On the Distributional Effects of International Tariffs

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Introduction

- What are the distributional consequences of tariffs?
  - we do not consider sectoral or spatial heterogeneity (Caliendo Parro 2022 + many others)
  - we argue that other (less studied) dimensions are also important (income, wealth, skill)
- Tariffs
  - raise tradable prices, harming the poor
  - discourage capital accumulation by increasing the cost of capital production, harming workers
  - with capital-skill complementarity, skilled workers are especially affected (Parro 2013)
- Tariffs also raise revenue

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  - with capital-skill complementarity, skilled workers are especially affected
- Tariffs also raise revenue
  - how these revenues are spent (e.g. reduce distortionary taxes, increase transfers) can magnify or mitigate welfare differences
  - also matters for aggregate outcomes (e.g. output), which are NOT indicative of welfare

Overview

- We build a Ricardian trade + standard incomplete markets model
- Feed in the 2018 tariff changes
  - 4.0 percent increase in US tariffs against ROW
  - 2.5 percent increase in ROW tariffs against US
- Study the aggregate and distributional effects
  - using tariff revenue to reduce capital income taxes leads to largest output increase (but largest average welfare losses)
  - lumpsum transfers lead to largest output decline (but largest average welfare gain)
  - mix of consumption and income taxes leads to small average welfare loss (only benefiting the rich)

Model

Model environment

- Two countries, $i = 1, 2$
- Time is discrete, $t = 0, 1, ...$
- Agents
  - households
  - firms
  - government

$\Rightarrow$ We begin with the description of the household

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Household bloc

- Standard incomplete markets model
  - stochastic aging (á la Blanchard-Yarri perpetual youth)
  - worker households
    - face idiosyncratic productivity shocks
    - choose consumption, savings, and labor
  - distortionary taxes
    - flat capital income tax
    - progressive labor income tax and transfer system (á la Daruich-Fernandez/Boar-Midrigan)
    - PAYGO social security system for retirees
- Non-homothetic preferences
  - tradable expenditure share increasing in income/wealth

Retiree households

- Retirees with skill type s, wealth k, productivity ε solves

$$
\begin{aligned}
V_{is}^{R}(k,\varepsilon) = \max_{c_T, c_N, k'} \; & u(c_T, c_N, 0) + \beta(1-d)V_{is}^{R}(k',\varepsilon) \\
\text{s.t.} \quad & (1+\tau_{ic})(P_{iT}c_T + P_{iN}c_N) + P_{iX}(k'-k) \\
& \leq \tilde{r}_i P_{iX} k + b_{is}(\varepsilon), \\
& k' \geq 0
\end{aligned}
$$

- d: probability of death
- $\tilde{r}_i = (1-\tau_{ik})\left(\frac{r_i}{P_{iX}} - \delta\right)$: after-tax return on capital
- $b_{is}(\varepsilon)$: social security benefits

Worker households

- Workers with skill type s, wealth k, productivity ε solves

$$V_{is}^{W}(k,\varepsilon) = \max_{c_T, c_N, \ell, k'} u(c_T, c_N, \ell) + \beta\left[(1-a)E_{\varepsilon'|\varepsilon} V_{is}^{W}(k',\varepsilon') + aV_{is}^{R}(k',\varepsilon)\right]$$

$$\text{s.t.} \quad (1+\tau_{ic})(P_{iT}c_T + P_{iN}c_N) + P_{iX}(k'-k) \leq$$
$$(1-\tau_{iSS})w_{is}\ell\varepsilon - T_i(w_{is}\ell\varepsilon) + \tilde{r}_i P_{iX} k,$$
$$k' \geq 0$$

- a: aging probability
- τ_{iSS}: social security tax
- T_i : (progressive) labor income tax function

Production and trade bloc

- In each country ($i = 1, 2$)
  - tradables/nontradables used for consumption/investment
  - tradables produced by bundling intermediate varieties ($\omega \in [0, 1]$)
  - countries trade ω varieties due to Ricardian comparative advantage (á la DFS)
    - subject to trade barriers (iceberg and tariffs)
  - intermediate varieties and nontradables produced using capital and labor (skilled and unskilled)
    - capital-skill complementarity $\Rightarrow$ trade increases skill premium
- Labor and capital flow freely across sectors (but not countries)

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- Labor and capital flow freely across sectors (but not countries)
  - $\Rightarrow$ skill-specific wages equated across sectors
  - $\Rightarrow$ balanced trade

Non-tradables producer

- A representative firm produces non-tradable output Y_{iN}
- It solves the static profit maximization problem

$$\max_{H_{iN}, L_{iN}, K_{iN}} P_{iN} Y_{iN} - w_{iHi} H_{iN} - w_{iL} L_{iN} - r_i K_{iN}$$
$$\text{s.t. } Y_{iN} = F\left(H_{iN}, L_{iN}, K_{iN}\right).$$

Capital producer

- A representative firm produces capital X_i, by solving

$$\max_{I_{iT}, I_{iN}} P_{iX} X_i - P_{iT} I_{iT} - P_{iN} I_{iN}$$
$$\text{s.t. } X_i = z_{iX} I_{iT}^{\kappa} I_{iN}^{1-\kappa}.$$

- The capital price is given by $P_{iX} = \frac{1}{z_{iX}} \left(\frac{P_{iT}}{\kappa} \right)^{\kappa} \left(\frac{P_{iN}}{1-\kappa} \right)^{1-\kappa}$

Final tradables producer

- A representative final tradables producer bundles the varieties of tradables $\{q_{oi}(\omega)\}_{\omega,o}$ into a final good, Y_{iT}, and solves

$$\max_{\{q_{oi}(\omega)\}_{\omega}} P_{iT} Y_{iT} - \int_0^1 \sum_{o=1,2} \left[\tau_{oi} p_o(\omega) q_{oi}(\omega)\right] d\omega$$

$$\text{s.t. } Y_{iT} = \left\{ \int_0^1 \left[\sum_{o=1,2} q_{oi}(\omega) \right]^{\rho} d\omega \right\}^{\frac{1}{\rho}}.$$

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- Solution: $q_{oi}(\omega) \leq \left(\frac{\tau_{oi} p_o(\omega)}{P_{iT}} \right)^{-\theta} Y_{iT}, \quad = \quad \text{if } q_{oi}(\omega) > 0.$
- Price: $P_{iT} = \left[\int_0^1 \min_o \left\{ \tau_{oi} p_o(\omega) \right\}^{1-\theta} d\omega \right]^{\frac{1}{1-\theta}}$ where $\theta = \frac{1}{1-\rho}$ is the elasticity of substitution across varieties.

Intermediate tradables producer

- Each intermediate firm produces a single tradable variety, ω
- Taking as given the price $p_i(\omega)$, it solves

$$\max_{h_i(\omega), l_i(\omega), k_i(\omega)} p_i(\omega) y_i(\omega) - w_{iH} h_i(\omega) - w_{iL} l_i(\omega) - r_i k_i(\omega)$$

$$\text{s.t. } y_i(\omega) = z_i(\omega) F(h_i(\omega), l_i(\omega), k_i(\omega))$$

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$$\text{s.t. } y_i(\omega) = z_i(\omega) F(h_i(\omega), l_i(\omega), k_i(\omega))$$

- Zero-profit price:

$$p_i(\omega) = \frac{P_{iN}}{z_i(\omega)}$$

- Assumption of perfect mobility and common production function simplifies this expression

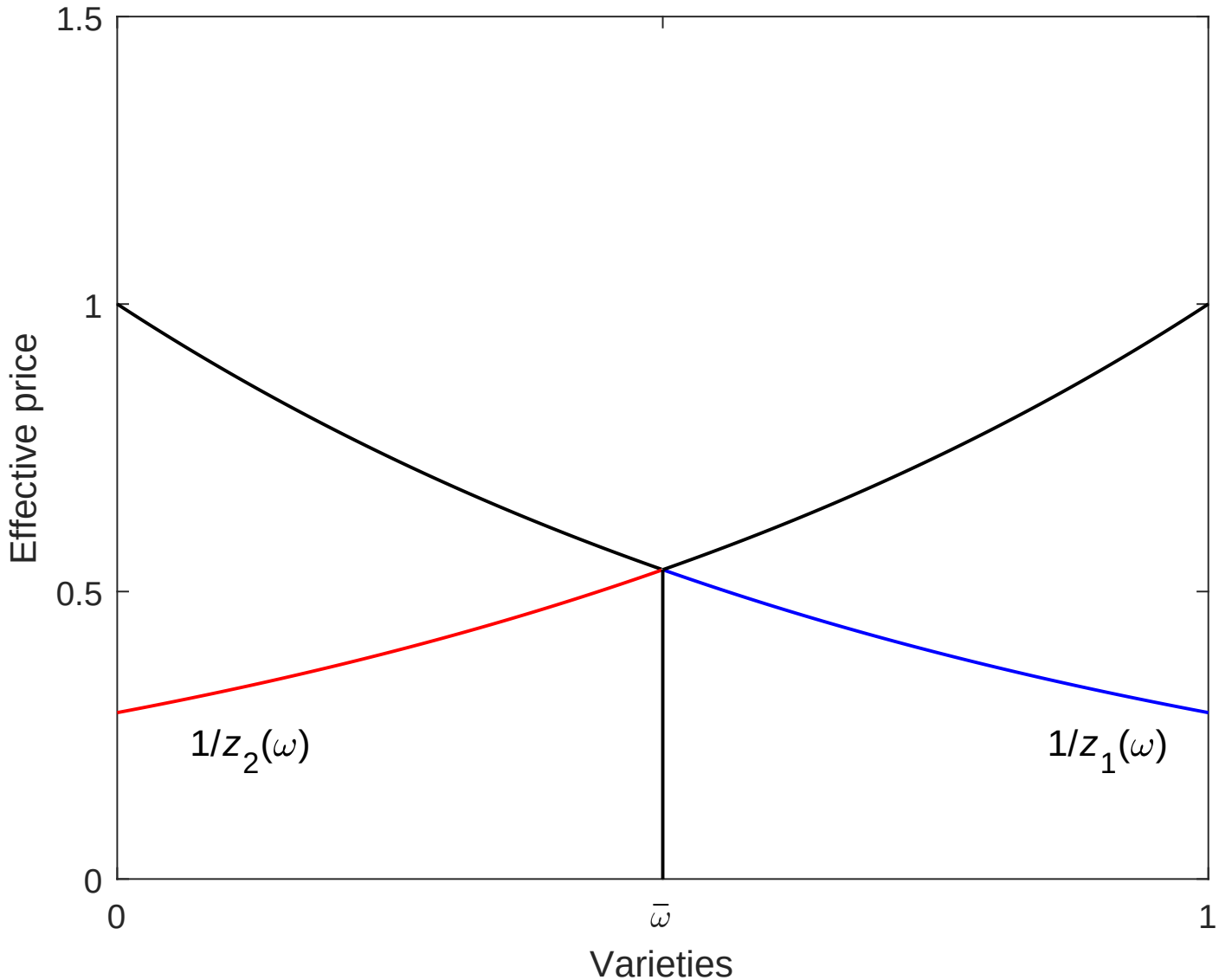
Productivity distributions in tradables production

- Productivities for variety ω are distributed according to

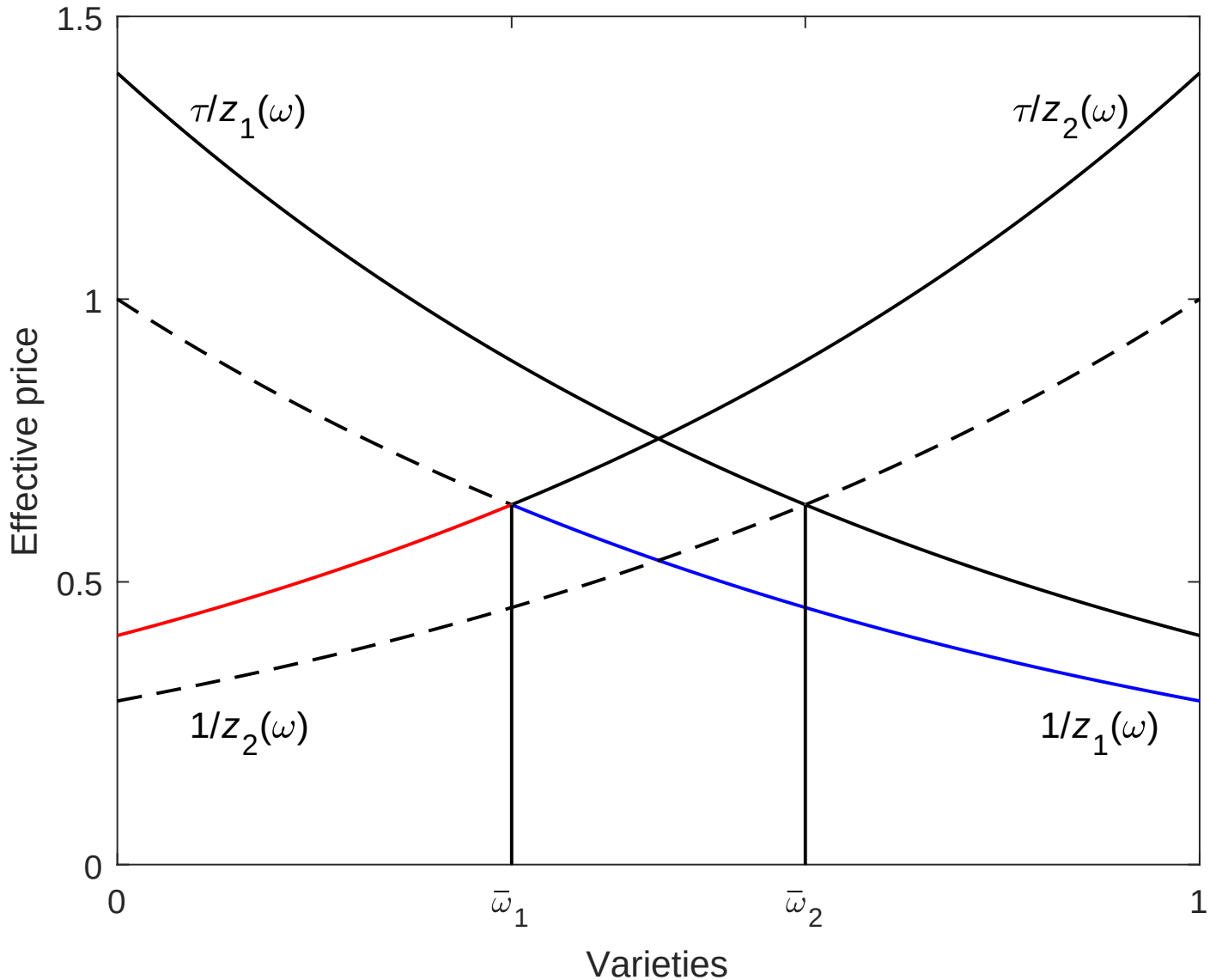
$$z_1(\omega) = e^{\eta\omega}$$
$$z_2(\omega) = e^{\eta(1-\omega)}$$

- Country $i = 1$ is more productive at producing high ω

Pattern of production (free trade)



Pattern of production (costly trade)



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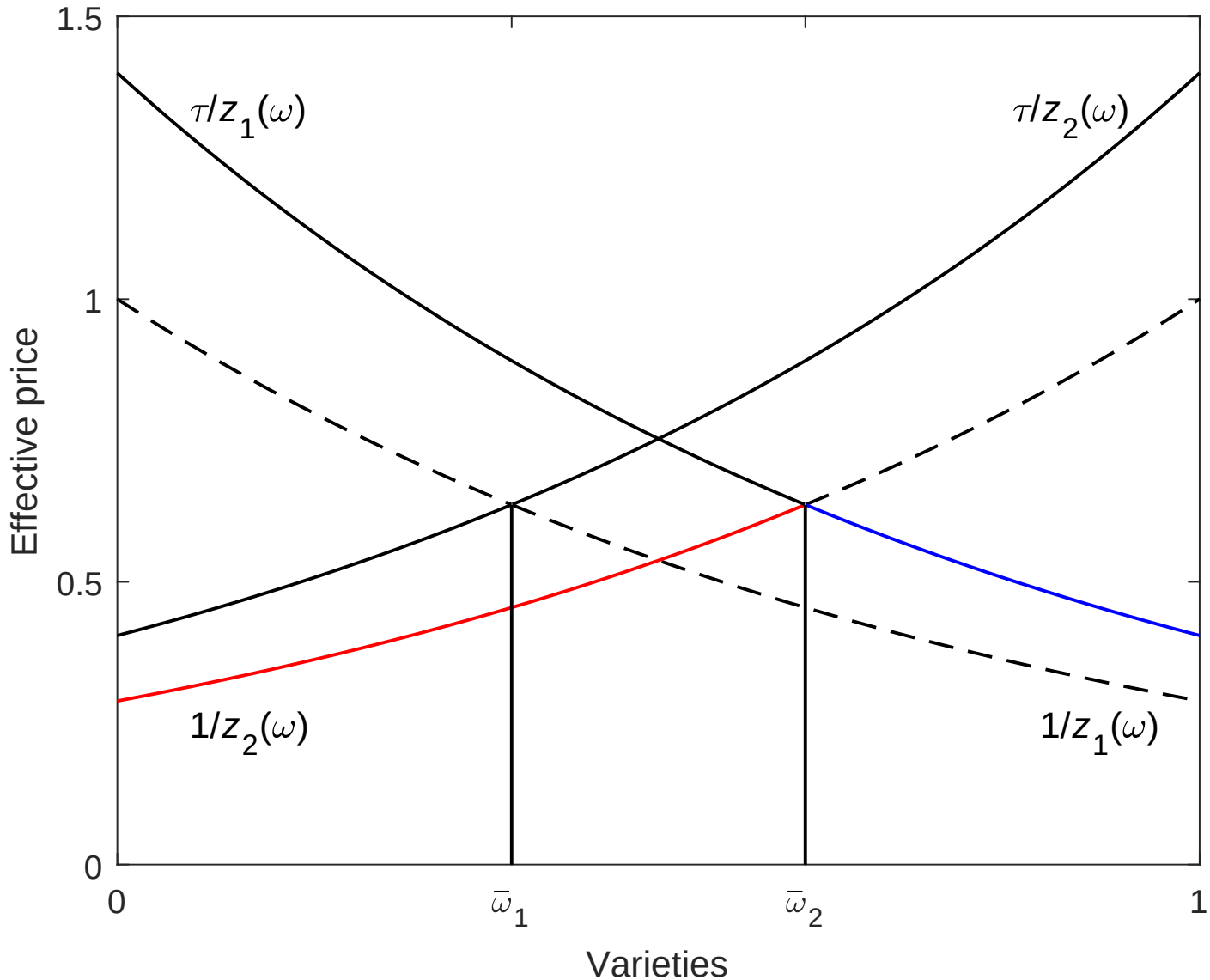

Government

- The government finances a constant stream of (wasteful) expenditures, G_i, by collecting
  - progressive taxes/transfers on labor income, $T_i(y)$
  - flat taxes on capital income, τ_{ik}, and consumption, τ_{ic}
  - tariffs, τ_{iP}
- The government also finances social security benefits with a flat tax on labor income, τ_{iSS}
- The government's budget constraint holds period by period

Characterization of equilibrium definition

- The tradable price is given by

$$P_{1T} = \left[\underbrace{\int_0^{\bar{\omega}_1} \left(\frac{\tau_1 e}{z_2(\omega)} \right)^{1-\theta} d\omega}_{\text{imports}} + \underbrace{\int_{\bar{\omega}_1}^1 \left(\frac{1}{z_1(\omega)} \right)^{\theta-1} d\omega}_{\text{domestic}} \right]^{\frac{1}{1-\theta}}$$

- Trade costs distort ...
- Comparative statics:
- The capital price is given by $P_X = \frac{1}{z_X} \left(\frac{P_T}{\kappa} \right)^{\kappa} \left(\frac{1}{1-\kappa} \right)^{1-\kappa}$

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- Trade costs distort the extensive and intensive margins
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- Trade costs distort the extensive and intensive margins
- Comparative statics:

$$\frac{dP_{1T}}{d\tau_1} = \underbrace{\frac{\partial P_{1T}}{\partial \tau}}_{\text{direct effect}>0} + \underbrace{\frac{\partial P_{1T}}{\partial e}}_{>0} \underbrace{\frac{de}{d\tau_1}}_{\substack{\text{depends on} \\ \text{size}\times\text{retaliation}}}$$

Note: $e \uparrow \Longleftrightarrow$ exchange rate depreciates

- The capital price is given by $P_X = \frac{1}{\cdot} \left(\frac{P_T}{\cdot} \right)^{\kappa} \left(\frac{1}{\cdot} \right)^{1-\kappa}$

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$\Rightarrow$ static and dynamic consequences

Quantitative Analysis

Quantitative Analysis

- Calibrate model to match features of U.S. economy
  - US vs. ROW (major trading partners)
  - ROW is 2 times larger than US
- Experiments
  1. raise US tariffs by 4.0 percent
     - ROW retaliates with 2.5 percent tariffs
  2. explore counterfactual fiscal adjustments
     - welfare losses are largest with capital income tax reduction
     - welfare gain largest with lumpsum redistribution
  3. how large can welfare gain be with tariffs under lumpsum redistribution

Calibration: preferences and demographics

- Utility function:

$$u\left(c_T, c_N\right) = \frac{\left(c_T^{\gamma}\left(c_N + \bar{c}\right)^{1-\gamma}\right)^{1-\sigma}}{1-\sigma} - \psi\frac{\ell^{1+\nu}}{1+\nu}$$

Parameters	Values	Targets / Source
Discount factor β	0.97	Wealth-to-GDP: 4.8 (2014)
Risk aversion σ	2	Standard value
Tradable share γ	0.28	Tradable exp. share: 35 percent
Non-homotheticity $\bar{c}$	0.05	Tradable exp. share of wealthiest quarter: 31 percent
Labor disutility, ψ	83	Average hours: 33 percent
Frisch elasticity $1/\nu$	0.5	Standard value
Skilled fraction, $\bar{H}_1$	0.33	Skilled labor force: 33 percent
Prob. of retiring, a	0.025	expected working years: 40
Prob. of death, d	0.067	expected retirement years: 15

Calibration: technology

- Production function:

$$F(L,H,K) = \left[(1-\mu)\,L^{\zeta} + \mu[(1-\alpha)\,H^{\chi} + \alpha K^{\chi}]^{\frac{\zeta}{\chi}}\right]^{\frac{1}{\zeta}}$$

Parameters	Values	Targets / Source
Capital weight, α	0.81	Capital income share: 36%
Skilled weight, μ	0.55	Skilled wage premium: 85%
Elasticity of substitutions,		
unskilled-capital, $1/(1-\zeta)$	1.67	Krusell et al. (2000)
skilled-capital, $1/(1-\chi)$	0.67	Krusell et al. (2000)
tradable intermediates, θ	6.00	Trade elasticity: –4.1
Factor elasticity, κ	0.56	Tradable input shares in capital
Depreciation, δ	0.05	Standard value
Productivity distribution, η	0.69	Emp. share of top 17 percent of large mfg. est.: 32 percent
Iceberg cost, $\tau - 1$	0.07	Import share: 17 percent

Calibration: government

- Tax/transfer function (Benabou, Boar-Midrigan, Dairuch-Fernandez, ...)

$$T_i(y) = y - (1 - \tau_{iy}) \frac{y^{1-\nu_{iy}}}{1 - \nu_{iy}} - Tr_{iy}$$

Parameters	Values	Targets / Source
Average tax parameter, τ_{iy}	0.27	average labor income tax rate: 13%
Progressivity parameter, ν_{iy}	0.11	NLS on PSID and Taxsim
Transfer, Tr_{iy}	0.002	average transfer in the bottom 10%: 1% of average labor income
Consumption tax, τ_c	0.06	Carey and Rabesona (2002)
Capital income tax, τ_k	0.27	Carey and Rabesona (2002)
Social security tax, τ_{SS}	0.11	Government budget constraint
Benefits, b		details

Calibration: productivity shocks

- ε follows a finite-state Markov process which approximates the continuous process,

$$\log \varepsilon_t = \quad \rho_\varepsilon \quad \log \varepsilon_{t-1} + \nu_t, \nu_t \sim N(0, \quad \sigma_\nu^2 \quad)$$

- Estimate (by skill) using PSID wage residuals, net of fixed effects for year, age, and education, and their interaction
- 1 percent earners shocks

Calibration: productivity shocks

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$$\log \varepsilon_t = \underset{\substack{\text{skilled, } 0.91 \\ \text{unskilled, } 0.94}}{\rho_\varepsilon} \log \varepsilon_{t-1} + \nu_t, \nu_t \sim N(0, \underset{\substack{\text{skilled, } 0.23 \\ \text{unskilled, } 0.20}}{\sigma_\nu^2})$$

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\+ 1 percent earners shocks

- unc. prob. of becoming a 1-percenter: 0.28 percent
- prob. of remaining a 1-percenter: 75% (Kopzuk et al. 2012)
- productivity of 1-percenter targets wealth p95/p50: 19.4

Model validity

Nontargeted moments	Data	Model
Gini coeffcients:		
wealth (k)	0.75	0.77
consumption (c)	0.35	0.35
disposable labor income (y)	0.41	0.47
Wealth distribution:		
p90/p50	11.2	9.3
p95/p90	1.7	2.1
p99/p95	2.7	2.6
frac. w/ non-positive wealth	0.17	0.19
skilled median/unskilled median	4.0	2.7
Wealth mobility: 2-year persistence of		
top 25 percent	0.83	0.71
bottom 25 percent	0.70	0.96

Experiment: Trade war

Primary Exercise

- Increase US tariffs and retaliation by ROW
- Tariff revenue is rebated to households through changes in taxes
- Total effect
  1. Pure effect of tariffs
  2. Fiscal effect from changes to distortionary taxes
- Decouple these effects by contrasting baseline results to *no redistribution case* ($\uparrow$ wasteful G)

Effective tariff changes in 2018

- Compute weighted average change of tariffs
  - officially announced in 2018
  - weighted by 2017 import values
  - against major trading partners: EU, Canada, Mexico, China, Japan, South Korea, Turkey, Australia, and New Zealand
- Tariffs on solar panels, washing machines, aluminum, steel, and $250 billion worth of imports from China
- Effective tariff change: 4.0 percent US tariffs
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- Compute weighted average change of retaliatory tariffs
  - officially announced in 2018
  - weighted by 2017 export values
  - by major trading partners
- Retaliatory tariffs by China, Canada, EU, and Mexico
- Effective tariff change: 2.5 percent ROW tariffs
- Assume tariffs are permanent, but also consider transitory case

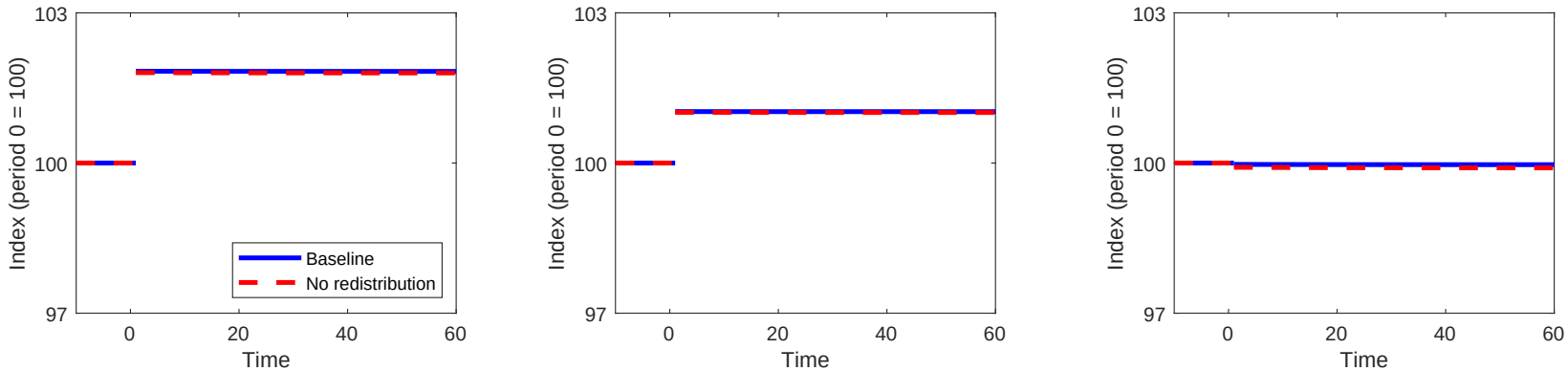
Redistribution of tariff revenue

- Allocate tariff revenue to consumption, labor, and capital taxes in proportion to fiscal revenues raised in the initial steady-state
- Baseline tariff revenue split:
  - 63% $\rightarrow \tau_y \downarrow$
  - 20% $\rightarrow \tau_c \downarrow$
  - 17% $\rightarrow \tau_k \downarrow$

Effect of tariffs on prices

- Tradables price and investment price increase

(a) Tradables price (b) Investment price (c) Real exch. rate

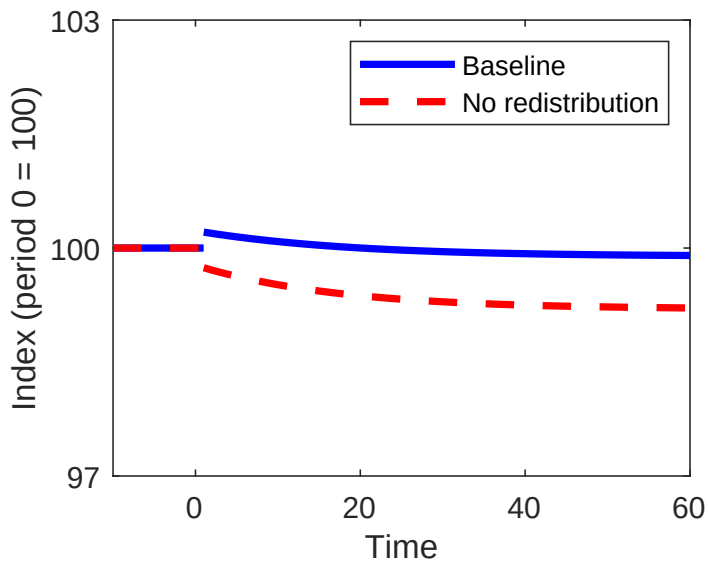


- $P_T \uparrow 1.8\% \longrightarrow P_X \uparrow 1.0\%$
- Roughly invariant to differences in redistribution scheme.

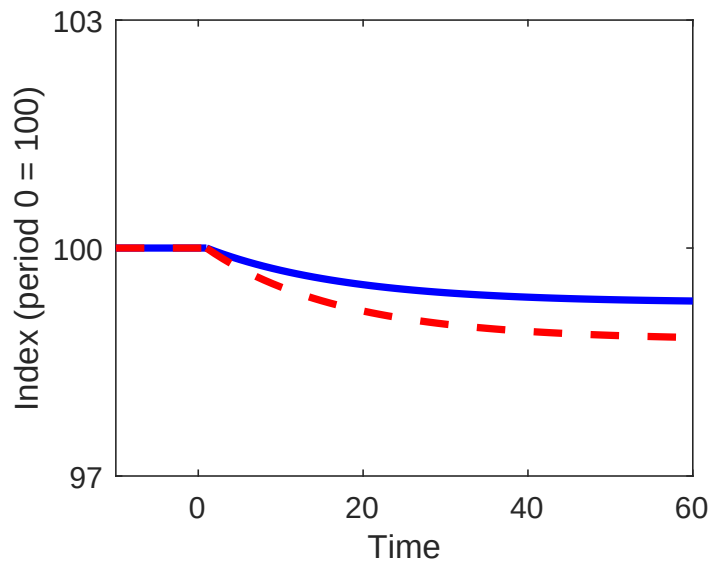
Effect of tariffs on aggregates

- Redistribution matters for aggregate outcomes
- Tariff-induced capital-shallowing mitigated by reduction in capital income taxes

(a) Consumption



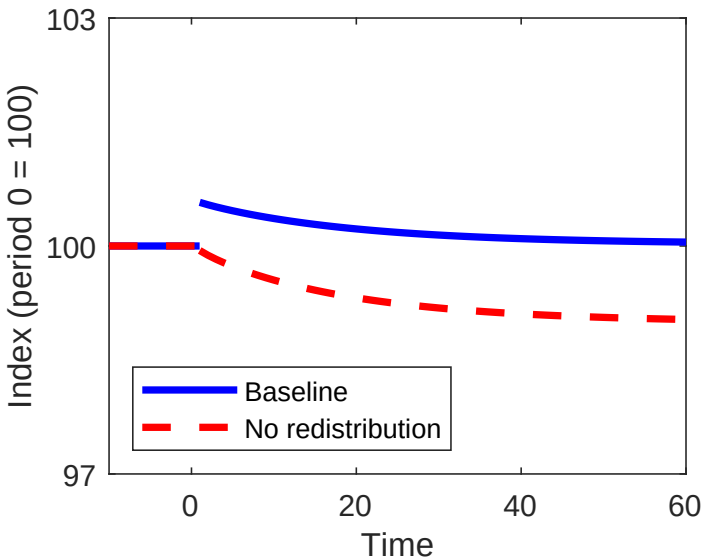
(b) Capital



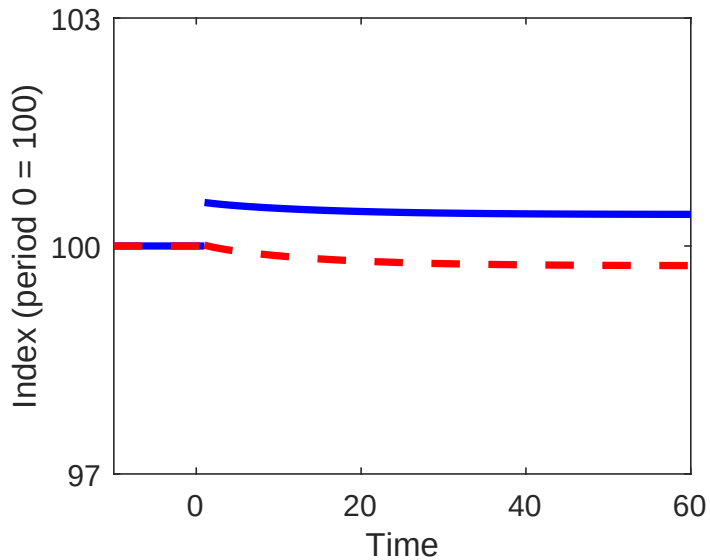
Effect of tariffs on wages

- Tariffs depress wages, but redistribution reverses this:
  1. directly increases after-tax wage
  2. mitigates capital shallowing (important for skilled workers)
- Overall, after-tax wages rise for both skill types

(a) Skilled wage



(b) Unskilled wage



Welfare

- Tariffs harm ...
  - poor more than rich
    - greater share of expenditures on tradables
  - workers more than capitalists
    - depresses wages
  - and the skilled more than the unskilled
    - skill premium falls
- Redistribution can offset or exacerbate these effects

Welfare Calculation

- For each household, we compute consumption equivalence, Δ
- How much would initial steady state consumption have to be permanently increased for a household to be indifferent to the tariffs?
- Solve for Δ such that $V_{ij\Delta}(k,\varepsilon) = V_{ij,t=1}(k,\varepsilon)$

$$\begin{aligned} V_{ij\Delta}(k,\varepsilon) =& u\left((1+\Delta)\, g^{ss}_{ijT}(k,\varepsilon), (1+\Delta)\, g^{ss}_{ijN}(k,\varepsilon), g^{ss}_{ij\ell}(k,\varepsilon)\right) \\ &+ \beta E_{\varepsilon'|\varepsilon} V_{ij\Delta}\left(g^{ss}_{ijk}(k,\varepsilon), \varepsilon'\right) \end{aligned}$$

- If $\Delta > 0$, then the household supports tariffs. If $\Delta < 0$, then it does not

Welfare by group

	Total	Decomposition			Support
		wage	investment	expenditure	
All	–0.1	0.2	0.1	–0.4	26
Skilled	–0.1	0.2	0.1	–0.4	14
Unskilled	–0.0	0.4	0.1	–0.4	42
Retired	–0.4	0.0	0.1	–0.5	7
High wealth	0.1	0.1	0.3	–0.4	92
Low wealth	–0.4	0.2	–0.0	–0.5	0
High income	–0.0	0.2	0.0	–0.3	37
Low income	–0.1	0.3	0.1	–0.5	15

Units: percent. High and low wealth correspond to the top and bottom deciles of wealth, respectively. High and low income correspond to the top and bottom deciles of labor income, respectively, conditional on working age. Support reports the percent of each (sub)population that has a positive welfare gain.

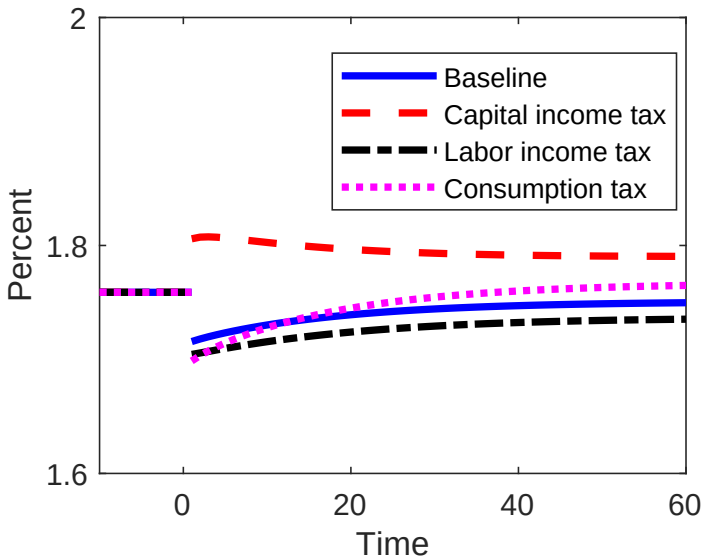
Alternative redistribution policies

- Rebate tariff revenue entirely via one of three alternatives
  1. Reduce the average labor income tax (27.3% $\rightarrow$ 26.6%)
  2. Reduce the consumption tax (6.4% $\rightarrow$ 5.7%)
  3. Reduce the capital income tax (27.0% $\rightarrow$ 22.2%)

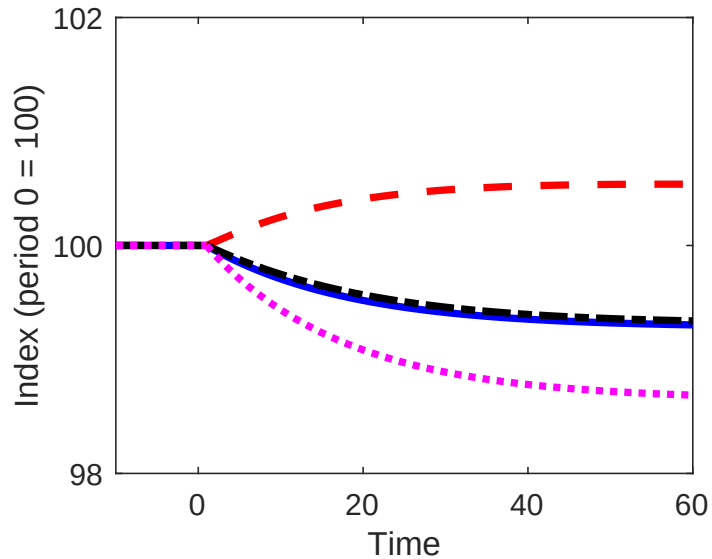
Effect of tariffs on aggregates (counterfactuals)

- Greater capital shallowing, except in capital income tax case

(a) After-tax net return



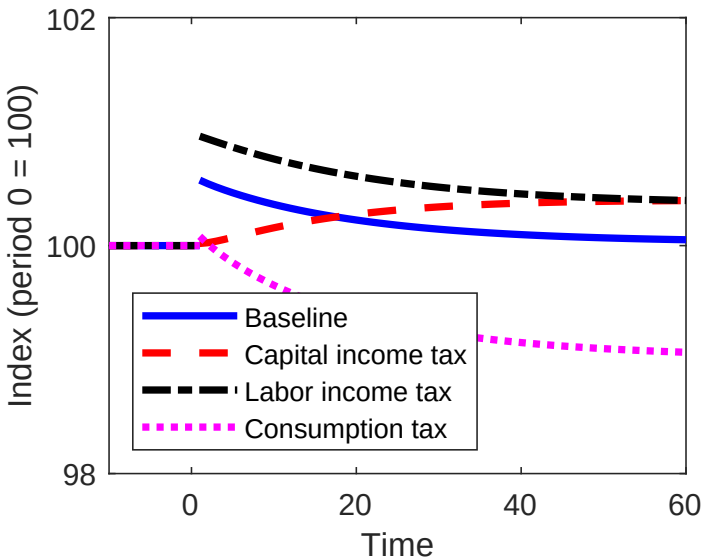
(b) Capital



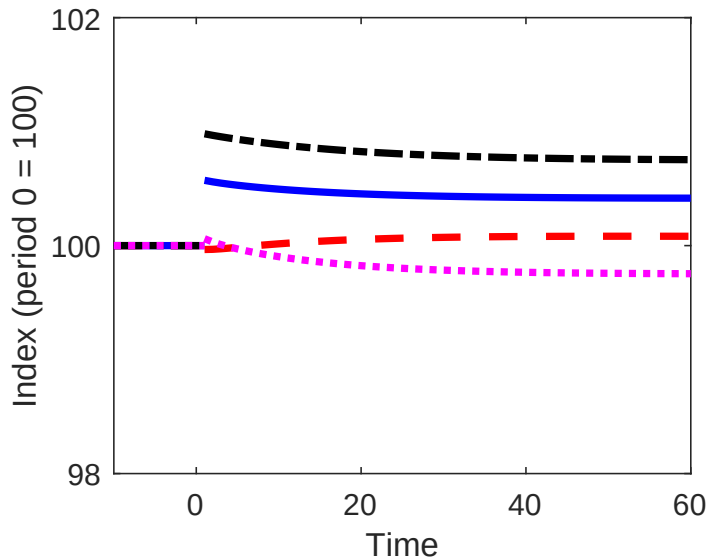
Effect of tariffs on wages (counterfactuals)

- After-tax wages generally higher except for consumption tax reduction

(a) Skilled wage



(b) Unskilled wage

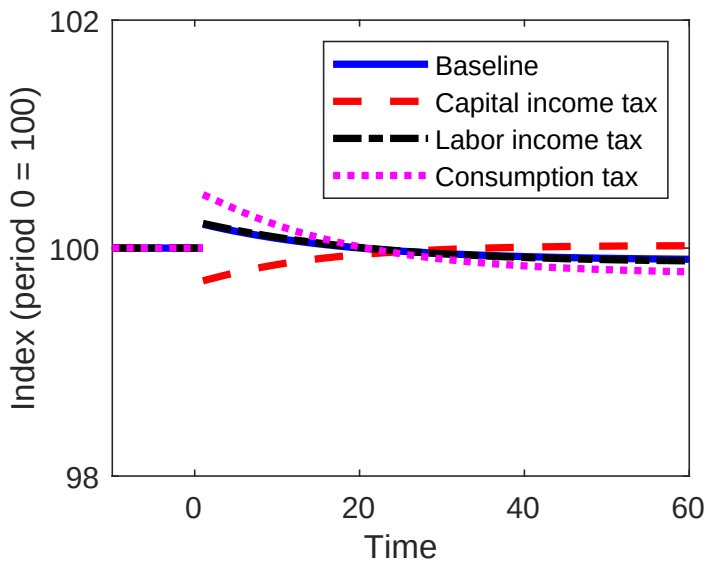


- After-tax skilled wages rise more when capital income taxes are reduced
- After-tax wages higher for both skill groups when labor income taxes are reduced

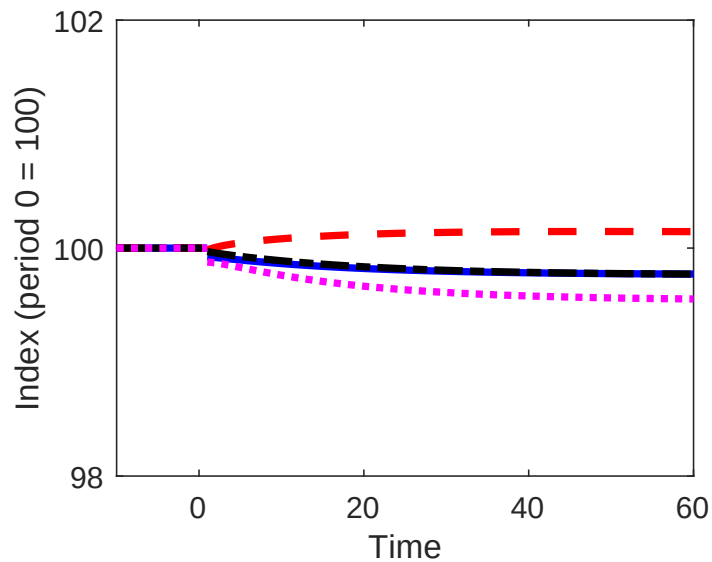
Effect of tariffs on aggregates (counterfactuals)

- Capital income tax reduction leads to more aggregate activity in the long run

(a) Consumption



(b) GDP



- Aggregate outcomes are not indicative of welfare

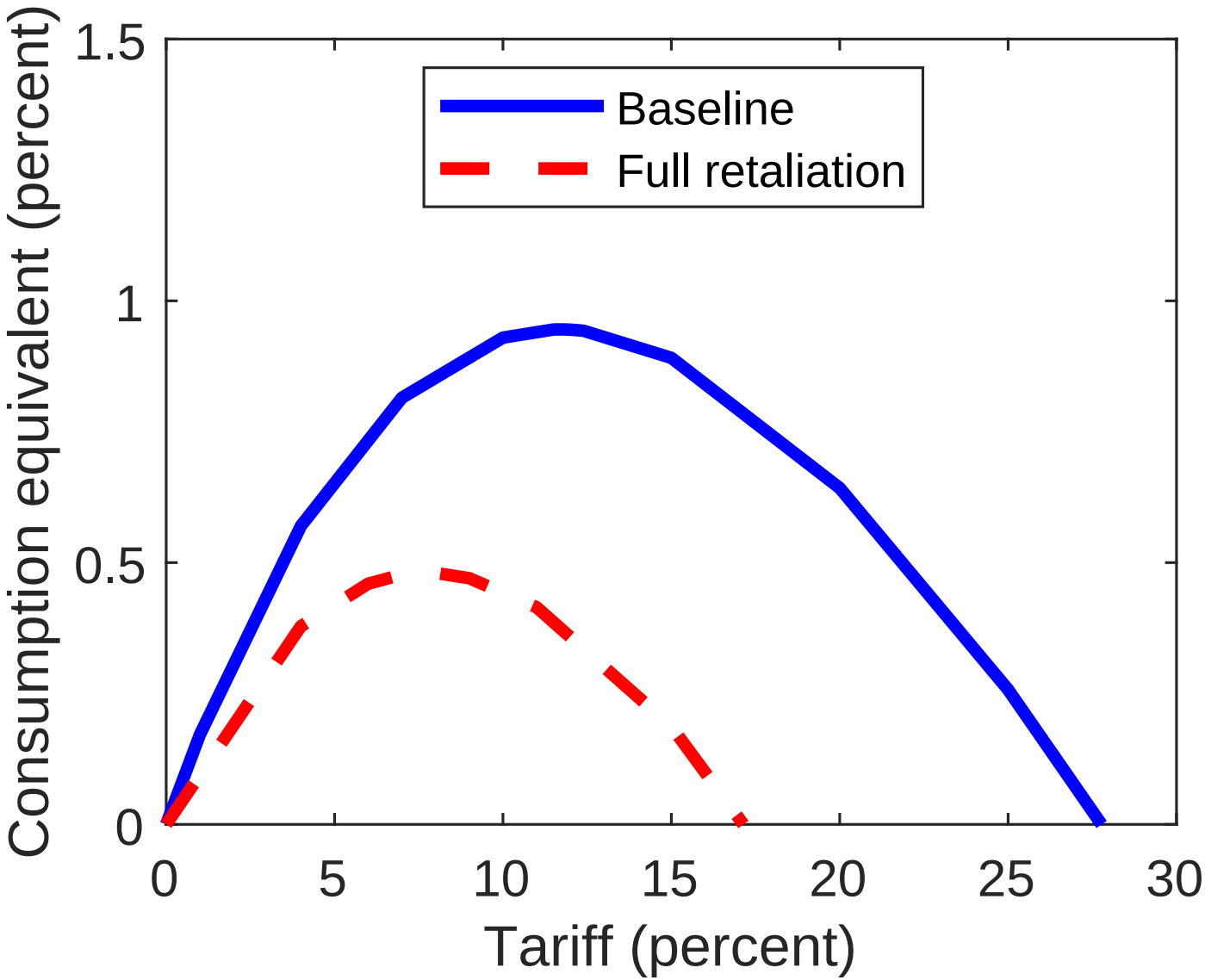
Welfare effects of Tariffs

	Baseline	Counterfactuals			
		no redistribution	capital income tax	labor income tax	consumption tax
Average	–0.1	–0.7	–0.3	–0.2	0.1
Skilled	–0.1	–0.8	–0.1	–0.1	–0.0
Unskilled	–0.0	–0.6	–0.3	–0.0	0.1
Retired	–0.3	–0.6	–0.5	–0.6	0.2
High wealth	0.2	–0.3	0.7	–0.2	0.4
Low wealth	–0.3	–0.8	–0.7	–0.5	–0.0
High income	–0.0	–0.5	0.1	–0.1	0.1
Low income	–0.1	–0.7	–0.4	–0.0	0.1
Support	16	0	18	35	68

Sizable welfare gains with lumpsum transfer

- When tariff revenue is rebated lumpsum, a 4.0% tariff $\Rightarrow$ 0.6 percent average welfare gain and close to unanimous support
- With lumpsum transfers, what tariff rate would maximize average welfare?
- Two cases of ROW response:
  - retaliate in the same proportion as baseline (i.e. $\frac{2.5}{4.0} = 62.5\%$)
  - retaliate one-for-one
- This is NOT an optimal tax/tariff exercise
  - tariffs are likely a rather inefficient way of raising revenue

Welfare gains with lumpsum transfer



Key takeaways

- Poor and skilled households lose the most from tariffs
- Modest overall welfare of trade war (–0.1% on average)
- Distributional consequences unequal
  - depends on how tariff revenue is redistributed
  - reducing taxes or increasing lumpsum transfers can generate winners (and losers)
- Long-run output not indicative of welfare

Appendix

Equilibrium back

A *steady-state recursive equilibrium*, given fiscal policies $\{T_i, \tau_{ik}, \tau_{ic}, \tau_{iP}, G_i, \tau_{iSS}, \{b_{is}\}_{s=H,L}\}_{i=1,2}$, is for $i = 1, 2$,

- Functions $\left\{V_{is}^j, g_{isT}^j, g_{isN}^j, g_{is\ell}^j, g_{isk}^j\right\}_{s,j=W,R}$
- Nontradable producer plans $\{Y_{iN}, H_{iN}, L_{iN}, K_{iN}\}$
- Final tradable producer plans $\left\{Y_{iT}, \{q_{oi}(\omega)\}_{\omega\in[0,1],o=1,2}\right\}$
- Intermediate producer plans $\{y_i(\omega), h_i(\omega), l_i(\omega), k_i(\omega)\}_\omega$
- Capital producer plans $\{X_i, I_{iT}, I_{iN}\}$
- Prices $\{w_{iH}, w_{iL}, r_i, P_{iT}, P_{iX}, e, \{p_i(\omega)\}_\omega\}$ and
- Invariant distributions $\{\mu_{is}^j\}_{s,j}$ such that:

1. Given prices, households and firms optimize
2. Goods and factor markets clear
3. Balanced trade
4. Gov't budget holds
5. For any $(\mathcal{K}, \mathcal{E}) \in \mathcal{B}$, the invariant distribution μ_{is}^{j} satisfies

$$\mu_{is}^{W}(\mathcal{K}, \mathcal{E}) = (1-a) \int \sum_{\varepsilon' \in \mathcal{E}} 1_{\left\{g_{isk}^{W}(k,\varepsilon) \in \mathcal{K}\right\}} \Gamma(\varepsilon', \varepsilon)\, d\mu_{is}^{W}(k, \varepsilon)$$
$$+ d \int 1_{\{\varepsilon \in \mathcal{E}\}} 1_{\left\{g_{isk}^{R}(k,\varepsilon) \in \mathcal{K}\right\}} d\mu_{is}^{R}(k, \varepsilon)$$
$$\mu_{is}^{R}(\mathcal{K}, \mathcal{E}) = (1-d) \int 1_{\{\varepsilon \in \mathcal{E}\}} 1_{\left\{g_{isk}^{R}(k,\varepsilon) \in \mathcal{K}\right\}} d\mu_{is}^{R}(k, \varepsilon)$$
$$+ a \int 1_{\{\varepsilon \in \mathcal{E}\}} 1_{\left\{g_{isk}^{W}(k,\varepsilon) \in \mathcal{K}\right\}} d\mu_{is}^{W}(k, \varepsilon)$$

back

Data Sources

- Tariffs
  - official documents
  - trade data: USITC Dataweb (2017)
- Skilled labor force: PSID (2004–2014)
- Skilled wage premium: PSID (2004–2014)
- Wage process: PSID (1970–1997)
- Wealth/consumption/earnings moments: PSID (2004–2018)
- Tax function: PSID (2017-2019)

Data

- How do tradable expenditures vary with income/wealth?
- We use two complementary datasets:
  - Consumer Expenditure Survey (CEX, 2004–14)
    - \+ detailed expenditure categories
    - \+ self-reported owner-equivalent rent
    - – can't compute net worth: only liquid wealth
  - Panel Survey of Income Dynamics (PSID, 2004–14)
    - – more aggregated expenditure categories
    - – have to impute owner-equivalent rent
    - \+ detailed measures of wealth

Tradable expenditure shares (CEX)

- Total expenditures: 500+ expenditure categories
  - exclude mortgage interest, property taxes, home insurance
  - include self-reported owner's equivalent rent
- Tradable expenditures: 307 items
  - if imports or exports exceed 11 percent of production Examples
- 23,090 working-age household-year observations

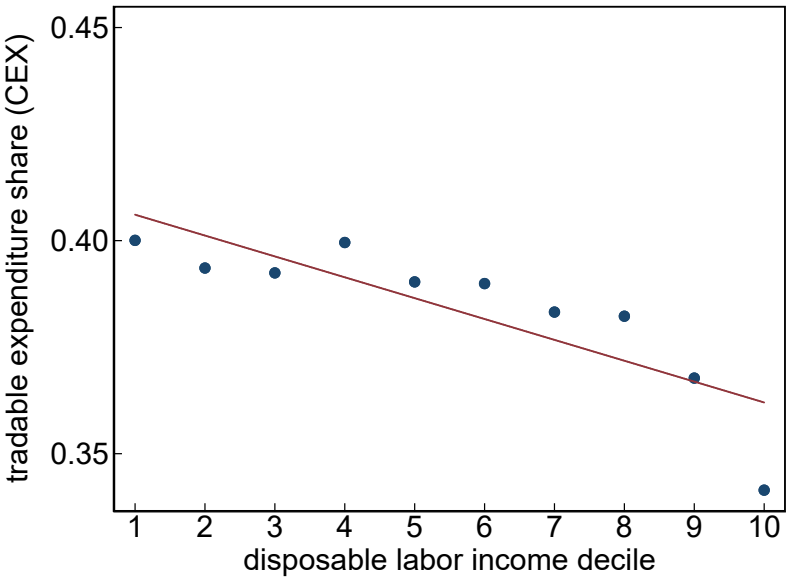
Tradable expenditure shares (PSID)

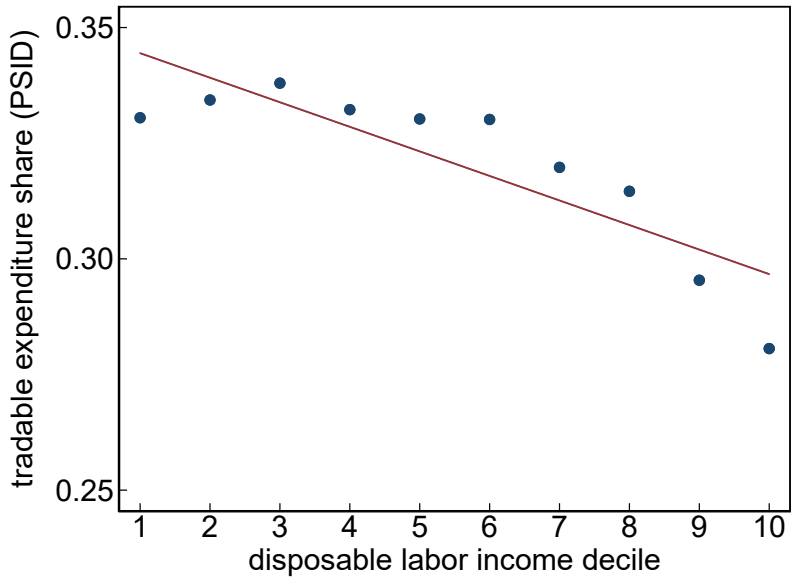
Exp. category	Tradable	Nontradable
Child care & education		✓
Clothing	✓	
Food	food at home	away from home
Health care	prescriptions	all other
Housing w/o repairs	furnishings	utilities, rent*
Transportation w/o repairs	gasoline, purchase and lease of cars and trucks	all other
Vacation/ent.	21 percent	all other
Repairs	21 percent	all other

- * : excludes mortgage, property taxes, and home insurance, but includes owner-equivalent rent, imputed by dividing state-level price-to-rent ratios from value of primary residence
- 30,228 working-age household-year observations

Tradable shares decline with labor income

back





Tradable shares decline with wealth

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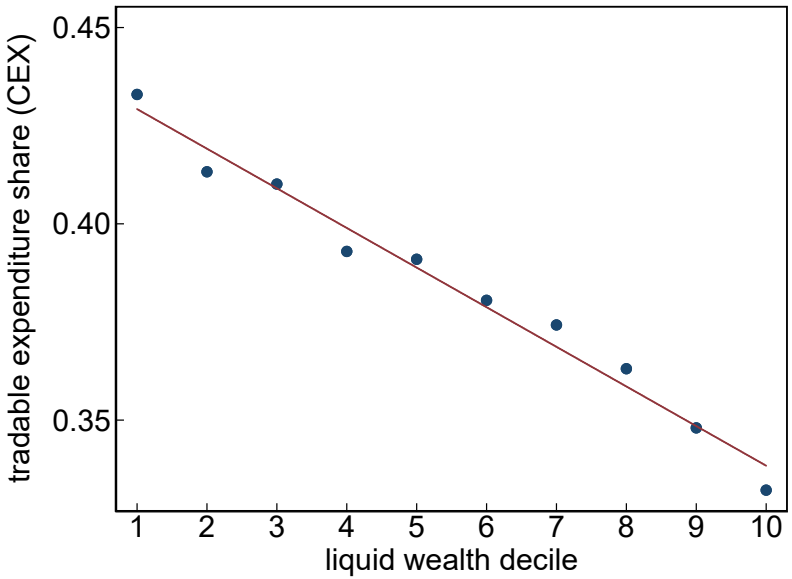
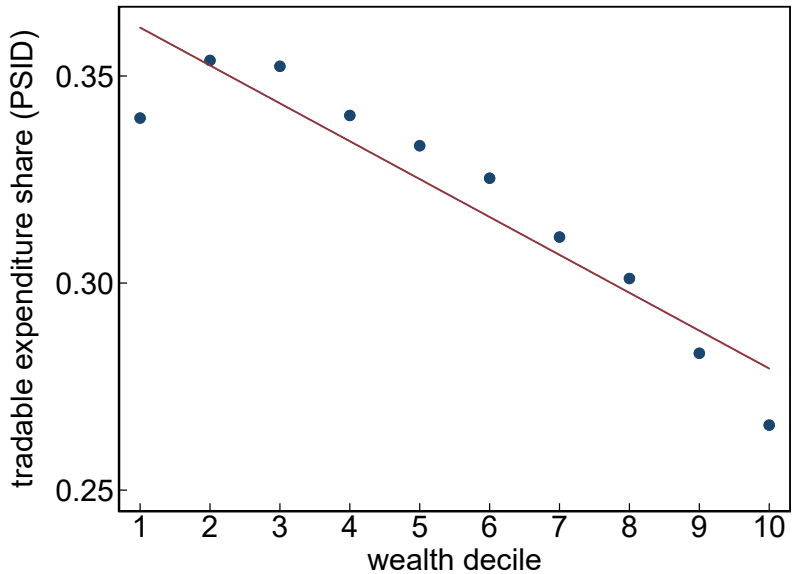
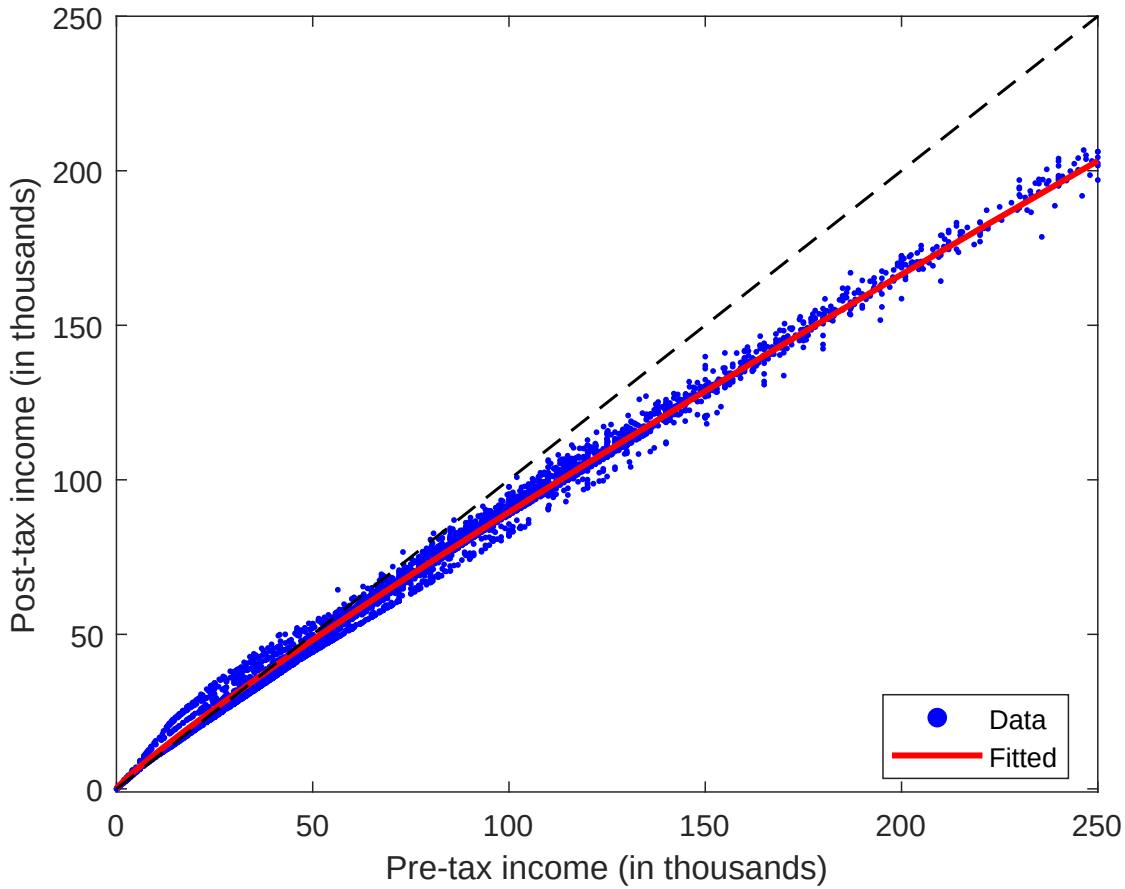




Tax function back



Notes: Each data observation is a household in the PSID for the tax year 2016. Pre-tax income includes household labor income plus transfer income, excluding social security. Post-tax income is pre-tax income minus taxes estimated by TAXSIM32.

Social security back

- Retirement benefits depend on skill and last working age productivity
- Marginal replacement rates are:

$$\begin{cases} 0.90 & \text{if } \tilde{y} \in (0, 0.3\bar{y}] \\ 0.32 & \text{if } \tilde{y} \in (0.3\bar{y}, 1.84\bar{y}] \\ 0.15 & \text{if } \tilde{y} \in (1.84\bar{y}, 3.46\bar{y}] \end{cases}$$

  - $\bar{y}$: median labor income
  - $\tilde{y}$: $w_s \varepsilon \bar{h}$ where $\bar{h}$ is average hours
- Consistent with Huggett and Parra (2010)

US Tariffs

Date officially announced	Date effective	Country	Products	Official tariff (percent)	Effective tariff (percent)	Weight ($ bil)	Source
Jan, 2018	Feb, 2018	all	Solar panels	30	30	4	US Proc. 9693
Jan, 2018	Feb, 2018	all	Wash. Mchns.	20–50	50	1	US Proc. 9694
Mar, 2018	Mar, 2018	all	Aluminum	10	10	12	US Proc. 9704
Mar, 2018	Mar, 2018	all	Steel	25	25	19	US Proc. 9705
Jun, 2018	Jul, 2018	China	List 1	25	25	34	USTR 2018-13248
Aug, 2018	Aug, 2018	China	List 2	25	25	16	USTR 2018-17709
Sep, 2018	Sep, 2018	China	List 3	10–25	25	200	USTR 2018-20610
Total imports from EU, Canada, China, Japan, Korea, Mexico (2017)						1751	
Weighted average tariff (percent)					**4.0**		

back

Retaliatory Tariffs

Date officially announced	Date effective	Country	Products	Official tariff (percent)	Effective tariff (percent)	Weight ($ bil)	Source
May, 2018	Jun, 2018	Mexico	Various	7–25	20	4	Mexican government
May, 2018	Jun, 2018	EU	Various	10–50	23	7	WTO G/L/1237
Jun, 2018	Jul, 2018	Canada	Various	10–25	14	17	Canadian government
Mar, 2018	Apr, 2018	China	Various	15–25	22	3	WTO G/L/1218
Jun, 2018	Jul, 2018	China	List 1	25	25	34	USTR 2018-15090
Jun, 2018	Aug, 2018	China	List 2	25	25	16	USTR 2018-15090
Aug, 2018	Sep, 2018	China	List 3	5–25	14	60	Chinese government
Total exports to EU, Canada, China, Japan, Korea, Mexico (2017)						1056	
Weighted average tariff (percent)					**2.5**		

back