Reciprocity and the China Shock

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Motivation

- When China joined the WTO in 2001, it secured from the United States a promise of Permanent Normal Trade Relations
  - A grant to China on a permanent basis of the US tariff reductions that had been agreed at the 1995 conclusion of the Uruguay Round of GATT negotiations.
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- Did a failure of China's WTO accession protocol to deliver reciprocity contribute to the "China Shock" experienced in the United States?

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- Nevertheless, the United States among others has accused China of not living up to its commitment to reciprocity, and of harming US workers as a result
- Did a failure of China's WTO accession protocol to deliver reciprocity contribute to the "China Shock" experienced in the United States?
- General Research Question: What is the link between *reciprocity* in tariff negotiations and the magnitude of the *labor-market adjustments* that can be expected under negotiations that abide by reciprocity?

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- Our quantitative results indicate that China *exceeded* reciprocity when it joined the WTO
- This led to higher aggregate real incomes in the United States and in the rest of the world as a whole through improvements in their terms of trade
- But it amplified the magnitude of the China Shock experienced by the United States and other countries that was attributable to tariff changes over the post-China-WTO-accession period
  - The contribution of China's deviation from reciprocity to the China Shock in the United States was roughly comparable in magnitude to the contribution of the US's own tariff cuts over this period

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- In this sense, our quantitative results confirm the relative significance of China's deviations from reciprocity for understanding the China Shock.

Institutional Background

- Along with MFN, reciprocity is a key feature of the GATT/WTO architecture
  - Refers to mutual changes in trade policy that bring about a change in the volume of each country's imports that is roughly equal to the change in the volume of its exports
- When govs negotiate reductions in trade barriers, they do so with the goal, found in the preamble to GATT, of striking "reciprocal and mutually advantageous arrangements directed to the substantial reduction in tariffs..."
  - Govs approach negotiations seeking a "balance of concessions," whereby the market access benefit from a tariff cut offered by one gov is matched by an "equivalent" concession from its trading partner
- There is evidence that GATT/WTO negotiations typically conform to reciprocity, e.g.
  - Various US gov reports evaluating degree of reciprocity achieved in each GATT Round
  - Bagwell, Staiger and Yurukoglu (2020) on bargaining behavior in the Torquay Round
- But negotiations over China's accession to the WTO may have been an important exception
  - Negotiators sought reciprocity (e.g., statements of WTO Working Group on China's accession)
  - But they may not have achieved it (e.g., statements of USTR)
  - And if reciprocity was not achieved, the labor-market consequences of deviations from reciprocity could be consequential due to China's economic size

Reciprocity in the Eaton and Kortum Model

- $z = (z_1, \ldots, z_N)$ is the vector of technology draws (output per worker) for any given tradable good for the N countries, with $z \in \mathbb{R}_+^N$
  - The $z's$ are independent draws from a Frechet distribution with shape parameter θ and scale parameter A_n
- A tradable good $z = (z_1, \ldots, z_N)$ is available in country i at unit prices

$$\frac{w_1 \kappa_{i1} \tau_{i1}}{z_1}, \frac{w_2 \kappa_{i2} \tau_{i2}}{z_2} \ldots\ldots \frac{w_N \kappa_{iN} \tau_{iN}}{z_N}.$$

- Country i buys from the lowest cost suppliers in the world, hence the effective price of any good z in country i is given by

$$p_i(z) = min_m \left\{ \frac{w_m \kappa_{im} \tau_{im}}{z_m} \right\}$$

- $B_{in} \subset \mathbb{R}_+^N$ is the set of $z's$ for which country n is the lowest cost supplier to country i

$$B_{in} = \left\{ z \in \mathbb{R}_+^n : p_i(z) = \frac{w_n \kappa_{in} \tau_{in}}{z} \right\}$$

- $D_i(z)$ is the quantity of good z demanded in country i, $\phi(z)$ is the joint density of z

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- The "world" (exporter) price of good z between country i and the lowest cost supplier country n is

$$p_{in}^w(z) \equiv \frac{p_i(z)}{\tau_{in}} = \frac{w_n \kappa_{in}}{z_n}$$

Reciprocity in the Eaton and Kortum Model

- For now, two countries i and n and one tradable sector: Reciprocity for country i

$$\int_{B_{in}^1} \hat{p}_{in}^{w0}(z) D_i^1(z) \phi(z) dz - \int_{B_{in}^0} \hat{p}_{in}^{w0}(z) D_i^0(z) \phi(z) dz = \int_{B_{ni}^1} \hat{p}_{ni}^{w0}(z) D_n^1(z) \phi(z) dz - \int_{B_{ni}^0} \hat{p}_{ni}^{w0}(z) D_n^0(z) \phi(z) dz$$

  - Defining D_{in} as the labor content of the volume of country $i's$ imports from country n inclusive of trade costs, reciprocity can be rewritten as $w_n^0 \left(D_{in}^1 - D_{in}^0\right) = w_i^0 \left(D_{ni}^1 - D_{ni}^0\right)$

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- Trade balance for country i

$$\int_{B_{in}} p_{in}^w(z) D_i(z) \phi(z) dz = \int_{B_{ni}} p_{ni}^w(z) D_n(z) \phi(z) dz$$

  - can be rewritten at the initial and new tariffs as $w_n^0 D_{in}^0 = w_i^0 D_{ni}^0$ and $w_n^1 D_{in}^1 = w_i^1 D_{ni}^1$

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- Defining $\omega_n \equiv w_n / w_i$ and applying trade balance at initial/new tariffs, reciprocity implies

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- Reciprocal tariff cut for country i is

$$\frac{dln\tau_{in}}{dln\tau_{ni}} = \frac{\tilde{\pi}_{nn}}{\tilde{\pi}_{ii}}, \quad \text{with } \tilde{\pi}_{ii} = \frac{\pi_{ii}\tau_{in}}{1 + \pi_{ii}\left(\tau_{in} - 1\right)}$$

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- Introduce a non-tradable (services) sector, and associate labor market dislocation with the loss of jobs in the tradable sector

$$dlnL_n^T = -\frac{L_n^{NT}}{L_n^T}\frac{L_n^{NT}}{L_n}\frac{1}{(1-\alpha)}\left[\frac{\alpha\left(1-\pi_{nn}^T\right)\pi_{nn}^T\left(\tau_{ni}-1\right)\theta}{\tau_{ni}}\right]dln\omega_n$$
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- Extends naturally to many countries and many tradable sectors

$$d\ln L_n^T = -\frac{L_n^{NT}}{L_n^T}\frac{L_n^{NT}}{L_n}\frac{1}{\alpha_n^{NT}}\left[\sum_{i=1}^{N}\sum_{s=1}^{J}\frac{\alpha_n^s\pi_{ni}^s\left(\tau_{ni}^s-1\right)\theta^s}{\tau_{ni}^s}d\ln\omega_{ni}^s\right]$$
$$-\frac{L_n^{NT}}{L_n^T}\frac{L_n^{NT}}{L_n}\frac{1}{\alpha_n^{NT}}\left[\sum_{i=1}^{N}\sum_{s=1}^{J}\left[\theta^s\pi_{ni}^s\sum_{m=1}^{N}\frac{\alpha^s\pi_{nm}^s\left(\tau_{nm}^s-1\right)}{\tau_{nm}^s}+\frac{\alpha^s\pi_{ni}^s\left[1-\theta^s\left(\tau_{ni}^s-1\right)\right]}{\tau_{ni}^s}\right]d\ln\tau_{ni}^s\right.$$

where $d\ln\omega_{ni}^s = \sum_{m=1}^{N}\pi_{nm}^s d\ln w_m - d\ln w_i$

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- **Proposition 10.** *In a many-country CDK world, if the rest of the world's* tariff cuts fall short of *(exceed) those necessary to reciprocate the tariff cuts of country n, country n′s labor market dislocation will be dampened (amplified) compared to the dislocation that country n would experience under reciprocal tariff cuts from the rest of the world.*

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- **Corollary** *In this world, a country's own tariff changes are a sufficient statistic for calculating the labor-market dislocation it will experience as a result of negotiated tariff liberalization with its trading partners if and only if those tariff negotiations conform with multilateral reciprocity.*

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- We also derive an expression for labor market dislocation within the tradable sector

$$dln\frac{L_{nn}}{L_n} = -\left(\frac{(1-\pi_{nn})\,\theta}{1+(\tau_{ni}-1)\,\pi_{nn}}\right) dln\omega_n + \left(\frac{(1-\pi_{nn})\,(1+\theta)}{1+(\tau_{ni}-1)\,\pi_{nn}}\right) dln\tau_{ni}$$

  - When $dln\frac{L_{nn}}{L_n} < 0$, country n's labor in the tradable sector must reallocate from production that serves domestic demand to export-oriented production
  - The analog of Proposition 10 and its Corollary hold for this within-sector measure of labor market dislocation and its multi-country multi-sector extension

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- Reciprocity for country i now implies

$$\sum_j \left(c_{n,j}^1 - c_{n,j}^0\right) D_{in,j}^1 - \sum_j \left(c_{i,j}^1 - c_{i,j}^0\right) D_{ni,j}^1 = 0$$

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- Tariff changes that fix $c_{n,j}$ and $c_{i,j}$ for all j, and hence fix the terms of trade sector by sector, will satisfy reciprocity
  - With one tradable sector, this is the only solution so, defining $\tilde{\omega}_n \equiv c_n/c_i$,

$$\Longrightarrow \tilde{\omega}_n/\text{terms of trade fixed under reciprocal tariff changes}$$

  - But with many tradable sectors, reciprocity might also be satisfied with changes in $c_{n,j}$ and $c_{i,j}$ for some $j's$, provided these changes balance out in a way that fixes each country's overall terms of trade

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- **Proposition 13.** *In a two-country Caliendo and Parro world with a single tradable sector, if country i's* tariff cuts fall short of (*exceed) those necessary to reciprocate the tariff cuts of country n, country n's labor market dislocation will be dampened (amplified) compared to the dislocation that country n would experience under reciprocal tariff cuts from country i.*

- **Corollary** *In this world, a country's own tariff changes are a sufficient statistic for calculating the labor-market dislocation it will experience as a result of negotiated tariff liberalization with its trading partner if and only if those tariff negotiations conform with the reciprocity norm.*

Reciprocity in the Caliendo and Parro Model

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- Extends naturally to many countries, under multilateral reciprocity
  - but must be qualified with many tradable sectors

Quantitative Analysis: Approach

- China joined the WTO on December 11 2001
- Secured from the United States and other WTO members a promise of Permanent Normal Trade Relations (PNTR)
  - A grant to China on a permanent basis of the tariff reductions embodied in the on-going phase-ins of market access commitments that had been agreed at the 1995 conclusion of the Uruguay Round of GATT negotiations
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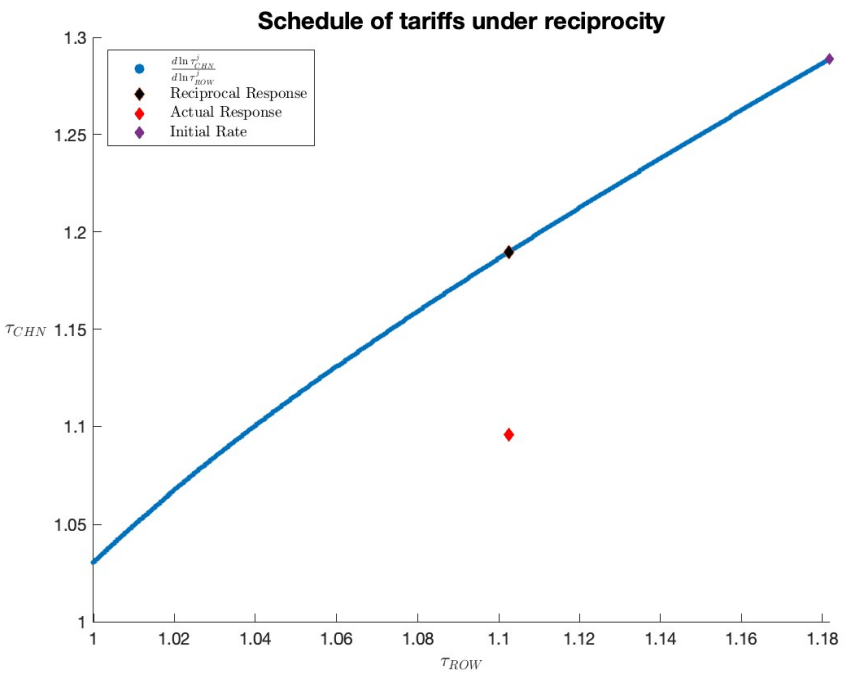
- In exchange, as the core of its protocol of accession China agreed to a set of market access commitments of its own
- We quantify the Chinese tariff cuts that would have reciprocated the grant of PNTR from the WTO membership
- We compare these reciprocal Chinese tariff cuts to the actual tariff cuts that China agreed to in its protocol of accession to the WTO
  - From the perspective of the year 2000 (also 1995), evaluate the actual changes in tariffs from 1990 to 2007
- We assess the implications of any deviations from reciprocity implied by China's actual agreed tariff cuts for the labor market dislocation in the rest of the world
- Data: WIOD; tariffs CFRT (2023), Elasticities CP (2015)

Quantitative Analysis: Main Results

- We start with a two-country (China and ROW) two sector (one tradable sector and one non-tradable sector) Eaton and Kortum (2002) model
- Reciprocal and actual tariff changes: Chinese tariff cuts exceeded those needed to reciprocate tariff cuts from ROW



(a) Reciprocal and actual tariff changes

(b) Welfare under reciprocal and actual tariff changes

Figure 1: Reciprocity and welfare

Quantitative Analysis: Main Results

- China's deviation from reciprocity amplified employment dislocation in ROW

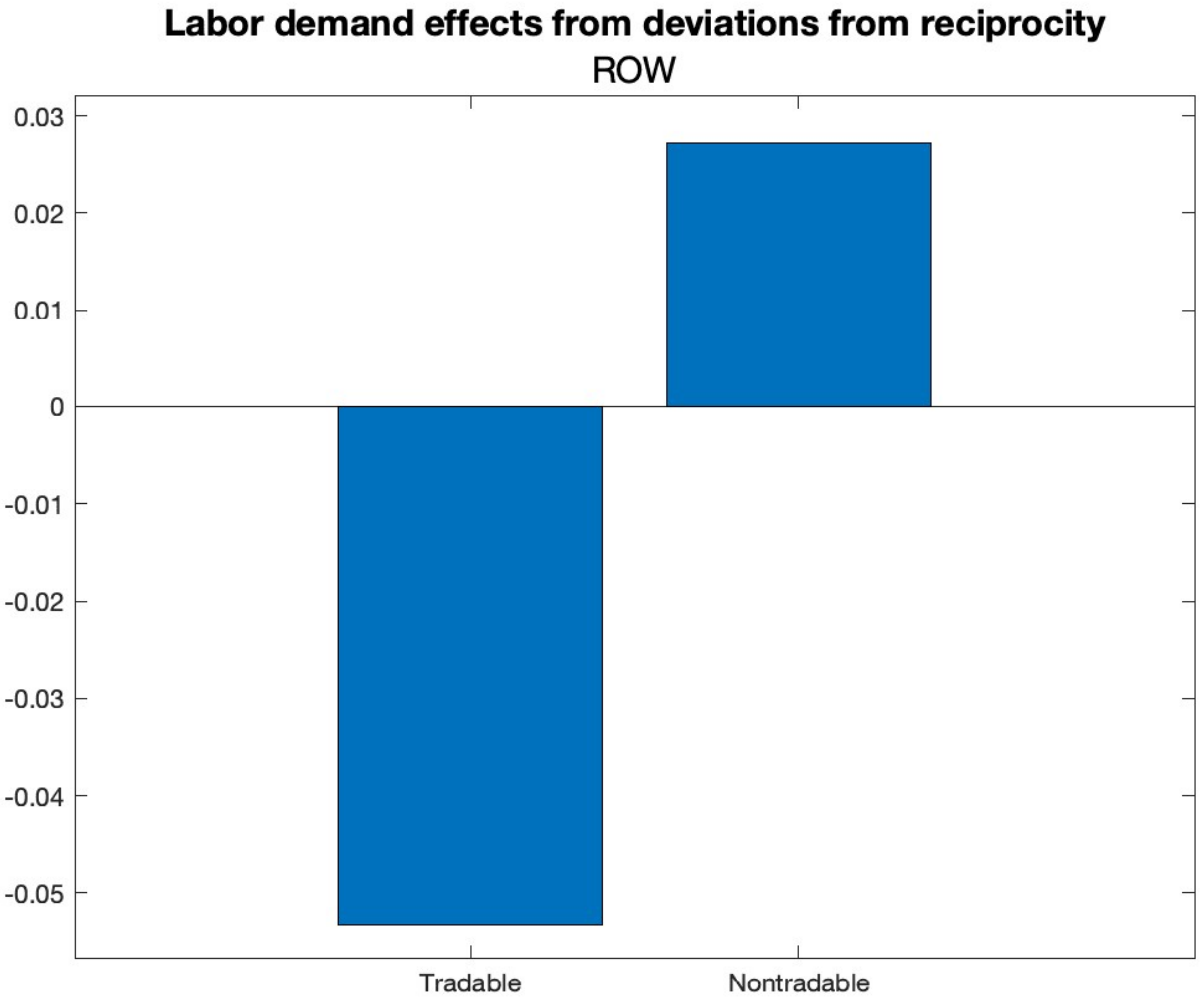
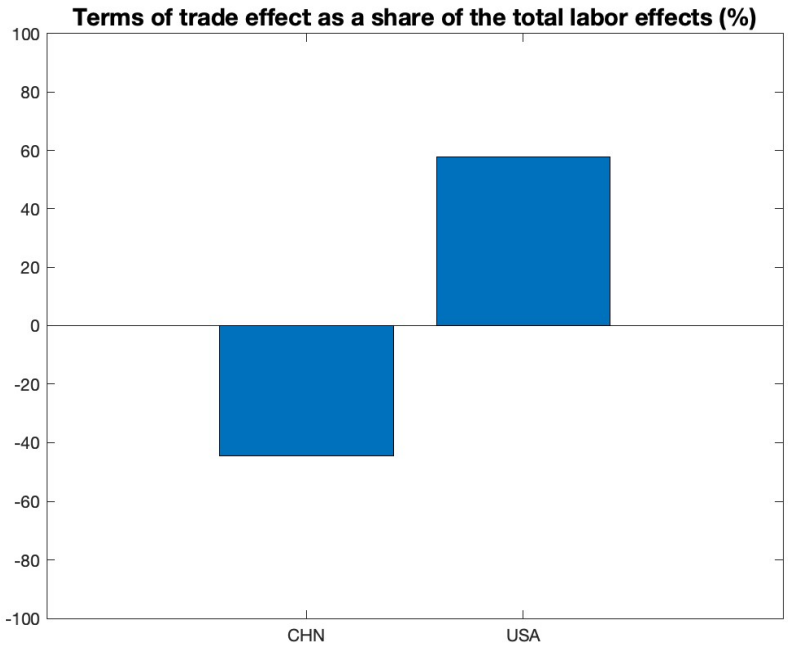
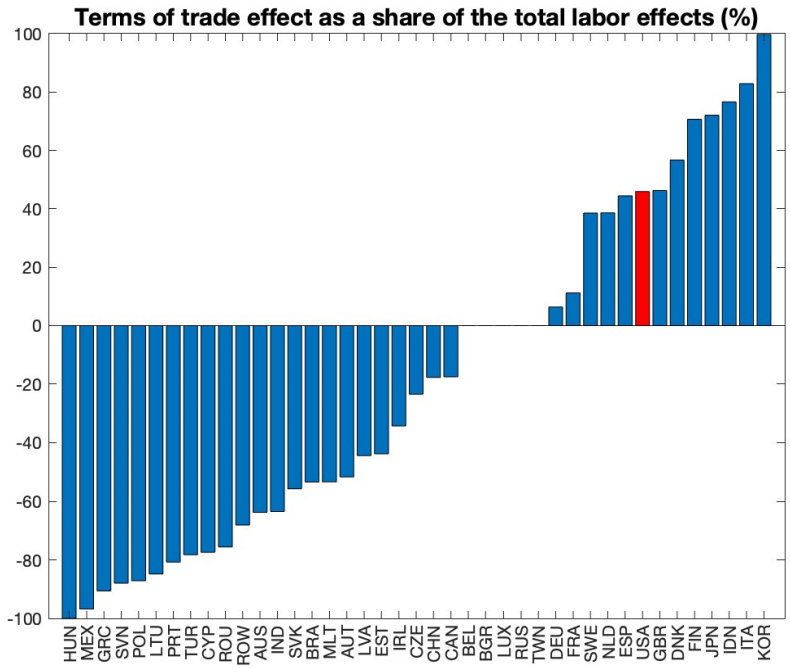


Figure 2: Employment effects across sectors in the rest of the world

Quantitative Analysis: Main Results

- Employment dislocation by ROW countries from China's deviation from reciprocity



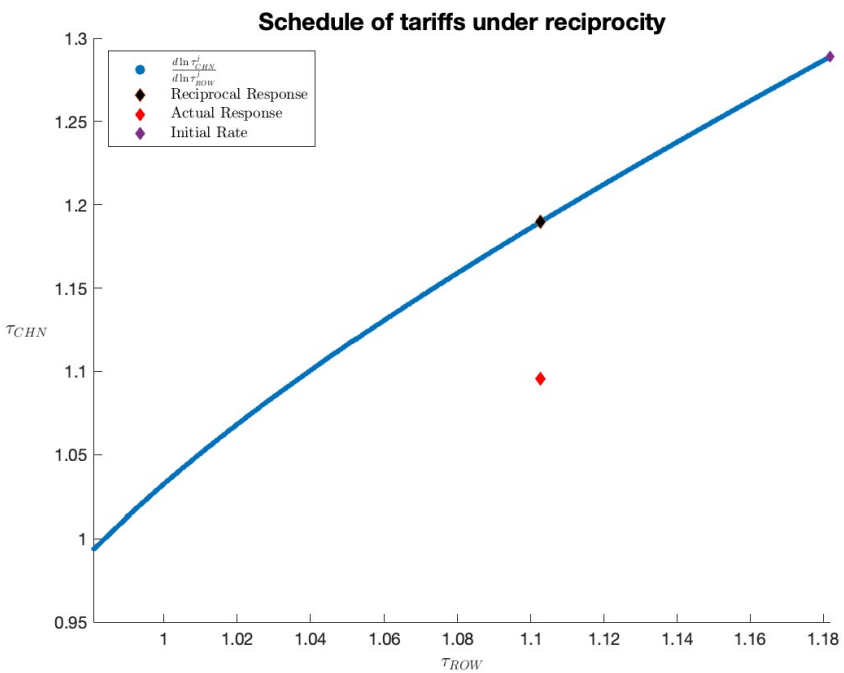


(a) Bilateral terms of trade effects on employment (b) Multilateral terms of trade effects on employment

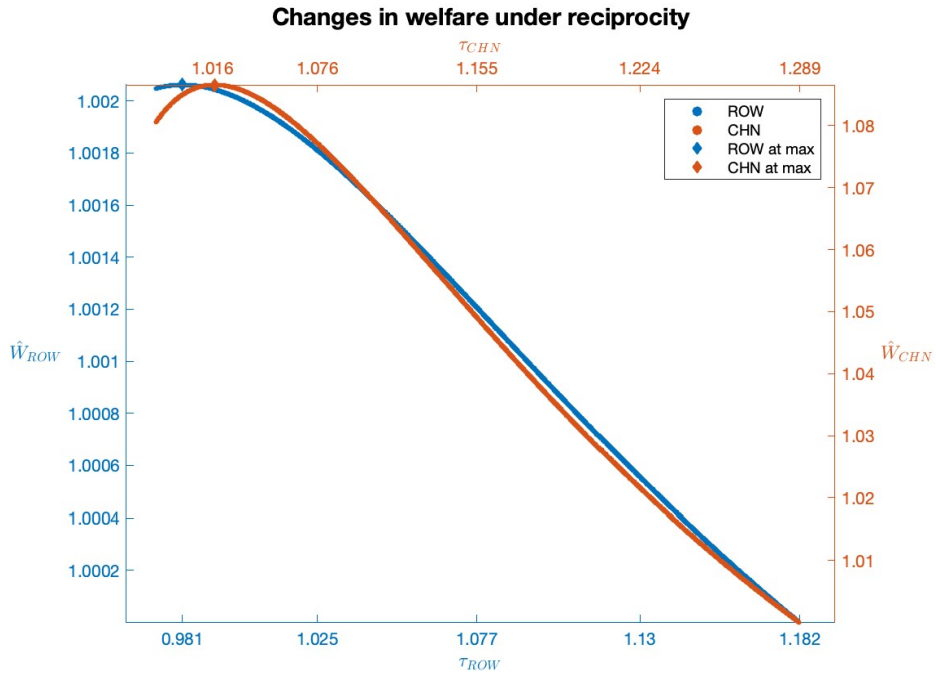
Figure 3: Employment dislocation across countries

Quantitative Analysis: Intermediate Goods Results

- Intermediate goods and employment dislocation in ROW from China's deviation from reciprocity



(a) Reciprocal and actual tariff changes with intermediate goods



(b) Welfare under reciprocal and actual tariff changes with intermediate goods

Figure 4: Reciprocity and welfare with intermediate goods

Quantitative Analysis: Intermediate Goods Results

- China's deviation from reciprocity amplified employment dislocation in ROW

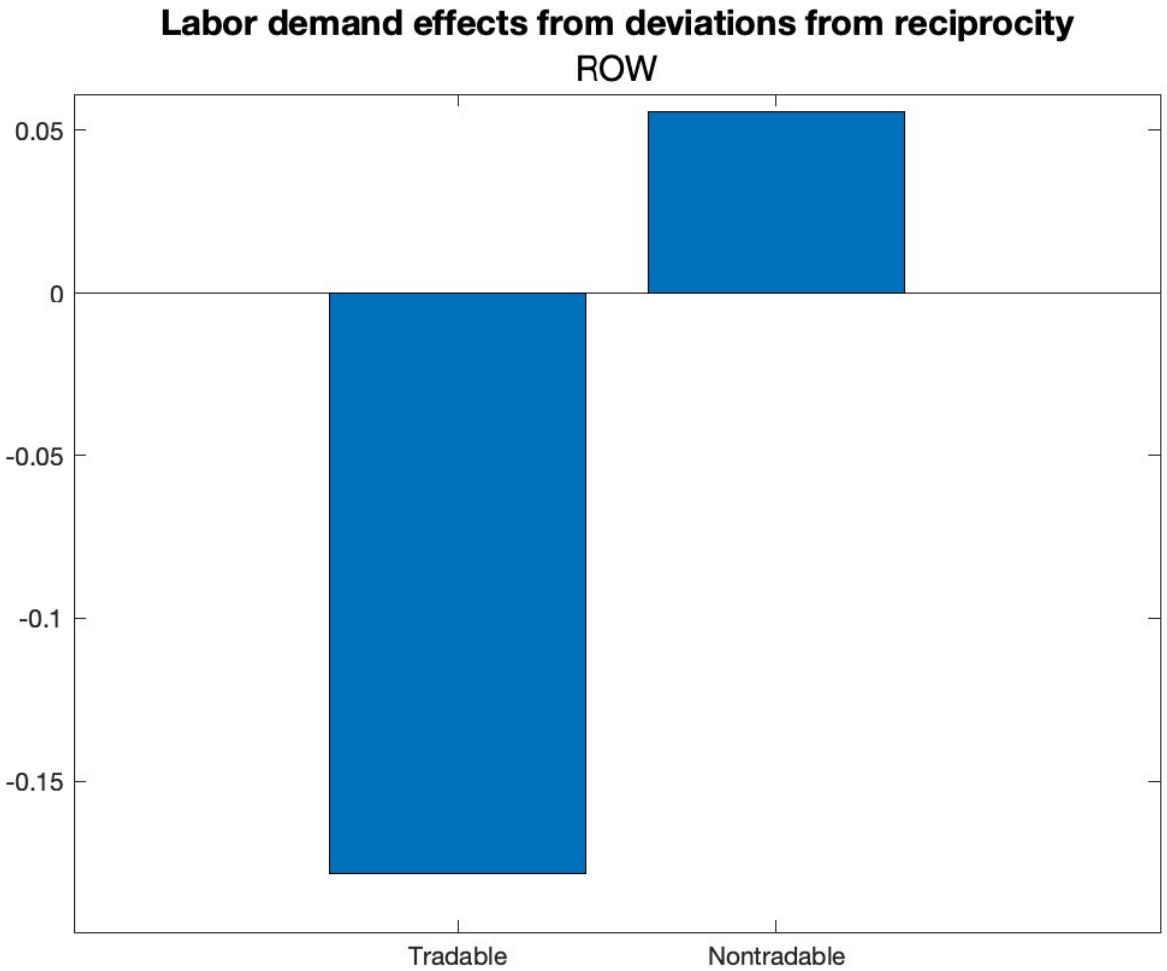


Figure 5: Employment effects across sectors in the rest of the world with intermediate goods

Quantitative Analysis: Within-Tradable-Sector Results

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- What about employment dislocation within the tradable sector?
- We find that the improvement in ROW terms of trade attributable to China exceeding reciprocity resulted in a within-sector employment dislocation of 0.76% in the rest of the world
  - Put differently, the share of workers in the tradable sector devoted to exported varieties in the rest of the world would have fallen by 0.76 percentage points less if China had conformed to reciprocity
- Intuitively, the terms-of-trade improvement experienced by the rest of the world resulted in access to cheaper imported varieties that before were produced domestically, which moved employment away from those varieties within the tradable sector

China's Growing Trade Surplus

- China's trade surplus grew from 1 percent to 10 percent of its GDP between 2001 and 2007
  - Treating these changing trade imbalances as exogenous to tariff negotiations, by the logic of the transfer problem they could have terms-of-trade effects of their own

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- Extended reciprocity

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- Loss of jobs in the tradable sector

$$\begin{aligned} dlnL_n^T = & -\frac{L_n^{NT}}{L_n^T} \frac{L_n^{NT}}{(L_n - TB_n)} \frac{1}{(1-\alpha)} \left[\frac{\alpha\left(1-\pi_{nn}^T\right)\pi_{nn}^T\left(\tau_{ni}-1\right)\theta}{\tau_{ni}}\right] dln\omega_n \\ & + \frac{L_n^{NT}}{L_n^T} \frac{L_n^{NT}}{(L_n - TB_n)} \frac{1}{(1-\alpha)} \left[\frac{\alpha\left(1-\pi_{nn}^T\right)\left(1-\pi_{nn}^T\left(\tau_{ni}-1\right)\theta\right)}{\tau_{ni}}\right] dln\tau_{ni} \\ & + \frac{L_n^{NT}}{L_n^T(L_n - TB_n)} \left[TB_n\right] d\ln TB_n \end{aligned}$$

China's Growing Trade Surplus: Quantitative Results

Table 1: China's Reciprocal Tariffs

Initial (2000)	Actual (2007)	Balanced trade	Constant surplus	Growing surplus
1.29	1.1	1.19	1.18	1.23

Table 2: Employment effects from deviation from reciprocity

	ROW		China	
	Non-tradable	Tradable	Non-tradable	Tradable
Rec with balanced trade	0.027%	-0.054%	0.570%	0.376%
Rec with constant trade imbalance	0.025%	-0.049%	0.546%	0.355%
Ext rec with growing trade surplus	0.035%	-0.068%	0.599%	0.389%
Rec with growing trade surplus	0.008%	-0.016%	0.560%	0.036%

- $\Longrightarrow$ In the presence of China's growing trade surpluses, while tradable employment in the rest of the world would have been 0.016% higher if China had conformed to reciprocity as traditionally defined, it would have been 0.068% higher if China had conformed to extended reciprocity

Conclusion

- What is the link between reciprocity in tariff negotiations and the magnitude of the labor-market adjustments that can be expected under negotiations that abide by reciprocity?

- Our analytical results extend findings on the potential benefits of reciprocity in trade agreements to the consideration of labor-market disruption
- We demonstrate how these results translate naturally from the textbook neoclassical trade model to a variety of workhorse quantitative trade models where closed-form expressions for labor-market dislocation can be derived

- Our quantitative results indicate that China *exceeded* reciprocity when it joined the WTO
- This led to higher aggregate real incomes in the United States and in the rest of the world as a whole through improvements in their terms of trade
- But it amplified the magnitude of the China Shock experienced by the United States and other countries that was attributable to tariff changes over the post-China-WTO-accession period
    - The contribution of China's deviation from reciprocity to the China Shock in the United States was roughly comparable in magnitude to the contribution of the US's own tariff cuts over this period
- In this sense, our quantitative results confirm the relative significance of China's deviations from reciprocity for understanding the China Shock.

Conclusion (cont'd)

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  - claims that China has not opened its own markets to imports sufficiently, and
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  - Holding trade balances and terms-of-trade fixed, a country's trade policies either restrict both its imports and its exports, or they stimulate both its imports and its export
- A possible resolution is that China's policies worsened its terms of trade, as we have found, in which case there is no tension between
  - claims that China has not opened its own markets to imports sufficiently (relative to the reciprocity norm), and
  - claims that China has taken actions that unduly stimulate its exports (relative to the reciprocity norm)