Trade Wars and Industrial Policy along the Global Value Chains

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Motivation

- The US-China trade war initiated by the Trump administration has resulted in significant income losses for the US consumers and firms:
  - Amiti, Redding, and Weinstein (2019); Cavallo et al. (2019); Fajgelbaum et al. (2020).
- The tariffs initially imposed by the Trump administration (on July 2018) are not correlated with the size of the US imports from China.
- What is the motivation of Trump's trade war?

Motivation

- The first wave of Trumpian tariffs aimed at China's industrial policy rather than Chinese imports:
  - They are concentrated in a few high-tech manufacturing industries emphasized by the "*Made in China 2025*" (MIC 2025) initiative,
    - e.g. Aerospace, advanced IT equipment, railway equipment, power generating and distribution equipment, and robotics.
- At the press conference releasing the USTR report of the investigation under Section 301 on March 22, 2018:
  - Trump and Pence talked about reducing trade deficits and protecting jobs.
  - In contrast, Lighthizer and Ross talked about technology and intellectual property.
  - *"So the steel and aluminum actions we've taken deal more or less with the present. This action on intellectual property rights deals with the future."*–Wilbur Ross

Motivation

- The first wave of Trumpian tariffs targeted at China's industrial policy rather than Chinese imports.

- Existing studies on the trade war have ignored the role of industrial policy.

- We consider scale effect and the interaction of industrial policy and tariffs in evaluating the impacts of the China-US trade war.

What we do

- We document that the industries listed in the “MIC 2025”
  - exhibit strong economies of scale,
  - have low intermediate input substitutability.
- We extend the quantitative trade model *a la* Caliendo and Parro (2015) by introducing
  - sectoral external economies of scale, varies across industries
  - CES input-output linkages, elasticity of substitution also varies across industries
- We calibrate the model to 7 major economies and 95 disaggregated industries in 2016 to quantify the impact of:
  - Trumpian tariffs
  - "MIC 2025" industrial policy
  - Trade wars: Interaction of the two, actual and Nash equilibrium

Preview of Our Results

- The first wave Trumpian tariffs (without retaliation) reduce the US real wages, but increase the US welfare,
  - their direct welfare effects are small: -0.008% for China and 0.023% for the U.S.
- The total welfare effects of the Trumpian tariffs and China's retaliation are larger: -0.04% for China and -0.28% for the U.S.
- Surprising results for China's industrial policy:
  - The "MIC 2025" subsidies increase the US welfare.
  - The Trumpian tariffs increase China's welfare returns from implementing the "MIC 2025".
- Trade wars:
  - Non-cooperative Nash equilibrium: China subsidizes its high-tech *production* by 5% and the U.S. imposes tariffs on both high-tech imports from China and high-tech exports to China
- Brazil and India benefit from these polices/conflicts, but Japan suffers.

Related Literature

- Empirical studies on the ongoing US-China trade war:
  - Amiti, Redding, Weinstein (2019), Fejgelbaum et al. (2019), Cavallo et al. (2019), Ma and Meng (2019), Huang et al. (2020)
  - This paper: quantifies effects of both industrial and trade policies in a more general framework, and considers strategic interactions.

- Quantification of trade policies:
  - Caliendo and Parro (2015), Ossa (2014), Caliendo et al. (2017)
  - This paper: highlights the importance of scale economies and non-Cobb-Douglas IO linkages.

- Scale economy and interdependence of trade and industrial policy:
  - Bartelme et al. (2019), Lashkaripour and Lugovskyy (2018)
  - This paper: explores the interdependence in detailed policy context of the real world.

- Impact of China's growth on the world economy:
  - Autor et al. (2013), Di Giovanni et al. (2014), Hsieh and Ossa (2016), Adao et al. (2019), Kleinman et al. (2020)
  - This paper: evaluate impacts of industrial policy and trade wars

Data and Facts

Data

- A system of world trade with 6 major economies: US, China, Japan, EU (28 countries), Brazil, India, and the rest of world (ROW).
- 95 disaggregated industries: 60 manufacturing industries (including mining), 1 agriculture, and 34 services sectors.
- Bilateral trade flows prior to the trade war: 2016 UN-Comtrade.
- Tariff data: 2017 World Integrated Trade System (WITS).
- Production and IO linkages: partition the 2014 World Input-Output Table (WIOT) into 95 sectors.
- Trump tariffs: the United State Trade Representative Office (USTR); HS 8; matched to 61 tradable sectors.
- China's retaliation tariffs: the China's Ministry of Commerce (MofCom).

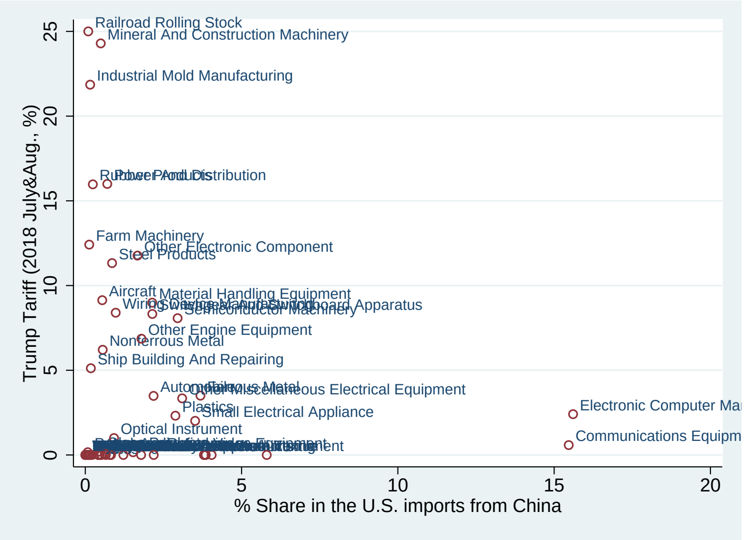


Figure: Initial Trumpian Tariffs (July&August 2018) and US imports from China (61 tradables)

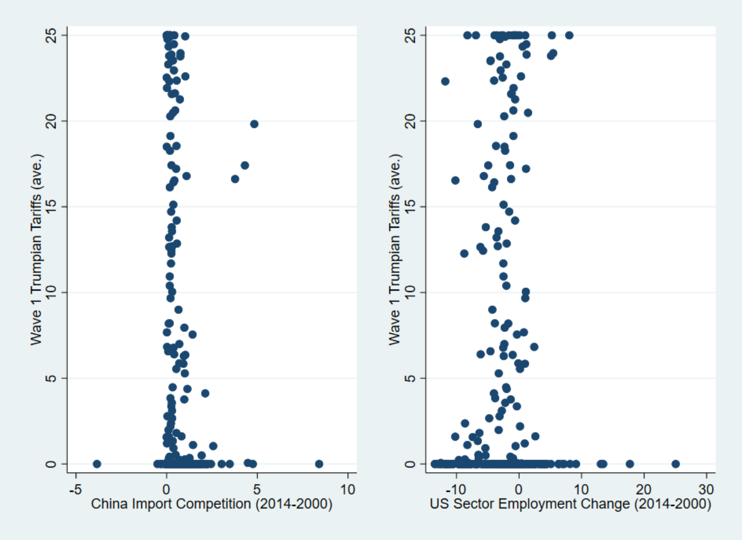


Figure: Initial Trumpian (July&August 2018) and China Shock (392 SIC sectors)

(Notes: China import competition is measured by the changes in China's sectoral exports times the initial shares of China in the U.S. sectoral imports.)

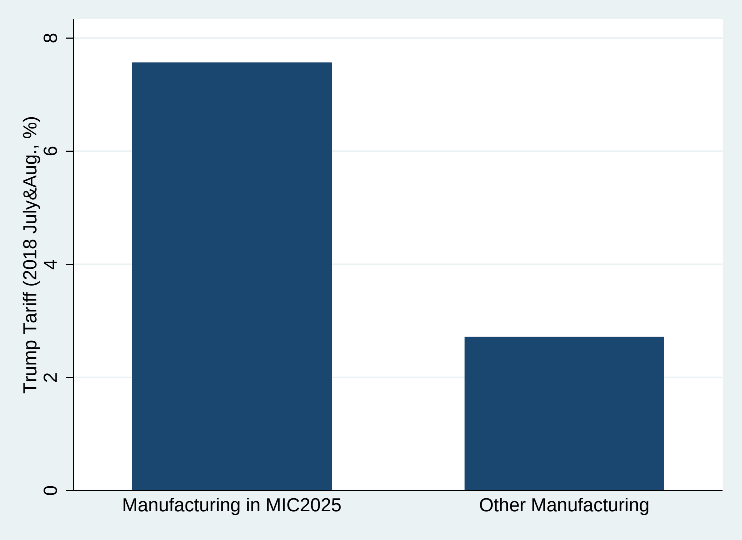


Figure: Initial Trumpian Tariffs (July&August 2018) and "MIC 2025"

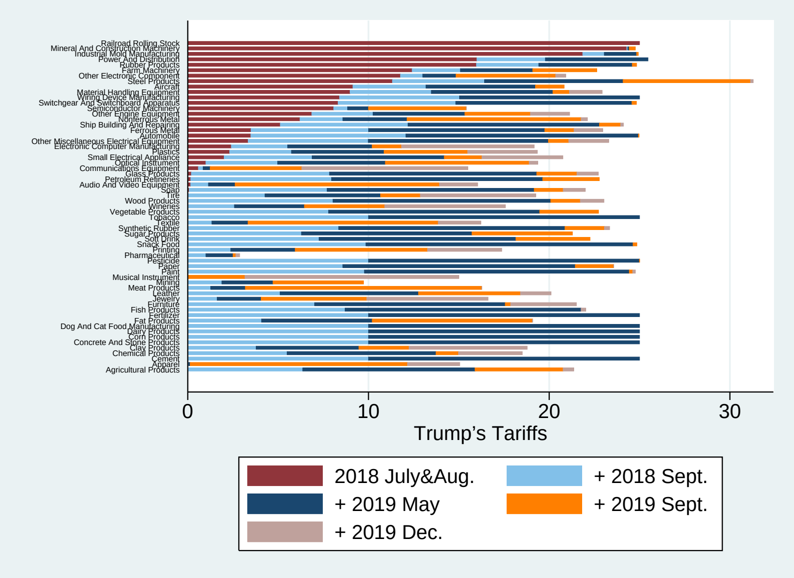


Figure: Trump's Tariffs

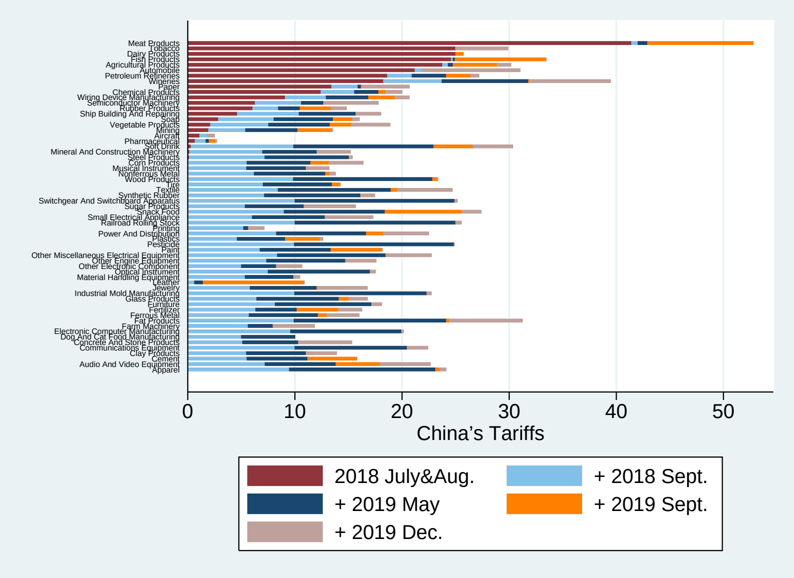


Figure: China’s Retaliation

Model

Preferences

- N countries with labor endowments $\{L_i\}_{i=1}^{N}$. J sectors.
- Labor: immobile across countries but perfectly mobile across sectors.
- Preference:

$$U_i = \sum_{j=1}^{J} \alpha_i^j \log \left[\left(\int_0^1 \left[C_i^j(\omega) \right]^{\frac{\sigma_j - 1}{\sigma_j}} d\omega \right)^{\frac{\sigma_j}{\sigma_j - 1}} \right] \tag{1}$$

Production Networks

- Each variety is produced under perfect competition using labor and composite intermediates. Unit cost function:

$$c_i^j = \underbrace{\frac{1}{\left(L_i^j\right)^{\psi_j}}}_{\text{Sectoral Scale Economy}} w_i^{\beta_j^L} \left(P_i^{Mj}\right)^{1-\beta_j^L}, \tag{2}$$

where

$$P_i^{Mj} = \left[\sum_{s=1}^{J} \gamma_i^{sj} \left(P_i^s\right)^{1-\mu_j}\right]^{\frac{1}{1-\mu_j}}, \tag{3}$$

- Productivity $z_i^j(\omega)$ is drawn from:

$$Pr\left[z_i^j(\omega) \leq z\right] = \exp\left\{-T_i^j z^{-\theta_j}\right\}, \quad z > 0, \quad \theta_j > \max\{\sigma_j - 1, 1\}, \tag{4}$$

Tariffs and Subsidies

All tariffs and tax/subsidies are levied on sales:

- Iceberg trade cost: $\tau_{in}^{j} \geq 1$.
- Import tariff: t_{in}^{j}.
- Export tariff: e_{in}^{j}
- Industry tax or subsidy: e_{i}^{j}

Equilibrium

- The equilibrium consists of $\left(w_i, L_i^j, P_i^j, X_i^j\right)$ that satisfy (i) goods and labor market clearing, and (ii) balanced trade.

- Equilibrium in relative changes: denote y' as the level of any variable y after change and $\hat{y} = y'/y$
  - Data and parameters in need: $\left(\psi_j, \mu^j, \theta_j\right)$ and $\left(X_{in}^j, t_{in}^j, e_{in}^j, \tilde{\alpha}_i^j, \tilde{\beta}_i^j, \chi_i^{gj}, \tilde{\gamma}_i^{sj}\right)$.
  - Exogenous changes: $\left(t_{in}^j\right)'$ and $\left(e_{in}^j\right)'$.
  - $\left(\hat{w}_i, \hat{L}_i^j, \hat{P}_i^j, \hat{X}_i^j\right)$ can be computed by solving a nonlinear equation system.

Decomposing the Welfare Effects of Tariff Changes

Proposition

The changes in the real wage with respect to tariff changes are

$$\log\left(\frac{\hat{w}_i}{\hat{P}_i}\right) = \sum_{j=1}^{J} \alpha_i^j \left[\underbrace{-\frac{1}{\theta_j}\log\left(\hat{\pi}_{ii}^j\right)}_{\textit{Final Goods}} + \underbrace{\frac{\psi_j}{\beta_i^j}\log\left(\hat{L}_i^j\right)}_{\textit{Scale Economy}} \underbrace{-\frac{1-\beta_i^j}{\beta_i^j}\left(\log \hat{\Xi}_i^j + \frac{1}{\theta_j}\log\left(\hat{\pi}_{ii}^j\right)\right)}_{\textit{Intermediates}} \right], \tag{5}$$

where the sectoral linkages are summarized by

$$\hat{\Xi}_i^j = \left(\sum_{s=1}^{J} \gamma_i^{sj}\left(\frac{\hat{P}_i^s}{\hat{P}_i^j}\right)^{1-\mu^j}\right)^{\frac{1}{1-\mu^j}}. \tag{6}$$

Optimal Policy: What does the existing theoretical literature say?

If governments have a full menu of industrial and trade policies, then

- industrial policy is used to address misallocation due to external economies of scale
- trade policies are used to manipulate terms of trade

- Bartelme et al. (2019): optimal unilateral policies for a small open economy in a class of models that includes Caliendo and Parro (2015) augmented with external economies of scale
- Lashkaripour and Lugovskyy (2018): optimal unilateral policies in general equilibrium, but without input-output linkages
- Beshkar and Lashkaripour (2020): optimal unilateral policies in genearl equilibrium with input-output linkages, but no external increasing returns to scale

Our Quantitative Analysis

- Starts from the existing trade barriers and trade policies before the US-China trade war
- Evaluates actual trade policies of Trump administration and China's retaliations
- Examines the strategic interactions between them

Illustrative Examples

Two Symmetric Countries

- $N = J = 2$ with Cobb-Douglas utility and production functions.
- Sector 1: high-tech with $\psi_1 = \psi > 0$; produced by labor.
- Sector 2: low-tech with $\psi_2 = 0$; produced by labor and freely traded.
- $\tau_{12}^1 = \tau_{21}^1 = \tau$ is sufficiently large so that both countries produce high-tech products.
- α_1 is low to ensure that both countries produce low-tech goods.
- We start from no policy equilibrium and consider unilateral policies in country 1.

Non-Cooperative Policies: A Numerical Example

- Baseline: $\theta = 4$, $\psi = 0.1$, $\alpha_i^1 = 0.2$, and $\beta = 0.5$.
- To capture ToT effect: $\tau_{12}^j = \tau_{21}^j = 1.2$ for all j.
- To resemble US-China trade conflicts:
  - Country 1: North, $T_1^1 = 1.5$ and $T_i^j = 1$ for $(i, j) \neq (1, 1)$.
  - Country 2: South, $L_1 = 1$ and $L_2 = 1.5$.

Tariffs vs. Industrial Subsidies

- Strategies:
  - Country 1: tariff on high-tech imports t^1_{21}.
  - Country 2: subsidies on high-tech industry, $e^1_{21} = e^1_{22} = e^1_2$.

Table: Nash Equilibrium

	e^1_2	t^1_{21}
$\psi = 0.1,\ \beta = 0.5$	-0.1085	0.3033
$\psi = 0.15,\ \beta = 0.5$	-0.1433	0.4429
$\psi = 0,\ \beta = 0.5$	-0.0367	0.1994
$\psi = 0.1,\ \beta = 1$	-0.1593	0.2777
$\psi = 0,\ \beta = 1$	-0.0939	0.1817

Retaliations

Table: Nash Equilibrium with retaliations

	Country 1: North				Country 2: South			
	t_{21}^1	e_1^1	e_{12}^1	t_{21}^2	e_2^1	t_{12}^1	t_{12}^2	e_{21}^1
Country 2's retaliation by tariffs	0.3257	n.a.	n.a.	n.a.	-0.0861	0.2784	0.3873	n.a.
Country 1's retaliation by export control	0.4111	n.a	0.1949	0.2126	-0.1166	0.0861	0.2803	0.0173
Country 1's retaliation with industrial policy	0.3095	-0.0508	0.2545	0.2298	-0.1257	0.0418	0.2693	0.0186

(Notes: t_{in}^j refers to the rate of tariff levied by country n on the imports of good j from country i. e_{in}^j refers to the rate of tariff levied by country i on the exports of good j to country n. e_i^j refers to the production subsidy on industry j in country i.)

Calibration

External Calibration

Parameter	Definition	Source
θ_j	Trade elasticity	Bartelme et al. (2019)
ψ_j	Sectoral scale economies	Bartelme et al. (2019)

- Baseline calibration of (θ_j, ψ_j) from from Bartelme et al. (2019):
  - Sectoral bilateral trade data and country-and-sector-level demand shocks as instruments.
  - Their estimates suggest that economies of scale in manufacturing sectors are moderate ($\simeq 0.1$) and relatively uniform. No scale economies in service sectors.
  - Conservative estimates on scale economies $\rightarrow$ lower bounds on the gains from industrial policies.
- Alternative calibration of (θ_j, ψ_j) from Lashkaripour and Lugovskyy (2017):
  - Firm-product-level import data.
  - Economies of scale are larger and more heterogeneous across sectors $\rightarrow$ upper bounds on the gains from industrial policies.

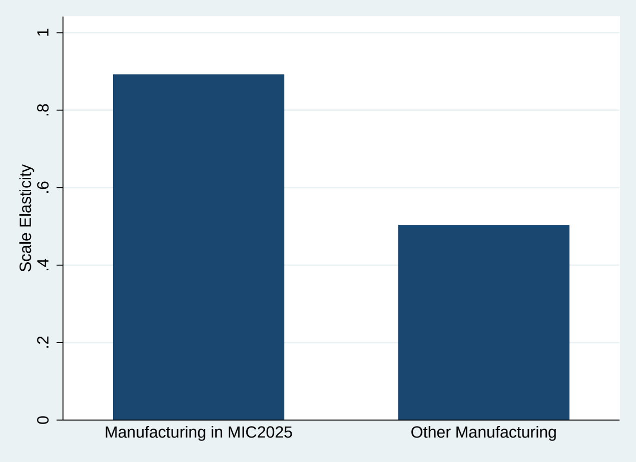


Figure: "MIC 2025" and Sectoral Economies of Scale: Lashkaripour and Lugovskyy (2017)

Estimating (μ_j)

- The changes in intermediate price indices:

$$\hat{P}_i^{Mj} = \left[\sum_{s=1}^{J} \delta_i^{sj} \left(\hat{P}_i^{s} \right)^{1-\mu_j} \right]^{\frac{1}{1-\mu_j}}, \tag{7}$$

where δ_i^{sj} is the fraction of industry j's intermediate expenditure on industry s in country i.

- Estimating μ_j by the following equation:

$$\Delta \log \underbrace{\delta_i^{sj}}_{\text{Input Share}} = (1-\mu_j) \left(\Delta \log \underbrace{P_i^{s}}_{\text{Output Price}} - \Delta \log \underbrace{P_i^{Mj}}_{\text{Input Price Index}} \right) + \epsilon_i^{sj}. \tag{8}$$

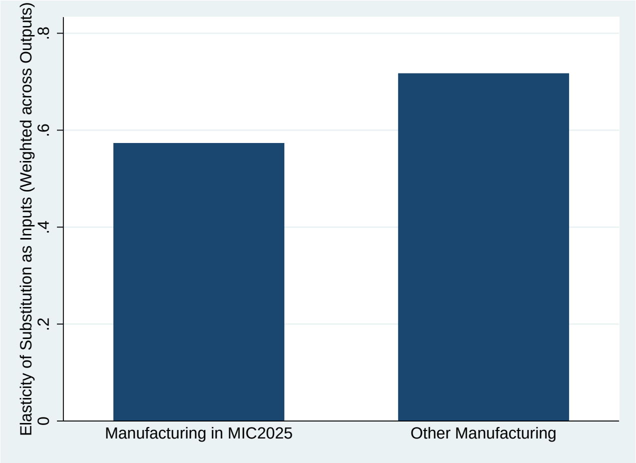
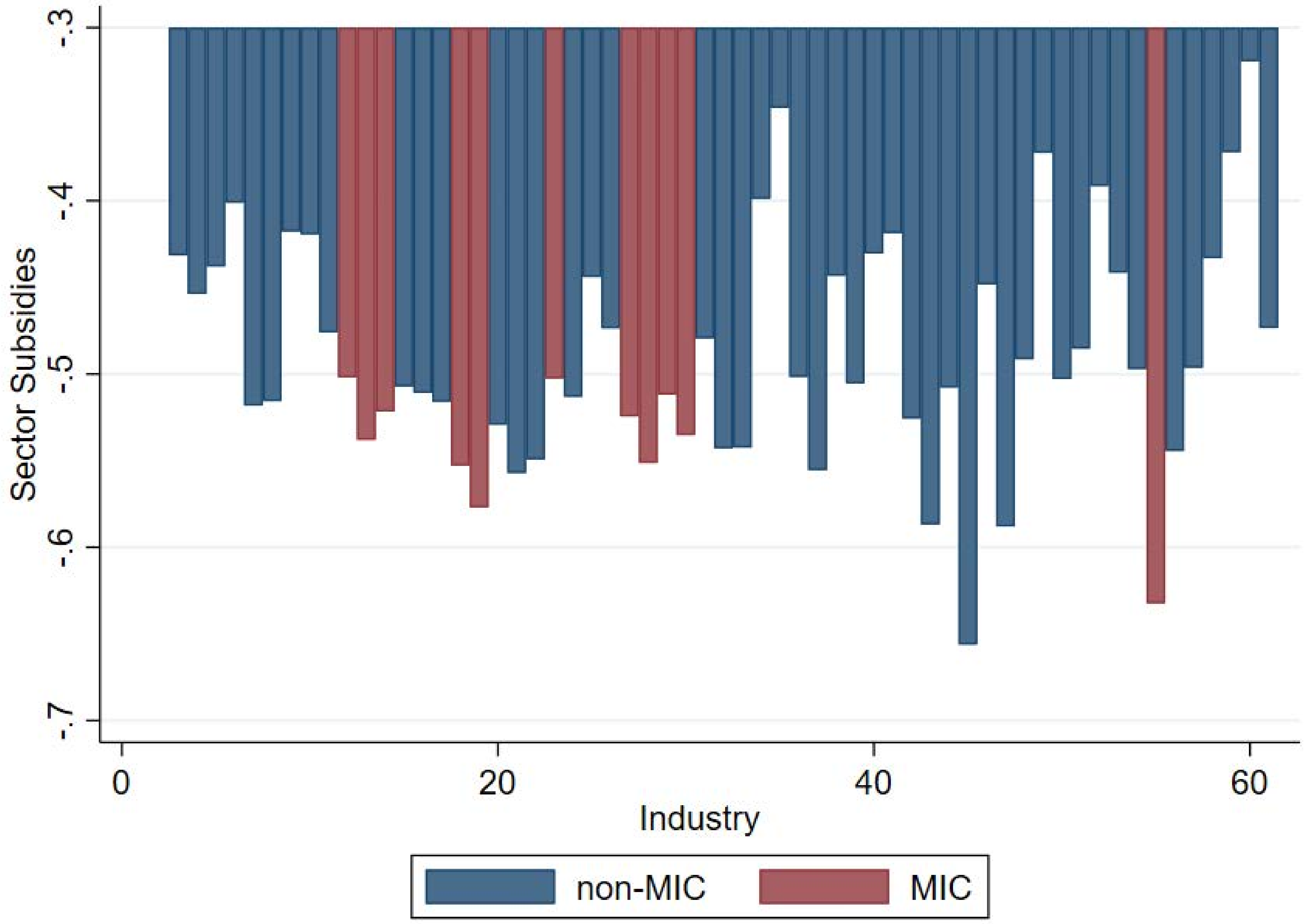


Figure: "Made-in-China 2025" and Elasticity of Substitution as Inputs

Counterfactuals

Initial Equilibrium and MIC 2025 policy

- We assume the initial equilibrium is the economy in 2016 without China's industrial policy
- In counterfactuals, we consider a uniform 5% subsidy for all "Made-in-China 2025" industries



Sector Subsidies
-.3
-.4
-.5
-.6
-.7
0
20
40
60
Industry
non-MIC
MIC

Table: Trump Tariffs (Wave 1: July/Aug. 2018) and "MIC 2025": Baseline

	China							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
Trump Wave 1	-0.008	-0.007	-0.001	0.000	-0.005	0.000	0.001	-0.003
MIC2025	0.134	1.527	0.502	0.004	0.482	0.000	0.114	0.424
Both	0.126	1.520	0.501	0.004	0.478	0.000	0.115	0.421
MIC under Trump Wave 1	0.135	1.527	0.502	0.004	0.482	0.000	0.114	0.424
Trump Wave 1 under MIC	-0.008	-0.007	-0.001	0.000	-0.004	0.000	0.001	-0.003
	U.S.							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
Trump Wave 1	0.023	-0.039	-0.024	0.003	0.014	0.000	-0.018	-0.013
MIC2025	0.007	0.008	0.160	-0.003	-0.841	0.000	0.680	0.012
Both	0.031	-0.043	0.113	0.000	-0.728	0.000	0.577	-0.006
MIC under Trump Wave 1	0.008	-0.004	0.137	-0.003	-0.741	0.000	0.596	0.008
Trump Wave 1 under MIC	0.025	-0.051	-0.047	0.003	0.115	0.000	-0.102	-0.017

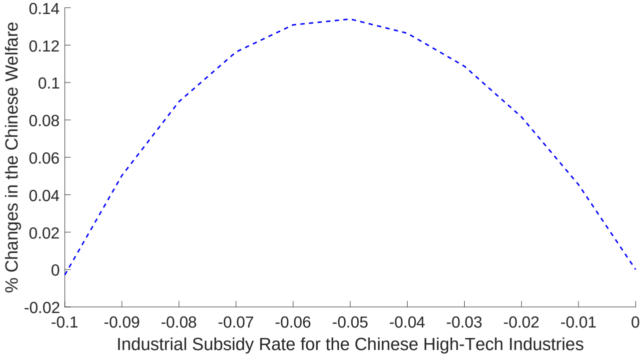


Figure: Welfare Effects of China's Uniform Subsidies on High-tech Industries

Table: Trump Tariffs (Wave 1: July/Aug. 2018) and "Made-in-China 2025": Caliendo and Parro (2015) with no economies of scale

	China							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
Trump Wave 1	-0.049	-0.046	-0.014	-0.001	0.000	0.000	-0.015	-0.016
MIC 2025	-0.475	2.323	0.956	0.000	0.000	0.000	0.740	0.627
Both	-0.520	2.277	0.942	-0.001	0.000	0.000	0.725	0.611
MIC under Trump Wave 1	-0.471	2.324	0.956	0.000	0.000	0.000	0.740	0.627
Trump Wave 1 under MIC	-0.046	-0.045	-0.013	-0.001	0.000	0.000	-0.015	-0.016
	U.S.							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
Trump Wave 1	-0.469	-0.871	-0.315	0.014	0.000	0.000	-0.208	-0.362
MIC2025	0.103	0.102	0.044	0.001	0.000	0.000	0.021	0.036
Both	-0.337	-0.786	-0.280	0.015	0.000	0.000	-0.190	-0.331
MIC under Trump Wave 1	0.132	0.086	0.034	0.001	0.000	0.000	0.019	0.031
Trump Wave 1 under MIC	-0.439	-0.887	-0.324	0.015	0.000	0.000	-0.211	-0.367

Table: Trump Tariffs (Wave 1: July/Aug. 2018) and "MIC 2025": Other Economies

	Trump Wave 1							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
BRA	0.0005	-0.0001	0.0000	0.0000	0.0013	0.0000	-0.0013	0.0000
EU	-0.0022	-0.0027	0.0064	-0.0012	-0.0137	0.0000	0.0070	-0.0013
JPN	-0.0003	-0.0004	0.0006	0.0000	-0.0007	0.0000	0.0003	-0.0007
IND	0.0004	0.0000	0.0004	0.0000	-0.0005	0.0000	0.0002	-0.0001
ROW	0.0377	0.0258	-0.0093	0.0056	0.0678	0.0000	-0.0481	0.0098
	MIC 2025							
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
BRA	0.0198	0.0050	0.0106	0.0001	-0.0688	0.0000	0.0614	0.0018
EU	-0.0285	-0.0262	0.1465	-0.0029	-0.9263	0.0000	0.7636	-0.0070
JPN	-0.0236	-0.0137	0.0228	-0.0014	-0.2331	0.0000	0.1958	0.0023
IND	0.0152	-0.0051	0.0230	-0.0012	-0.1641	0.0000	0.1398	-0.0025
ROW	-0.1521	-0.0092	0.2571	-0.0435	-1.1742	0.0000	0.9444	0.0070

Nash Equilibrium (1)

- U.S. strategy: tariffs on Chinese imports that are proportional to the Trump tariffs (Wave 1: July/Aug. 2018). That is:

$$\left(\text{tariff}^{j}_{CN,US}\right)' = \text{tariff}^{j}_{CN,US} + t \times \text{Trump Tariff Wave } 1^{j}_{CN,US}. \tag{9}$$

- China's strategy: a subsidy e on the Chinese high-tech production, financed by lump-sum taxes.

- Nash equilibrium: $(e^* = -0.052, t^* = 1.044)$.

Table: Welfare Effects of the Nash Equilibrium ($e^* = -0.052, t^* = 1.044$)

%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
BRA	0.0214	0.0052	0.0113	0.0000	-0.0719	0.0000	0.0640	0.0019
CHN	0.1263	1.5818	0.5225	0.0044	0.4958	0.0000	0.1209	0.4382
EUR	-0.0296	-0.0276	0.1589	-0.0041	-0.9758	0.0000	0.8015	-0.0080
IND	0.0173	-0.0046	0.0252	-0.0013	-0.1751	0.0000	0.1492	-0.0025
JPN	-0.0224	-0.0122	0.0263	-0.0015	-0.2498	0.0000	0.2102	0.0026
ROW	-0.1226	0.0122	0.2490	-0.0410	-1.1193	0.0000	0.9061	0.0174
USA	0.0337	-0.0428	0.1213	-0.0002	-0.7683	0.0000	0.6096	-0.0051

Nash Equilibrium (2)

- U.S. strategy: tariffs on Chinese imports that are proportional to the Trump tariffs (Wave 1: July/Aug. 2018) and on US high-tech exports to China $e^{*}_{\text{USA,CHN}}$
- China's strategy: a subsidy e on the Chinese high-tech production, financed by lump-sum taxes.
- Nash equilibrium: $\left(e^{*}_{\text{CHN}} = -0.053; t^{*} = 1.03, e^{*}_{\text{USA,CHN}} = 0.0525\right)$.

Table: Welfare Effects of the N.E. $\left(e^*_{\text{CHN}} = -0.053; t^* = 1.03, e^*_{\text{USA,CHN}} = 0.0525\right)$

%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
BRA	0.0219	0.0051	0.0116	0.0000	-0.0739	0.0000	0.0655	0.0019
CHN	0.1316	1.6129	0.5357	0.0044	0.4949	0.0000	0.1307	0.4471
EUR	-0.0361	-0.0345	0.1681	-0.0054	-1.0200	0.0000	0.8335	-0.0107
IND	0.0182	-0.0047	0.0264	-0.0014	-0.1814	0.0000	0.1543	-0.0026
JPN	-0.0243	-0.0138	0.0278	-0.0016	-0.2608	0.0000	0.2185	0.0023
ROW	-0.1274	0.0101	0.2759	-0.0425	-1.2176	0.0000	0.9779	0.0164
USA	0.0479	0.0307	0.0934	0.0027	-0.5349	0.0000	0.4538	0.0157

Table: Further Retaliations and the US-China Trade Decoupling

%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
Trump Tariffs Wave 5 and China's Retaliation								
			Goods	Services	Goods	Services	Goods	Services
BRA	0.0034	0.0002	0.0016	-0.0001	-0.0033	0.0000	0.0020	0.0001
CHN	-0.0415	-0.0372	-0.0070	-0.0007	-0.0069	0.0000	-0.0061	-0.0165
EUR	0.0245	0.0225	0.0262	0.0006	-0.0670	0.0000	0.0533	0.0093
IND	0.0009	-0.0008	0.0025	0.0003	-0.0151	0.0000	0.0120	-0.0006
JPN	-0.0010	-0.0020	0.0030	0.0001	-0.0087	0.0000	0.0064	-0.0028
ROW	0.2730	0.1828	-0.0892	0.0421	0.5860	0.0000	-0.4154	0.0593
USA	-0.2802	-0.4544	-0.0793	-0.0024	-0.4193	0.0000	0.2167	-0.1701
US-China Trade Decoupling								
%Δ in:	Welfare	Real Wage	Final Goods		Scale		Intermediates	
			Goods	Services	Goods	Services	Goods	Services
BRA	0.0048	0.0007	0.0018	-0.0001	-0.0030	0.0000	0.0019	0.0002
CHN	-0.0789	-0.0547	-0.0130	-0.0008	-0.0016	0.0000	-0.0149	-0.0243
EUR	0.0521	0.0500	0.0321	0.0031	-0.0547	0.0000	0.0485	0.0210
IND	0.0015	-0.0006	0.0038	0.0004	-0.0184	0.0000	0.0143	-0.0007
JPN	-0.0010	-0.0024	0.0040	0.0002	-0.0141	0.0000	0.0108	-0.0032
ROW	0.4024	0.2619	-0.1100	0.0617	0.7756	0.0000	-0.5524	0.0869
USA	-0.8071	-0.7475	-0.1270	-0.0068	-0.6668	0.0000	0.3348	-0.2817

Conclusion

- We capture the features of high-tech industries by incorporating:
  - Sectoral external economies of scale.
  - CES input-output linkages with low elasticity of input substitution
- Rich interdependence of tariffs, industrial policy, and global linkages:
  - China's industrial subsidies effectively increase the US welfare and the welfare of poor and emerging economies, but reduce the welfare of EU, and Japan.
  - The Trumpian tariffs increase the US welfare, but reduce the U.S. real wage
  - Both policies increase the high-tech industry scale of own country, but reduce that of other countries.
  - Brazil and India benefits from these policies and US-China trade wars, but Japan suffers.
- Future research needs to consider dynamic effect of tariffs and industrial policy on high-tech industrial capacities.