

Protectionism and the Business Cycle

Alessandro Barattieri Matteo Cacciatore Fabio Ghironi

UQAM, Collegio Carlo Alberto HEC Montréal, NBER University of Washington

CEPR, EACBN, NBER

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Motivation

- Rising concerns about possible use of trade restrictions

a 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)

a We study the effects of protectionism on macroeconomic fluctuations both empirically and theoretically

Contribution

- Estimate effects of temporary trade barriers using country-level and panel VARs
 - ▶ Quarterly/monthly data on product-level antidumping investigations (which typically lead to the imposition of tariffs)
 - ▶ Annual data on applied tariff rates
- Transmission of tariff shocks:
 - ▶ SOE with key macro/trade ingredients: physical capital, nominal rigidities, endogenous trade structure (firm heterogeneity -I- sunk/fixed entry costs)
 - ▶ 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

Results

- Empirical analysis: temporary trade barriers act as a negative supply shock
 - ▶ Recessionary, inflationary, with (at best) a small positive effect on the trade balance/GDP
- Macro and micro dynamics behind the contractionary effects of tariffs
 - ▶ Macro level: expenditure switching vs. decline in real income and investment (coupled with contractionary monetary policy response)
 - ▶ Micro level: reallocation of market shares towards less efficient domestic producers
- Protectionism remains contractionary even in a liquidity trap or under a peg

Literature

- Empirical work on the cyclicalities 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

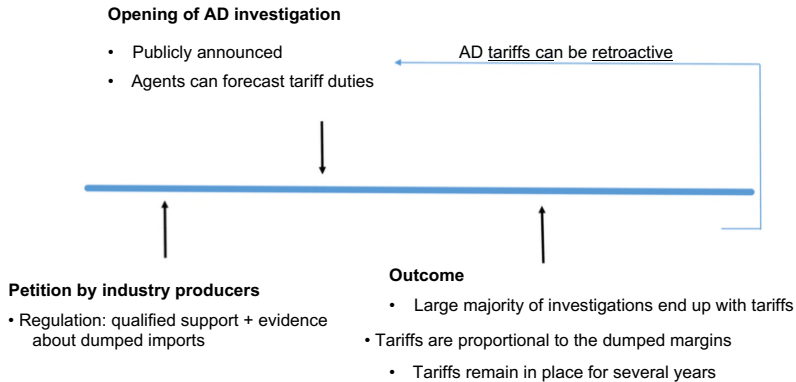
Empirical Analysis

Temporary Trade Barriers

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

Global Antidumping Database

- GAD (Bown, 2016): product-level data on AD investigations and related tariffs
- Possible to build time series for AD policy actions at any time frequency



Empirical Strategy

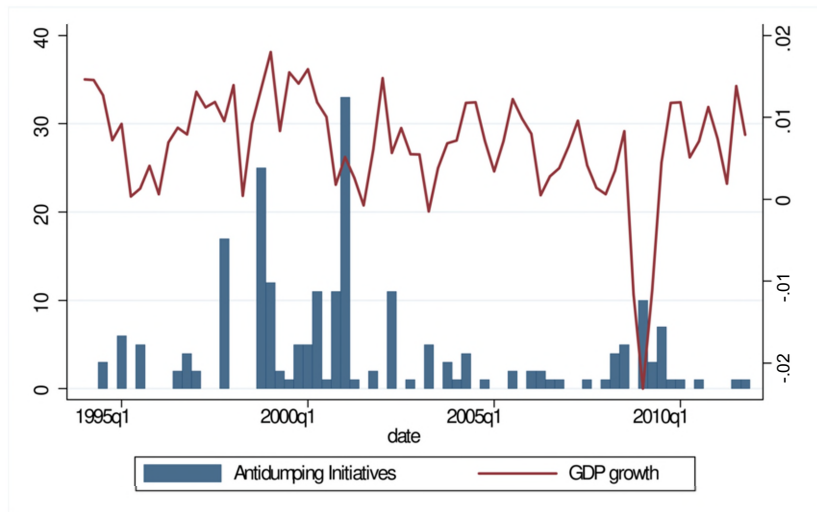
- Quarterly and monthly VARs for Canada and Turkey (India for robustness)

a Baseline trade-policy measure: # of HS-6 digits products for which an AD investigation begins in a given month or quarter

a 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 ~ 30% of sectoral imports
 - ▶ Steel sector output was 1.1% of GDP (including IO linkages)
- All AD initiatives were successful
- Median imposed tariff equal to 56%

Empirical Strategy

- Structural VAR

$$Y_t = e + \sum_{i=1}^p A_i Y_{t-i} + A_0 u_t$$

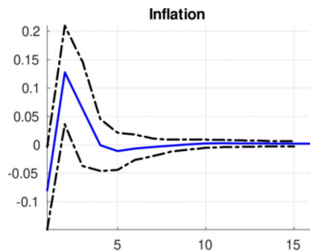
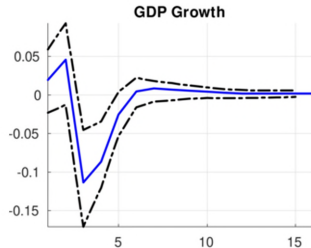
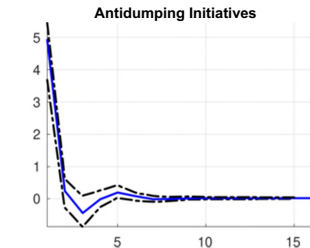
$$E(u_t u_t') = I_N$$

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

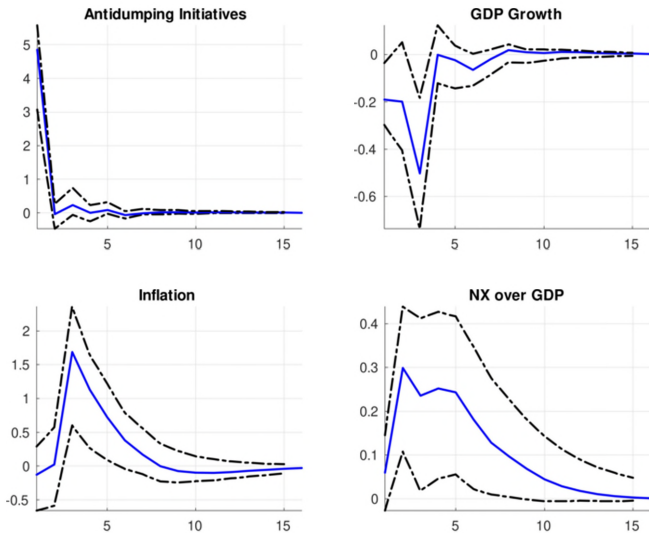
More on Identification

- Bown and Crowley (2013): countercyclical, lagged response of TTBs to macroeconomic shocks (up to 2008)
- Not a challenge for identification:
 - Analysis at monthly frequencies (decision lags realistically exceed a quarter)
 - VAR lag structure captures AD response to previous macro shocks
 - In our samples, $\text{corr}(A_{y,t}, AD1) \sim 0$
 - Reduced-form VAR: very weak covariance between trade-policy and macro shocks
- OIRFs not consistent with demand/financial shocks (realistic drivers of business cycles in our sample period)

Quarterly VAR: Canada



Quarterly VAR: Turkey



Monthly VAR and Robustness

- Monthly estimates yield similar results

▶ Monthly Canada and ▶ Monthly Turkey

- Results are also similar when considering India

- Variety of robustness checks

- ▶ Additional controls
- ▶ Focus only on AD investigations that end up with tariffs
- ▶ Different recursive ordering: AD initiatives respond to all macro shocks contemporaneously

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Panel VAR

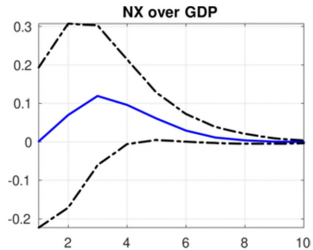
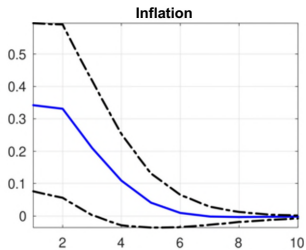
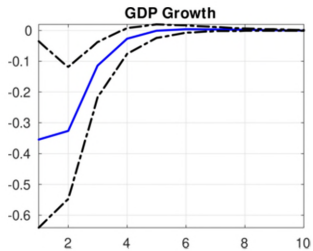
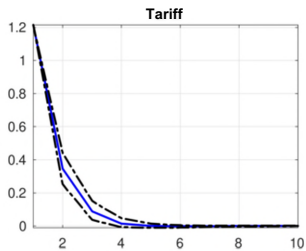
- AD investigations only apply to a subset of imports
- More comprehensive trade policy measure (only available at annual frequency): import-weighted average of the applied tariff rates
- Panel VAR using harmonized data for fifteen small open economies over the period 1996-2014

► All the countries had flexible exchange rates and did not hit the ZLB

► ► Tariff Data J

- Continue to assume that trade policy responds with a one-period delay to macroeconomic shocks

Panel VAR



The Model

Key Features

- Small open economy model (two-country model in which Home is of measure zero relative to Foreign)
- Two vertically integrated production stages
 - ▶ Non-tradable intermediate input (Y_2) produced with capital (K_1) and labor (L_t)
 - ▶ Tradable and non-tradable final consumption sectors (use Y_t)
- Firm heterogeneity and endogenous producer entry in the tradable sector (Ghironi and Melitz, 2005)
- Trade policy captured by an ad-valorem import tariff
- Incomplete international asset markets and nominal rigidities

Preferences

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

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

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

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

- Number of tradable varieties is endogenous

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

- Ad-valorem import tariff

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

Intermediate Input Producers

- Homogenous intermediate input:

$$Y = Z K^{\alpha} L^{\beta}$$

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

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

where $L_t(h)$ = labor hired from household h

- Capital rented in a competitive market

Tradable Sector

- Endogenous # of monopolistically competitive firms ($ND.t$) with heterogeneous productivity (z)
 - ▶ Time to build: $ND.t = (1 - \delta)(ND_{t-1} + Ng_{t-1})$.
- Sunk entry cost $fE.t$ and per-period fixed export cost fx,t
- Flexible prices (we also consider price stickiness, PCP and LCP)
- Standard Melitz-type selection of tradable producers into exporting:
 - ▶ Relatively more productive firms export: $z > Z_{X,t}$ to cover fixed export costs
 - ▶ Number of exporting firms: $N_{x,t} = [1 - G(z_{X,t})] ND.t$
- Free entry condition determines Nut

Households and Monetary Policy

- Households can invest in three assets:
 - Non-contingent nominal bonds in Home and Foreign currency
 - Shares in a mutual fund of domestic tradable-sector firms
 - Physical capital accumulation
- Household sets $w(h)$ subject to a quadratic wage-adjustment cost:

$$\frac{w(h)}{P, -M(h)} L\epsilon$$

- Nominal interest rate follows a feedback rule

$$1 + 4+1 = \max \left((1+7b, (1+7)\% [(1+i) (1+*)^* (Pa)ey]4 e \right)^{-}$$

- Calibrate the model using standard values in the literature

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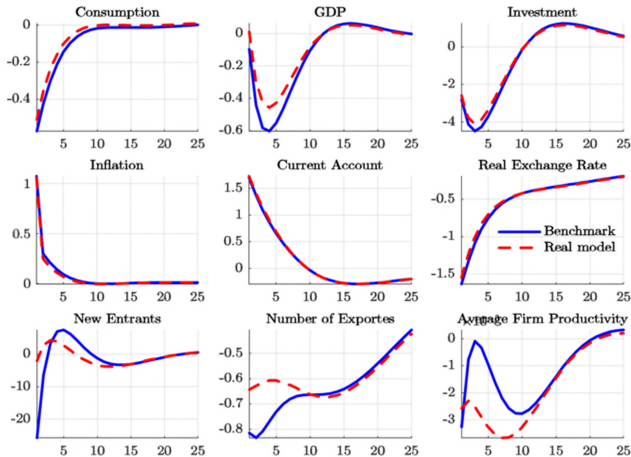
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Protectionism in Normal Times

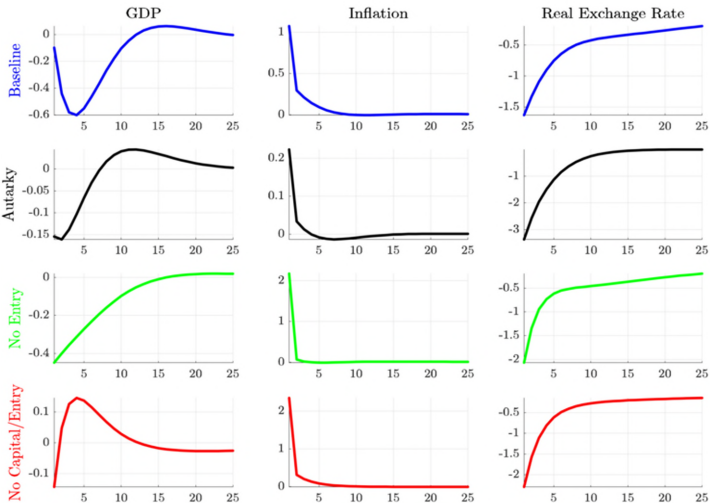
Protectionism in Normal Times

- Temporary increase in $TIM = 5\%$ ($P2IM = 0.75$ to match panel-VAR estimates)



Micro and Macro Forces

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



Counterfactual Scenarios

Counterfactual Scenarios

a Use the model to study scenarios where temporary trade barriers advocated as potentially beneficial

- Is protectionism expansionary when countries are in a liquidity trap (ZLB)?
 - 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, TIM may help lift the economy out of a liquidity trap
- We perform the following exercise:
 - At $t = 0$, risk-premium shock $A_{a,t}$ depresses output and generates deflation (binding ZLB)

$$\frac{1}{1+r} \text{Mat} = \frac{1}{(1+r_{t+1})} E_t \bar{I} \left(\frac{P_{t,t+1}}{1+TC_{t,t+1}} \right)^X$$

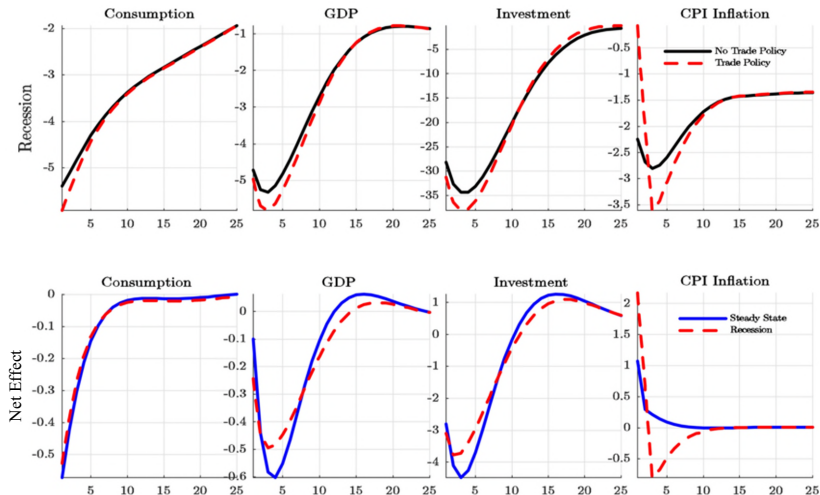
$$1 + P_{aw,t+1} + A_{at} = (1+r_{t+1}^*) E_t \bar{I} \left(\frac{\beta_{t,t+1} Q_{t+1}}{1+TC_{t,t+1} C_t} \right)$$

- Interpretation for A_{at} : shock to the demand for safe/liquid assets

- At $t = 1$, unanticipated tariff increase

Protectionism in a Liquidity Trap

- Temporary increase in $TIM = 5\%$ at the ZLB

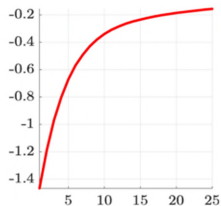
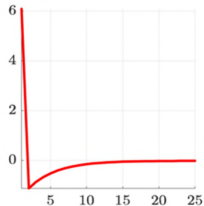
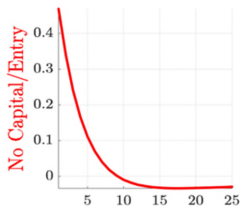
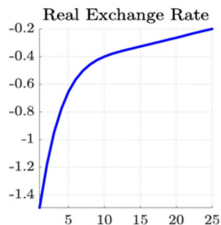
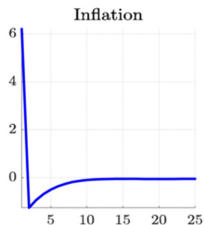
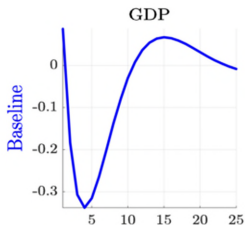


Protectionism under a Fixed Exchange Rate

- 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
- a In contrast to typical conclusion of textbook models, we find that protectionism remains contractionary under a peg

Protectionism under a Fixed Exchange Rate

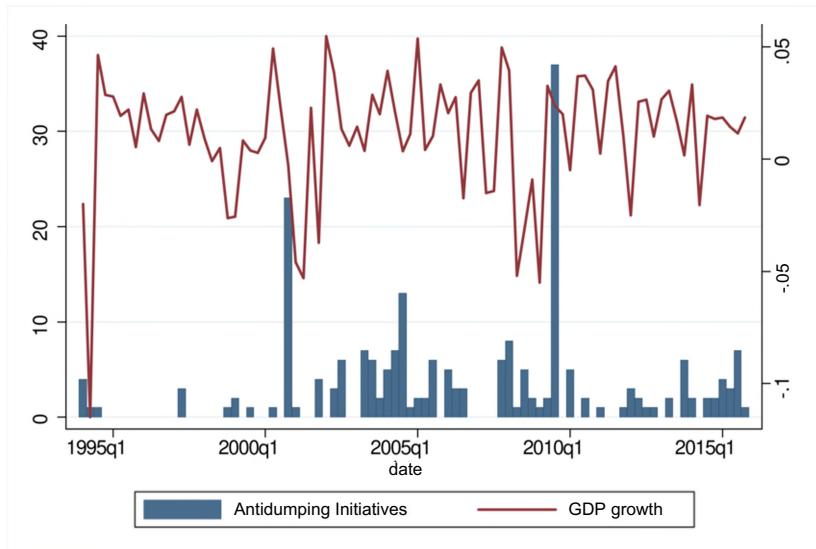
- **Baseline vs no capital/no firm dynamics**



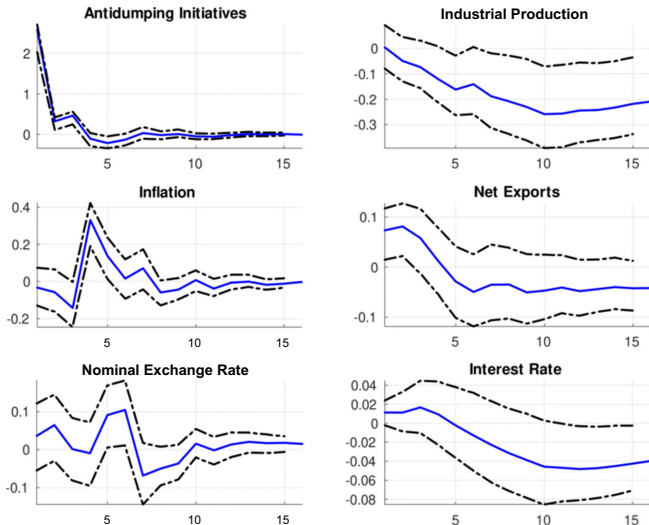
Conclusions

- 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
- Small-open economy model with key macro/trade ingredients reproduces VAR evidence
 - ▶ Both macro and micro dynamics behind the contractionary effects of tariffs
- 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

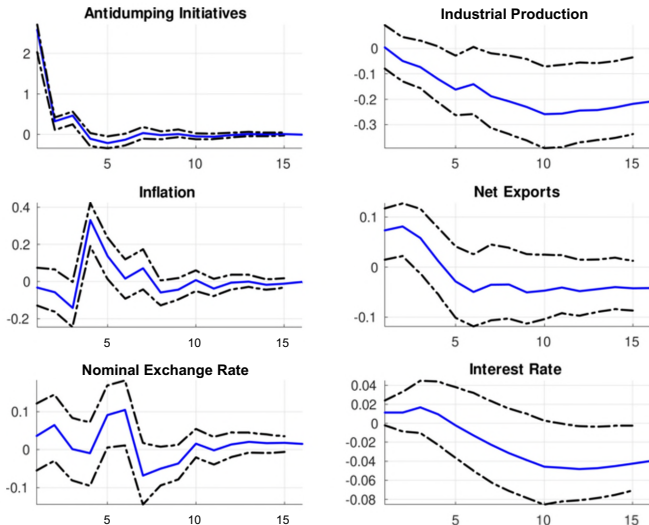
Data: Antidumping Investigations in Turkey



Monthly VAR: Canada



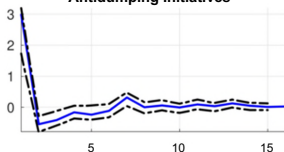
Monthly VAR: Canada



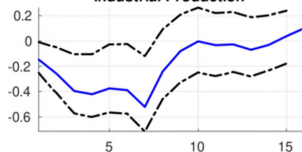
Monthly VAR: Turkey

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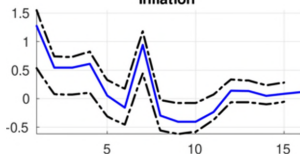
Antidumping Initiatives



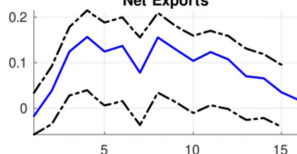
Industrial Production



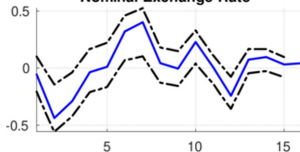
Inflation



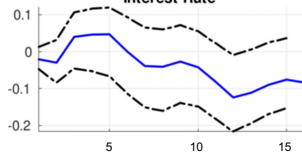
Net Exports



Nominal Exchange Rate

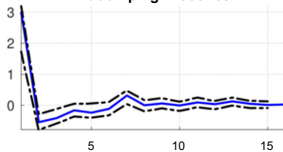


Interest Rate

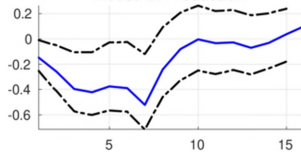


Monthly VAR: Turkey

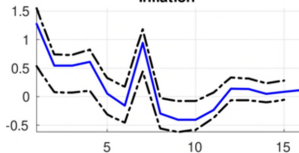
Antidumping Initiatives



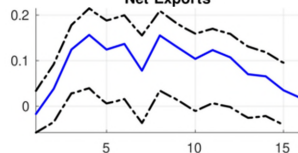
Industrial Production



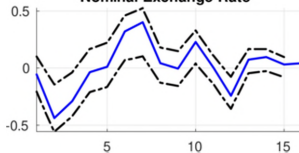
Inflation



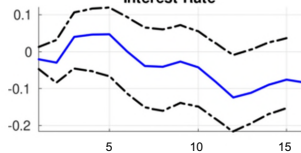
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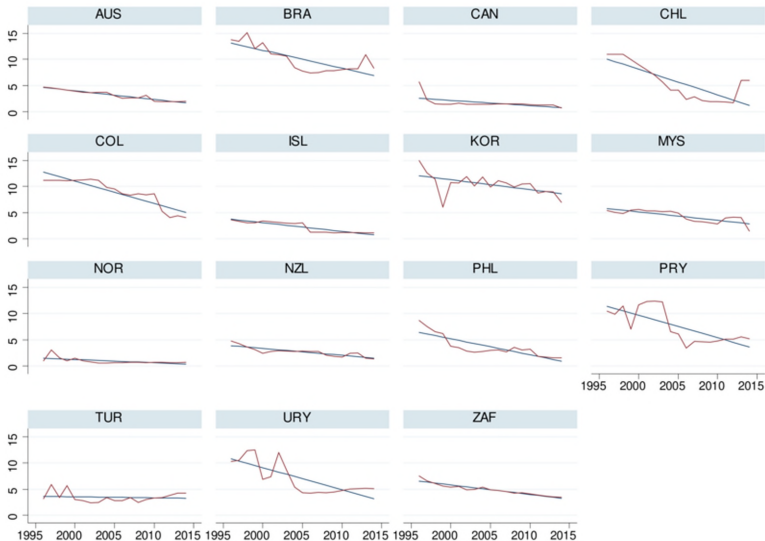


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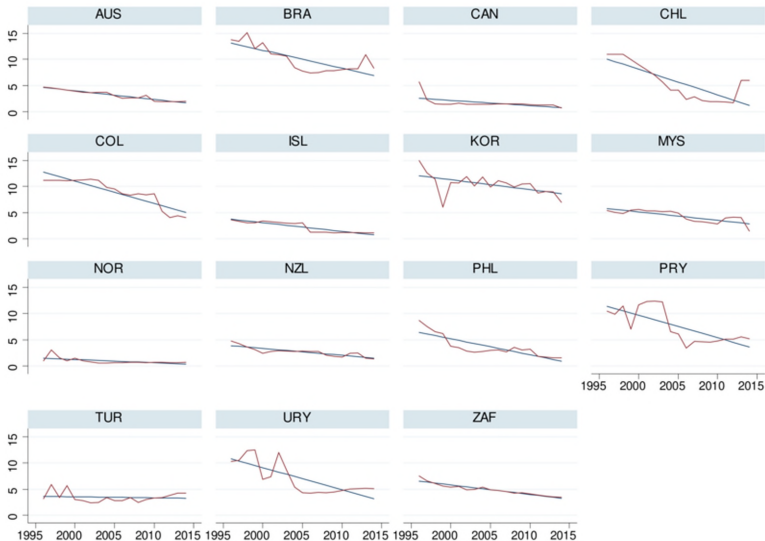
Data: Applied Tariff Rates

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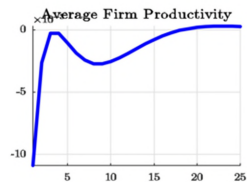
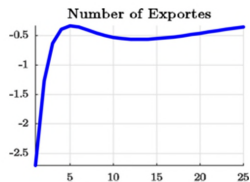
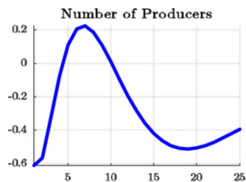
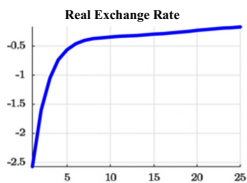
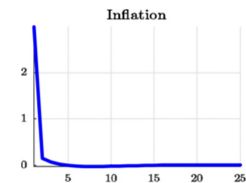
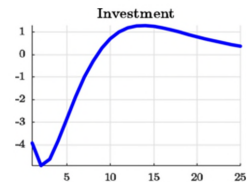
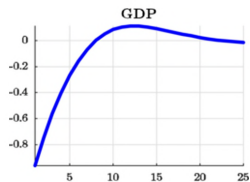
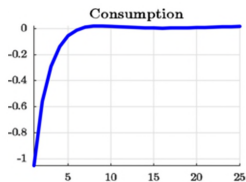


Data: Applied Tariff Rates

► Back



Producer Currency Pricing



Tradable Sector (cont.)

► Back

- Producer z faces domestic and export demand:

$$y_{i,w} = \left(\frac{p_{i,w}}{P} \right)^{-\sigma} Y^T$$

$$Y() = (++) = \frac{P_{X,t}}{P_{X,t} + P_{Y,t}}$$

- Prices: constant markups over marginal cost

$$\frac{P_{D,t}^T}{P_{D,t}} = \frac{P_{D,t}^T(z)}{Q_t} = (0, -1)^2 \text{ and } \frac{P_{D,t}^T(z)}{Q_t} = \frac{P_{D,t}^T(z)}{Q_t}$$

- Firm exports if

$$d_t(z) = [Q_{pk}(z) - (1+r)^4] Y(2) - 7,6 \quad , t > 0$$

- Number of exporting firms:

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

$$z_{x,t} = \inf\{z : d^{\wedge} z > 0\}$$

► Back

Tradable Sector (cont.)

► Back

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$$\frac{P_{D,t}^T}{P_{D,t}} = (0,-1)^2 \text{ and } \frac{P_{D,t}^T(z)}{Q_t}$$

- Firm exports if

$$d_t(z) = [Q_{pk}(z) - (1+r)^4] Y(2) - 7,6 \quad , t > 0$$

- Number of exporting firms:

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

$$z_{x,t} = \inf\{z : d^A(z) > 0\}$$

► Back

Household's Budget Constraint

• Back

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

$$A_{t+1}(h) + A_{t+1}^*(h) + L_t^E P \left(\frac{A_{t+1}^*(h)}{r_t} \right)^2 + P_t C_t(h) + P_t K_t(h) + e_t (N D_t + N E_t) X_{t+1}(h) \\ = (1+i)A_t(h) + (1+i)A_t^*(h) + \left[\frac{v}{2(W_t)} \frac{X_t^n(h)}{f(h)} - 1w \right] L_t(h) + \\ + P_t K_t E K_t(h) + (a[\tilde{+} E] N D_t X_t(h) + T_t(h),$$

Household's Budget Constraint

• Back

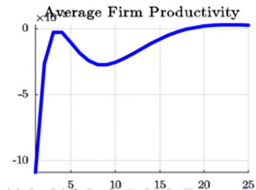
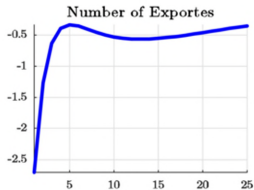
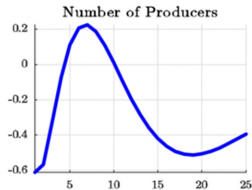
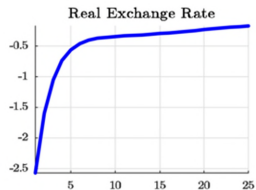
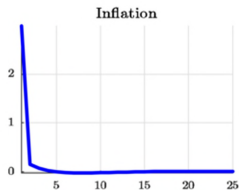
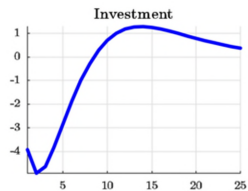
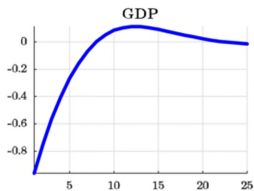
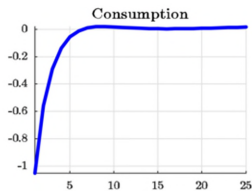
- The representative Home household's period budget constraint is:

$$\begin{aligned}
 A_{t+1}(h) + A_{t+1}^*(h) + L_t^E P \left(\frac{A_{t+1}(h)}{r_t} \right)^2 + P_t C_t(h) + P_t K_t(h) + e_t (N_t + N_{E,t}) X_{t+1}(h) \\
 = (1+i)A_t(h) + (1+i)A_t^*(h) + 1 \left[\frac{v}{2} \frac{X_t^n(h)}{(W_t L_t(h))} \right] L_t(h) + \\
 + P_t K_t(h) + (a + E) N_t X_t(h) + T_t(h),
 \end{aligned}$$

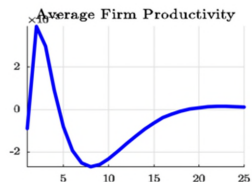
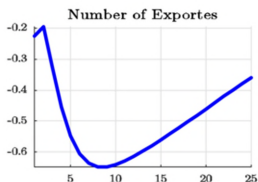
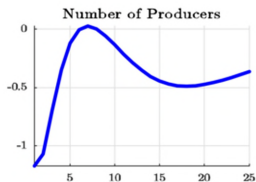
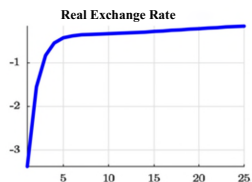
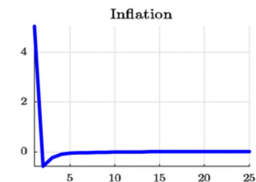
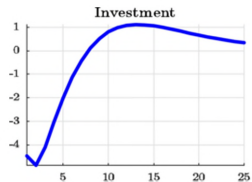
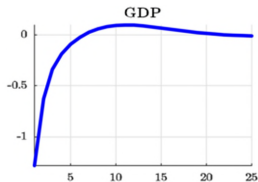
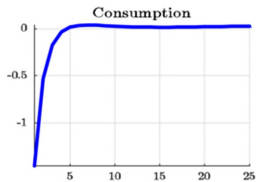
Calibration

- 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: $AN \implies \text{trade-to-GDP} = 50\%$
 - ▶ Size of the tradable sector: $aT \implies \text{manufacturing output share} = 30\%$
 - ▶ Iceberg trade costs: $T = T^* = 0.3$
 - ▶ Average import tariffs: $TIM = TIM^* = 0.02$
- Interest rate rule using estimates in Kichian (2015): $Q; = 0.5, I7 = 2.80, Qy = 0$

Producer Currency Pricing



Local Currency Pricing



Protectionism under a Fixed Exchange Rate

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

