Trade and inequality across local labor markets: The margins of adjustment

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Margins of adjustment to a trade shock

- Empirical research documents importance of non-wage margins of adjustment in response of local labor markets to trade shocks
- To formalize observation, decompose differential impact of a trade shock across U.S. local labor markets, c, on *(i)* per capita labor income into
  - *(ii)* wage,
  - *(iii)* hours worked per employee,
  - *(iv)* unemployment,
  - *(v)* labor force participation margins of adjustment

  and do so separately for distinct labor groups, g

$$\underbrace{\frac{\text{Income}_{cgt}}{\text{Population}_{cgt}}}_{(i)} = \underbrace{\frac{\text{Income}_{cgt}}{\text{Hours}_{cgt}}}_{(ii)} \times \underbrace{\frac{\text{Hours}_{cgt}}{\text{Employed}_{cgt}}}_{(iii)} \times \underbrace{\frac{\text{Employed}_{cgt}}{\text{Labor force}_{cgt}}}_{(iv)} \times \underbrace{\frac{\text{Labor force}_{cgt}}{\text{Population}_{cgt}}}_{(v)} \quad (1)$$

- Definitions of groups:
  - All workers
  - CLG + vs SMC-

Empirics

- Follow ADH as closely as possible
- Estimate regressions of the form

$$\Delta y_{cgt} = \alpha_{gt} + \beta_g \Delta \mathrm{IPW}^{us}_{cgt} + \mathbf{X}'_{cgt}\gamma_g + \varepsilon_{cgt}$$

- $\Delta \mathrm{IPW}^{us}_{cgt} = \Delta$ U.S. import exposure / worker from China in *cg* starting at t
  - *cg* specific (using Census + ACS) instead of *c* specific (using CBP) in ADH
  - instrument as in ADH
- Vector $\mathbf{X}'_{cgt}$ contains a set of controls for *cg* start-of-decade labor force and demographic composition
  - *cg* specific instead of *c* specific
- Outcome variables of interest, Δy_{cgt}, include natural logarithms of LHS and each of RHS variable in accounting identity (1), expressed in first differences

Empirics

Sensitivity to controls: total per capita income as DV, aggregating across all workers

Table 1: Imports from China and Change in Per Capita Income
for All Workers in CZs, 1990-2007: 2SLS Estimates
Dependent variable: 10 x annual change in the log of income/working-age population (in %)

	I. 1990-2007 stacked first differences					
	(1)	(2)	(3)	(4)	(5)	(6)
(Δ imports from China to US)/	-1.225***	-1.194***	-1.208***	-0.769***	-0.835***	-0.746***
	(0.255)	(0.231)	(0.228)	(0.209)	(0.164)	(0.186)
manufacturing share$_{-1}$		-0.014	0.086**	-0.099	0.123***	0.004
		(0.059)	(0.042)	(0.063)	(0.046)	(0.057)
college share$_{-1}$				-0.592***		-0.443***
				(0.166)		(0.145)
foreign born share$_{-1}$				-0.019		0.116
				(0.036)		(0.071)
female share$_{-1}$				-0.218		0.041
				(0.137)		(0.172)
routine occupation share$_{-1}$					-1.135***	-0.661**
					(0.236)	(0.311)
average offshorability$_{-1}$					-0.211***	-0.185***
					(0.041)	(0.050)
regional FE	No	No	Yes	Yes	Yes	Yes
	II. 2SLS first stage estimates					
(Δ imports from China to OTH)/	1.042***	1.060***	1.053***	1.005***	1.029***	1.005***
	(0.137)	(0.159)	(0.152)	(0.137)	(0.148)	(0.134)
R^2	0.82	0.82	0.84	0.85	0.84	0.85

Notes: N = 1,444 (722 CZs x two time periods). * p<0.10, ** p<0.05, *** p<0.01; standard errors are clustered by state; the regression analyses are weighted by initial CZ share of national population. Regional FE refers to the Census division dummies. All control variables are what are used in ADH.

Empirics

Results using column 6 specification

Table 2: Imports from China and the Decomposition of Change in Income per Capita for Each Group in CZ, 1990-2007: 2SLS Estimates

Dependent variable: 10 x annual change in the log of each margin (in %)

	1990-2007 stacked first differences					
	$\Delta \ln\left(\frac{inc}{pop}\right)$ (1)	$\Delta \ln\left(\frac{inc}{hour}\right)$ (2)	$\Delta \ln\left(\frac{hours}{emp}\right)$ (3)	$\Delta \ln\left(\frac{emp}{lf}\right)$ (4)	$\Delta \ln\left(\frac{lf}{pop}\right)$ (5)	$\Delta \ln\left(\frac{hours}{emp}\frac{lf}{pop}\right)$ (6)
Panel A: all workers						
(Δ imports from China to US)/ worker	-0.746***	-0.174	0.017	-0.213***	-0.376***	-0.359***
	(0.186)	(0.133)	(0.061)	(0.034)	(0.127)	(0.092)
Panel B: college educated						
(Δ imports from China to US)/ worker	-0.424***	-0.290**	-0.073*	-0.026**	-0.035	-0.108**
	(0.151)	(0.114)	(0.042)	(0.010)	(0.036)	(0.046)
Panel C: non college educated						
(Δ imports from China to US)/ worker	-1.292***	-0.283	0.065	-0.383***	-0.693***	-0.627***
	(0.259)	(0.255)	(0.098)	(0.054)	(0.222)	(0.173)

Notes: N = 1,444 (722 CZs x two time periods). * p<0.10, ** p<0.05, *** p<0.01; standard errors are clustered by state; the regression analyses are weighted by initial CZ share of group-specific national population. *inc* is wage and salary income, *hour* is hours worked, *emp* is employment, and lf is the size of the labor force (by CZ and group). Panel A includes all control variables in Table 1 whereas Panels B and C exclude the college-educated population control.

Empirics

Implications

- Panel A: effect of China shock on relative per capita income across commuting zones aggregating across all workers
  - primarily attributed to LFP (50%) and unemployment (29%)
  - hours worked per employee, wage margins statistically insignificant
  - although wage margin is economically significant (22%)
- Panel C: similar effects focusing on low-education workers
- Panel B: very different implications for high-education workers
  - primarily attributed wage margin (approximately 68%)
- Take-home messages:
  1. empirical relevance of heterogeneous treatment effects of trade shocks across g
  2. importance of non-wage margins of adjustment, including
     - frictional unemployment
     - optimal labor-leisure choices (primarily on the extensive margin)

     especially for low-education workers

Kim and Vogel (2021)

"Trade shocks and labor market adjustment" *AERI*

- Goal: Build a theory featuring
  - frictional unemployment
  - labor force participation
  - many sectors (+ regions) and possibility of many groups within region
  - heterogeneous treatment effects across groups
- Conduct comparative statics to understand mechanisms shaping responses and sources of heterogeneity

Kim and Vogel (2021): Setup I

- Roy-style model with groups and sectors indexed by g, s
  - group can include education $\times$ region
- Set of agents in g is denoted by Ω_g w/ $N_g = |\Omega_g|$
- Can be employed in sector $s = 1, ..., S$, out of LF $s = 0$, or unemployed $s = u$
- Agents chooses to apply to $s \in \{0, 1, ..., S\}$ maximizing expected utility
- Agent applying to a sector may become employed or unemployed
  - Employed w/ prob E_{gs}
  - Obviously, assume $E_{g0} = 1$
- Utility of ω consuming C and working H is $U(C, H; g) = \zeta_g C - \frac{H^{1+\upsilon_g}}{1+\upsilon_g}$
  - $1/\upsilon_g$ is both uncompensated (Marshallian) and compensated (Hicksian) intensive-margin labor supply elasticities
- Price index is P_g

Kim and Vogel (2021): Setup II (Production and Revenue)

- Worker $\omega \in \Omega_g$ in s produces $y_{\omega s} = A^Y_{gs}\varepsilon_{\omega s}H_{\omega s}$ output
- The joint distribution of $\{\varepsilon_{\omega s}\}_{s=0}^{S}$ is assumed to be

$$G(\varepsilon_0, ..., \varepsilon_S; g) = \exp\left[-\varepsilon_0^{-\iota_g} - \left(\sum_{s=1}^{S} \varepsilon_s^{-\iota_g/(1-\kappa_g)}\right)^{(1-\kappa_g)}\right]$$

  where $\iota_g > (1+\upsilon_g)/\upsilon_g$ and $\kappa_g < 1$
  - ι_g, κ_g shape elasticities of relative labor supply across sectors, extensive margin of labor supply
- Assume $\varepsilon_{\omega u} = \varepsilon_{\omega 0}$ since both operate home production tech
- Price, p_s, in each sector, $s \in \{1, ..., S\}$, is given (SOE)
- Nominal return per unit of output in home production is given by $p_0 P_g^{\psi}$, where $\psi \in [0, 1]$ and where p_0 is fixed

Kim and Vogel (2021): Setup III (Frictions and Timing)

- Production in sector requires worker-firm match (directed search)
- Real cost of posting vacancy for group g in s is $F_g > 0$
- Matches depend on applicants, N_{gs}, and vacancies, V_{gs}, as follows

$$M_{gs}(V_{gs}, N_{gs}) = A_g^M V_{gs}^{\alpha_g} N_{gs}^{1-\alpha_g}$$

- Let $\theta_{gs} \equiv V_{gs}/N_{gs}$ denote market tightness

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- Entrepreneurs know θ_{gs}, p_s, P_g; agents know $\varepsilon_{\omega s}$, p_s, P_g, and E_{gs}
- Stage 1: simultaneous vacancies + applications; then employment realizations
- Stage 2: workers choose hours; then bargain with firms
  - generalized Nash bargaining solution; worker's weight is β_g
  - vacancy costs and hours decisions already sunk/made (so outside options 0)

Kim and Vogel (2021): Eqm Characterization I

Define

$$w_{gs} \equiv \begin{cases} A^Y_{gs}\beta_g p_s & \text{if } s \in \{1, ..., S\} \\ \mathbb{I}_{(\tilde{w}_{g0}>0)} \tilde{w}_{g0}^{\frac{\upsilon_g}{1+\upsilon_g}} p_0 P_g^{\psi} & \text{if } s = 0 \end{cases}$$

where

$$\tilde{w}_{g0} \equiv \frac{1}{E_g} \left(A^Y_{g0}\right)^{\frac{1+\upsilon_g}{\upsilon_g}} + \frac{E_g - 1}{E_g} \left(A^Y_{gu}\right)^{\frac{1+\upsilon_g}{\upsilon_g}}$$

And define

$$\Phi_g \equiv \left(w_{g0}^{\frac{\iota_g}{1-\kappa_g}}\right)^{1-\kappa_g} + \left(\sum_{s\in\{1,...,S\}} w_{gs}^{\frac{\iota_g}{1-\kappa_g}}\right)^{1-\kappa_g}$$

And define

$$\pi^{\mathcal{S}(s)}_{gs} = w_{gs}^{\frac{\iota_g}{1-\kappa_g}} \Big/ \sum_{s'\in\mathcal{S}(s)} w_{gs'}^{\frac{\iota_g}{1-\kappa_g}}$$

where $\mathcal{S}(s) = 0$ if out of LF, $\mathcal{S}(s) = 1, ..., S$ o.w.

Kim and Vogel (2021): Eqm Characterization II

Proposition

In any equilibrium in which $\theta_g = \theta_{gs}$, probability employment and the avg wage per hour worked and hours worked per employee in any sector are

$$K_g = \chi_g^K \left(\Phi_g^{\frac{1}{\iota_g}} / P_g \right)^{\rho_g^K} \quad \textit{for} \quad K \in \{W, H, E\}$$

where $\chi_g^K > 0$ and where $\rho_g^W \equiv 1$, $\rho_g^H \equiv \frac{1}{\upsilon_g}$, and $\rho_g^E \equiv \frac{\alpha_g}{1-\alpha_g} \frac{1+\upsilon_g}{\upsilon_g}$.

In such an equilibrium, the labor force participation rate, L_g, is

$$L_g = \frac{1}{\Phi_g} \left(\sum_{s=1}^{S} \left(A_{gs}^Y \beta_g p_s \right)^{\frac{\iota_g}{1-\kappa_g}} \right)^{1-\kappa_g}$$

Kim and Vogel (2021): Comparative Statics I

Assumption 1. Either *(i)* the productivity of non-participation is zero, $A^Y_{g0} = 0$, or *(ii)* the productivity of unemployment is zero, $A^Y_{gu} = 0$.

Proposition

In any equilibrium in which $\theta_g = \theta_{gs}$ in all sectors, under Assumption 1 we have

$$d \ln K_g = \frac{\rho^K_g (1 - \alpha_g)}{1 - \alpha_g L_g} \left[L_g \sum_{s=1}^{S} \pi^{\mathcal{S}(s)}_{gs} d \ln p_s - (1 - \psi(1 - L_g))\, d \ln P_g \right]$$

for any $K \in \{W, H, E\}$, where $\rho^U_g \equiv \rho^W_g + \rho^H_g + \rho^E_g$; we also have

$$d \ln L_g = \frac{(1 - L_g)\iota_g}{1 - \alpha_g L_g} \left[\sum_{s=1}^{S} \pi^{\mathcal{S}(s)}_{gs} d \ln p_s - (\psi + \alpha_g - \alpha_g \psi) d \ln P_g \right]$$

Kim and Vogel (2021): Comparative Statics II

Assumption 2. $\theta_g = \theta_{gs}$ in all sectors; $\alpha = \alpha_g$, $\upsilon = \upsilon_g$, $\iota = \iota_g$, and $P = P_g$ for all g; and in the initial equilibrium $L = L_g$ for all g.

Proposition

Under Assumptions 1 and 2, the differential change in any $K \in \{W, H, E, L\}$ across two groups is given by

$$d \ln K_{g'} - d \ln K_g = \frac{\rho^K (1-\alpha) L}{1 - \alpha L} \sum_{s=1}^{S} \left(\pi_{g's}^{\mathcal{S}(s)} - \pi_{gs}^{\mathcal{S}(s)} \right) d \ln p_s$$

where $\rho^L \equiv \iota(1-L)/((1-\alpha)L)$