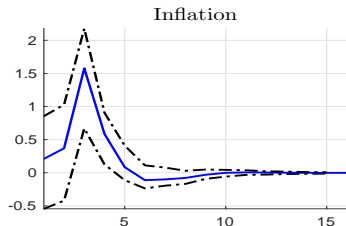
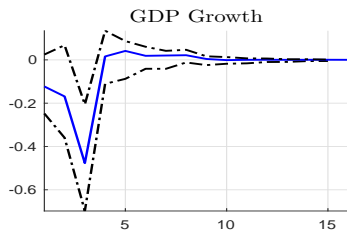
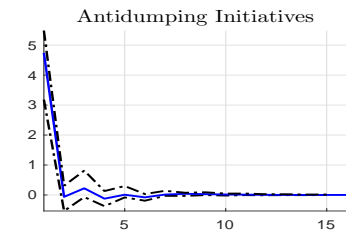
### Inflation



### NX over GDP

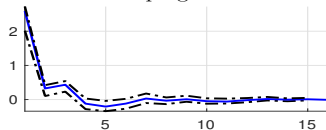


# Quarterly VAR: Turkey

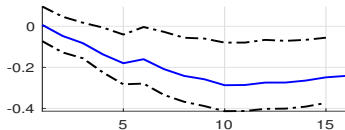


# Monthly VAR: Canada

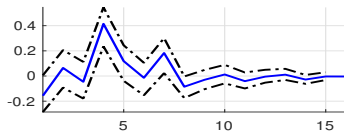
Antidumping Initiatives



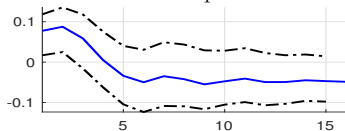
Industrial Production



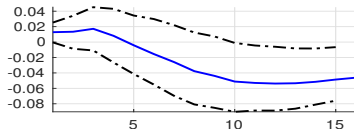
Inflation



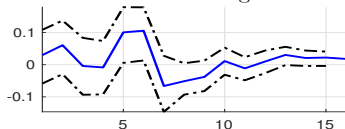
Net Exports



Interest Rate

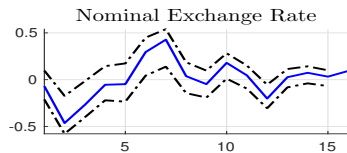
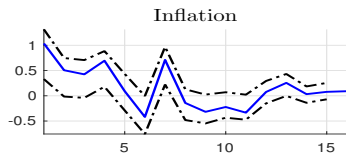
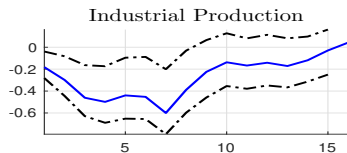
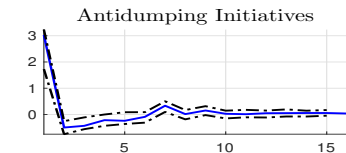


Nominal Exchange Rate





# Monthly VAR: Turkey



# Robustness

- Results are also similar when considering India
- Variety of robustness checks
  - ▶ Additional controls (i.e. oil price, Kilian index of global economic activity)
  - ▶ Focus only on AD investigations that end up with tariffs
  - ▶ Different recursive ordering: AD initiatives respond to all macro shocks contemporaneously

# Panel VAR

- AD investigations only apply to a subset of imports
- More comprehensive trade policy measure (only available at annual frequency): **import-weighted average of the applied tariff rates**

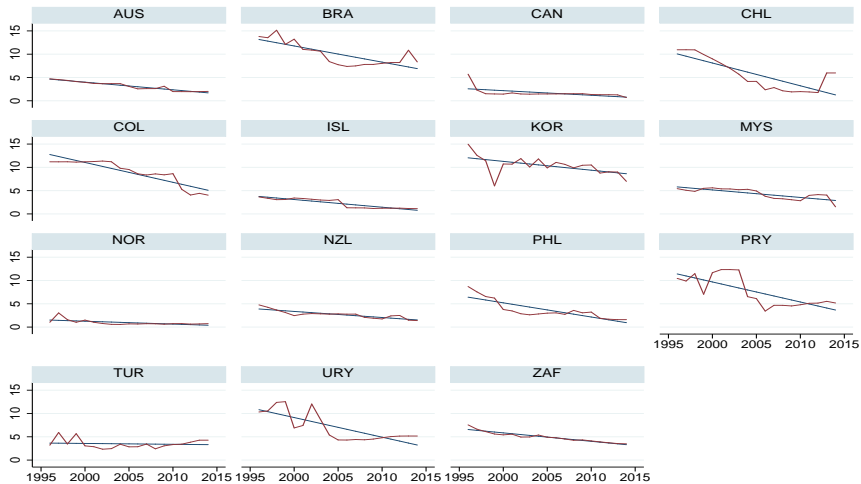
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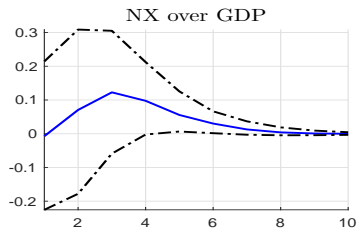
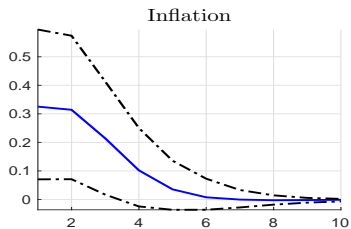
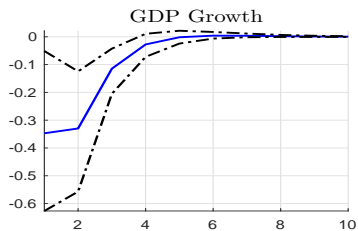
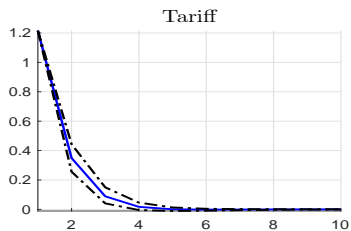
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  - ▶ All the countries had flexible exchange rates and did not hit the ZLB
- Continue to assume that trade policy responds with a one-period delay to macroeconomic shocks
  - ▶ WTO imposes negotiations with most concerned trading partners
  - ▶ Various countries in the sample are part of custom unions (Brazil, Colombia, Paraguay, Turkey and Uruguay)

# Data: Applied Tariff Rates



# Panel VAR



# The Model



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- Trade policy captured by an ad-valorem import tariff
- Incomplete international asset markets and nominal rigidities

# Preferences

- Household  $h \in [0, 1]$ , maximizes

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[ \frac{C_t(h)^{1-\gamma}}{1-\gamma} - \frac{L_t(h)^{1+\omega}}{1+\omega} \right]$$

$$C_t = \left[ (1 - \alpha_N)^{\frac{1}{\phi_N}} (C_t^T)^{\frac{\phi_N-1}{\phi_N}} + \alpha_N^{\frac{1}{\phi_N}} (C_t^N)^{\frac{\phi_N-1}{\phi_N}} \right]^{\frac{\phi_N}{\phi_N-1}}$$

$$C_t^T = \left[ (1 - \alpha_X)^{\frac{1}{\phi_T}} (C_{D,t}^T)^{\frac{\phi_T-1}{\phi_T}} + \alpha_X^{\frac{1}{\phi_T}} (C_{X,t}^{T*})^{\frac{\phi_T-1}{\phi_T}} \right]^{\frac{\phi_T}{\phi_T-1}}$$

- Number of tradable varieties is endogenous

$$C_{D,t}^T = \left[ \int_{\omega \in \Omega} (C_{D,t}^T(\omega))^{\frac{\theta_T-1}{\theta_T}} d\omega \right]^{\frac{\theta_T}{\theta_T-1}}, C_{X,t}^{T*} = \left[ \int_{\omega \in \Omega^*} [C_{X,t}^{T*}(\omega)]^{\frac{\theta_T-1}{\theta_T}} d\omega \right]^{\frac{\theta_T}{\theta_T-1}}$$

- Ad-valorem import tariff

$$P_{X,t}^{T*} = \left\{ \int_{\omega \in \Omega_t} \left[ (1 + \tau_t^{IM}) P_{X,t}^{T*}(\omega) \right]^{1-\theta_T} d\omega \right\}^{1/(1-\theta_T)}$$

# Intermediate Input Producers

- Homogenous intermediate input:

$$Y_t^I = Z_t K_t^\alpha L_t^{1-\alpha}$$

- $L_t$  is a composite of differentiated labor inputs supplied by households:

$$L_t \equiv \left[ \int_0^1 (L_t(h))^{\frac{\eta-1}{\eta}} dh \right]^{\frac{\eta}{\eta-1}}$$

where  $L_t(h) \equiv$  labor hired from household  $h$

- Capital rented in a competitive market

# Tradable Sector

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- Standard Melitz-type selection of tradable producers into exporting :
  - ▶ Only relatively more productive firms export (cover fixed export costs)
- Free entry condition determines  $N_{D,t}$

# Households and Monetary Policy

- Households can invest in **three assets** :
  - 1 Non-contingent nominal bonds in Home and Foreign currency
  - 2 Shares in a mutual fund of domestic tradable-sector firms
  - 3 Physical capital accumulation
- Household sets  $w_t^n(h)$  subject to a **quadratic wage-adjustment cost**
- Nominal interest rate follows a feedback rule

$$1 + i_{t+1} = \max \left\{ 1 + i^{zlb}, (1 + i_t)^{\varrho_i} \left[ (1 + i) (1 + \tilde{\pi}_{Ct})^{\varrho_\pi} \left( \tilde{Y}_{gt} \right)^{\varrho_Y} \right]^{1 - \varrho_i} \right\}$$

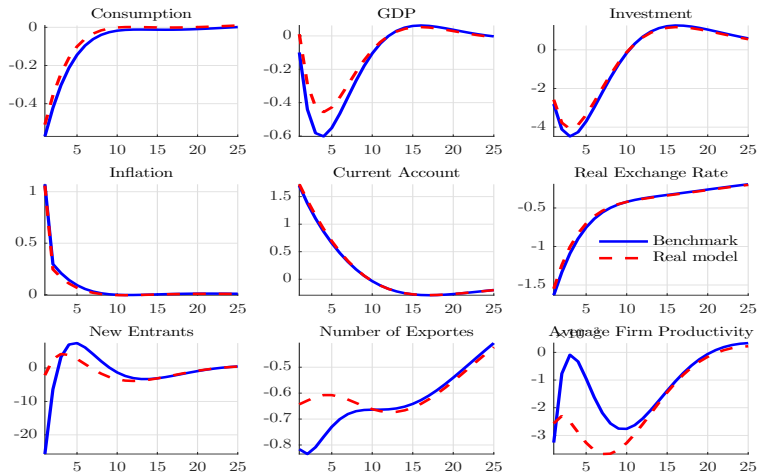
- Calibrate the model to match features of Canada and U.S.

▶ Additional Details

# Protectionism in Normal Times

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- Temporary increase in  $\tau_t^{IM} = 5\%$  ( $\rho_{\tau^{IM}} = 0.75$  to match panel-VAR estimates).



# Micro and Macro Forces: Intuition

- For a given nominal exchange rate  $\varepsilon_t$

- ① Expenditure switching toward Home goods and trade surplus

- ②  $P_t$  increases: directly through  $\tau_t^{IM}$  + reallocation of market shares

$$P_t^T = \left[ \varpi_{D,t}^T \left( \tilde{P}_{D,t}^T \right)^{1-\phi_T} + \varpi_{X,t}^{T*} \left( \varepsilon_t \frac{\tilde{P}_D^{T*}}{\tilde{Z}_{X,t}^*} \left( 1 + \tau_t^{IM} \right) \right)^{1-\phi_T} \right]^{\frac{1-\phi_N}{1-\phi_T}}$$

- $\varepsilon_t$  appreciates but not enough to offset  $\tau_t^{IM}$

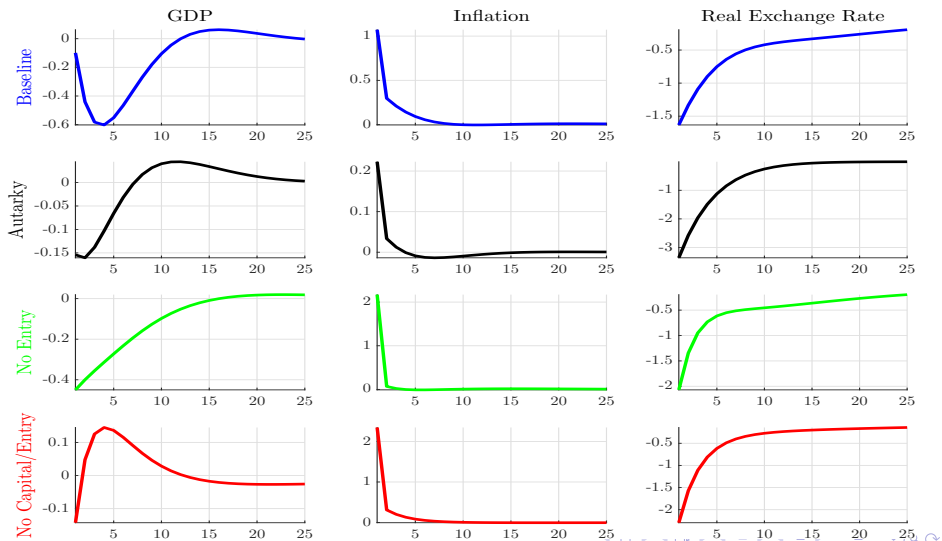
- Higher  $P_t$ :

- ▶ Reduces real income: lower investment and decline in firm entry
- ▶ Contractionary monetary policy response



# Micro and Macro Forces

- **Alternative models:** (i) financial autarky; (ii) no firm dynamics; (iii) no capital/no firm dynamics



# Counterfactual Scenarios

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- Use the model to study scenarios where temporary trade barriers advocated as potentially beneficial
  - 1 Is protectionism expansionary when countries are in a liquidity trap (ZLB)?
  - 2 Can protectionism be beneficial under a fixed exchange rate?
- Same trade policy shock considered in normal times

# Protectionism in a Liquidity Trap

- Evidence and theoretical analysis suggest that protectionism is inflationary
- Through this channel,  $\tau_t^{IM}$  may help lift the economy out of a liquidity trap
- We perform the following exercise:

- 1 At  $t = 0$ , risk-premium shock  $\Lambda_{a,t}$  depresses output and generates deflation (binding ZLB)

$$1 + \Lambda_{at} = (1 + i_{t+1}) E_t \left( \frac{\beta_{t,t+1}}{1 + \pi_{C,t+1}} \right)$$

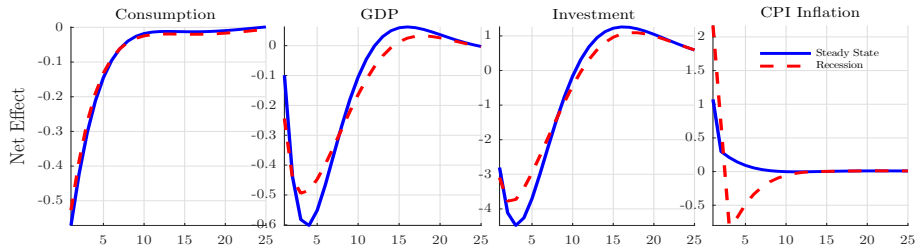
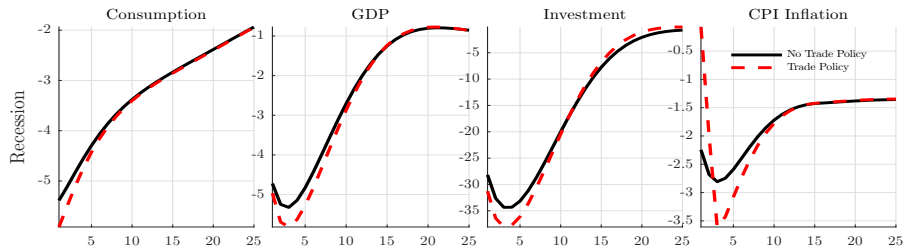
$$1 + \psi a_{*,t+1} + \Lambda_{at} = (1 + i_{t+1}^*) E_t \left( \frac{\beta_{t,t+1}}{1 + \pi_{C,t+1}^*} \frac{Q_{t+1}}{Q_t} \right)$$

- Interpretation for  $\Lambda_{at}$ : shock to the demand for safe/liquid assets

- 2 At  $t = 1$ , unanticipated tariff increase

# Protectionism in a Liquidity Trap

- Temporary increase in  $\tau_t^{IM} = 5\%$  at the ZLB

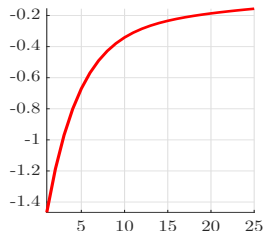
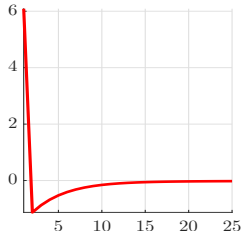
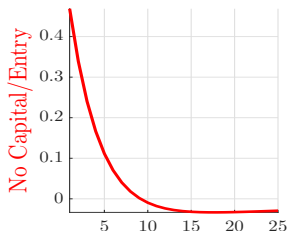
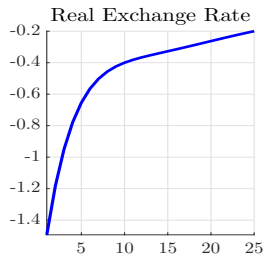
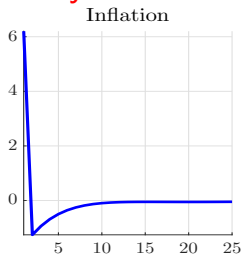
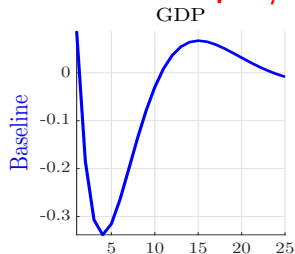


# Protectionism under a Fixed Exchange Rate

- Widespread diffusion of pegs, crawling pegs, and very narrow bands (Reinhart and Rogoff, 2004)
- Recent experience of Ecuador (dollarized economy) illustrates the issue
  - ▶ Broad range of temporary tariffs in 2015-2016 to fight a balance-of-payments crisis
  - ▶ Trade balance effectively improved but real GDP further declined, together with consumption and investment
- In contrast to typical conclusion of textbook models, we find that protectionism remains contractionary under a peg

# Protectionism under a Fixed Exchange Rate

- **Baseline** vs **no capital/no firm dynamics**

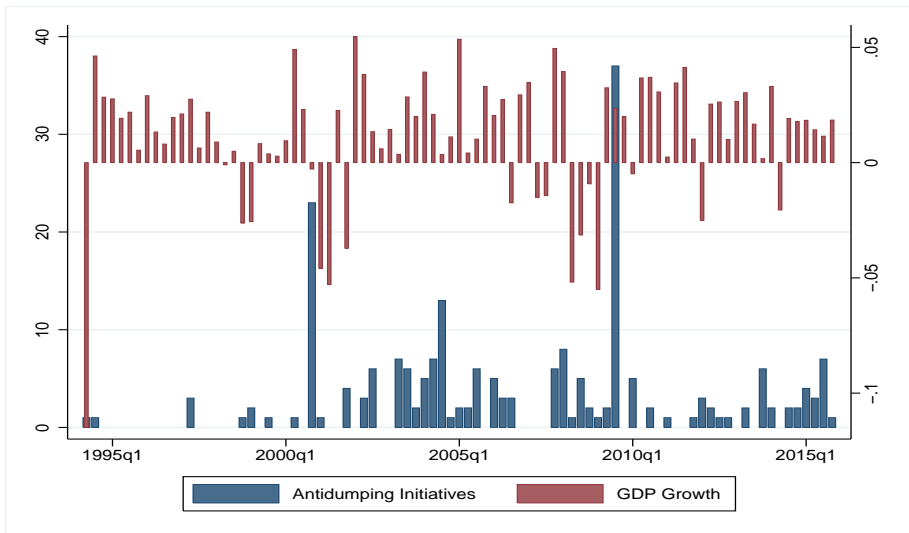


# Conclusions

- 1 Structural VARs using trade-policy and macro data at different frequency
  - ▶ Temporary trade barriers act as a negative supply shock
  - ▶ At best a small positive effect on the trade balance
- 2 Small-open economy model with key macro/trade ingredients reproduces VAR evidence
  - ▶ Both macro and micro dynamics behind the contractionary effects of tariffs
- 3 Policy takeaway: protectionism remains a bad idea—at least for small open economies
  - ▶ Even when in a liquidity trap and regardless of exchange rate arrangements
  - ▶ Detrimental economic effects even when abstracting from retaliation from trade partners



# Data: Antidumping Investigations in Turkey



# Tradable Sector Details

- Producer  $z$  faces domestic and export demand:

$$Y_{D,t}^T(z) = \left( \frac{P_{D,t}^T(z)}{P_{D,t}^T} \right)^{-\theta_T} Y_{D,t}^T$$

$$Y_{X,t}^T(z) = \left[ \left( 1 + \tau_t^{IM*} \right) \frac{P_{X,t}^T(z)}{P_{X,t}^T} \right]^{-\theta_T} Y_{X,t}^{T*}$$

- Prices: constant markups over marginal cost

$$\frac{P_{D,t}^T(z)}{P_{D,t}^T} = \frac{\theta_T}{(\theta_T - 1)} \frac{\varphi_t}{z} \quad \text{and} \quad \frac{P_{X,t}^T(z)}{P_{X,t}^T} = (1 + \tau_t) \frac{\rho_{D,t}^T(z)}{Q_t}$$

- Firm exports if

$$d_{X,t}^T(z) \equiv \left[ Q_t \rho_{X,t}^T(z) - (1 + \tau_t) \frac{\varphi_t}{z} \right] Y_{X,t}^T(z) - \varphi_t f_{X,t} > 0$$

- Number of exporting firms:

$$N_{X,t} = [1 - G(z_{X,t})] N_{D,t},$$

$$z_{X,t} = \inf\{z : d_{X,t}^T(z) > 0\}$$

# Household's Budget Constraint

- The representative Home household's period budget constraint is:

$$\begin{aligned} & A_{t+1}(h) + \varepsilon_t A_{*,t+1}(h) + \frac{\psi}{2} \varepsilon_t P_t^* \left( \frac{A_{*,t+1}(h)}{P_t^*} \right)^2 + P_t C_t(h) + P_t I_{K,t}(h) + \tilde{\varepsilon}_t (N_{D,t} + N_{E,t}) x_{t+1}(h) \\ &= (1 + i_t) A_t(h) + (1 + i_t^*) A_{*,t}(h) \varepsilon_t + \left[ 1 - \frac{\nu_w}{2} \left( \frac{w_t^n(h)}{w_{t-1}^n(h)} - 1 \right)^2 \right] w_t^n(h) L_t(h) + \\ & \quad + P_t r_{K,t} K_t(h) + (\tilde{d}_t^T + \tilde{\varepsilon}_t) N_{D,t} x_t(h) + T_t(h), \end{aligned}$$

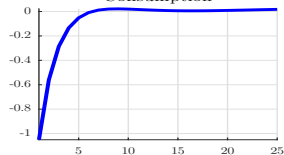
▶ Back

# Calibration

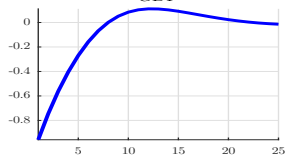
- Symmetric calibration with standard values in the literature
- Set parameters that directly affect trade volumes and monetary policy to match Canadian/U.S. data
  - ▶ Home bias:  $\alpha_N \implies \text{trade-to-GDP} = 50\%$
  - ▶ Size of the tradable sector:  $\alpha_T \implies \text{manufacturing output share} = 30\%$
  - ▶ Iceberg trade costs:  $\tau = \tau^* = 0.3$
  - ▶ Average import tariffs:  $\tau^{IM} = \tau^{IM*} = 0.02$
- Interest rate rule using estimates in Kichian (2015):  $\rho_i = 0.5$ ,  $\rho_\pi = 2.80$ ,  $\rho_Y = 0$

# Producer Currency Pricing

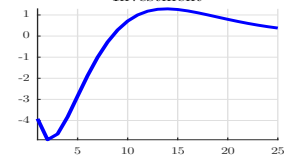
Consumption



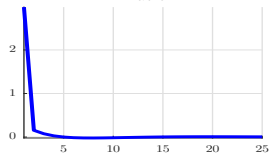
GDP



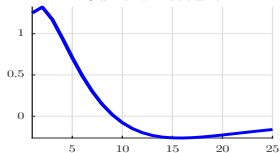
Investment



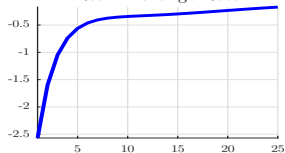
Inflation



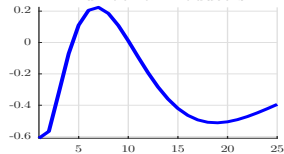
Current Account



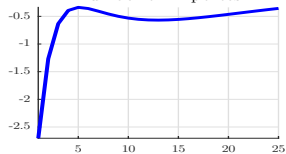
Real Exchange Rate



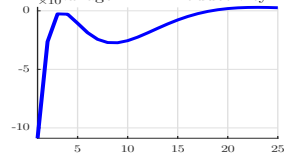
Number of Producers



Number of Exportes

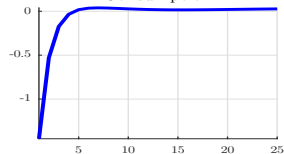


Average Firm Productivity

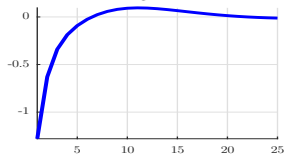


# Local Currency Pricing

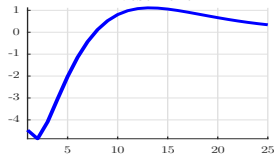
Consumption



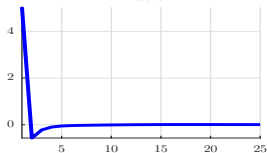
GDP



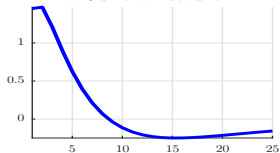
Investment



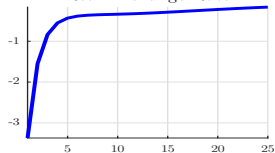
Inflation



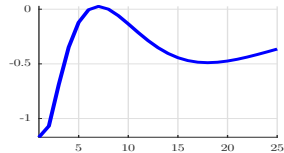
Current Account



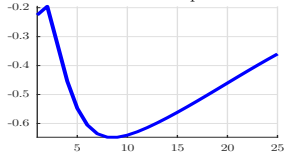
Real Exchange Rate



Number of Producers



Number of Exportes



Average Firm Productivity

