Trade Shocks and Human Capital:
Evidence from Brazil's Trade Liberalization

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August 29, 2024

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Motivation

- ▶ Child labor remains a problem in the developing world
    - Concerns regarding its impact on children's development

- ▶ At the heart of this issue lies the decision faced by households
    - Invest in children's education or make them work?

- ▶ Extensive research on economic shocks, child labor and schooling
    - Households' incomes vs opportunity costs of schooling
    - Contrasting results depending on the study-context

This Paper

- ▶ Studies the impact of Brazil's trade reform on child labor and schooling
    - Differences in local exposure to tariff changes (1990-1995)
    - Age-specific trade shocks to labor demand for adults and children

- ▶ Nearly three decades of data covering
    - School attendance
    - Labor market participation
    - Socioeconomic characteristics

- ▶ Representative at fine geographic levels

Findings

Regions exposed to **child-specific tariff shocks** experienced

- Larger decreases in child labor and faster increases in schooling

- Higher educational attainment for post-mid-1980s cohorts

- Transition towards formal employment and manufacturing

▶ Opposite effects for **adult-specific tariff shocks**

▶ These effects persisted and intensified over time

Roadmap

Brazilian Trade Reform of the 1990s

Figure: Tariff Changes by Industry, 1990-1995
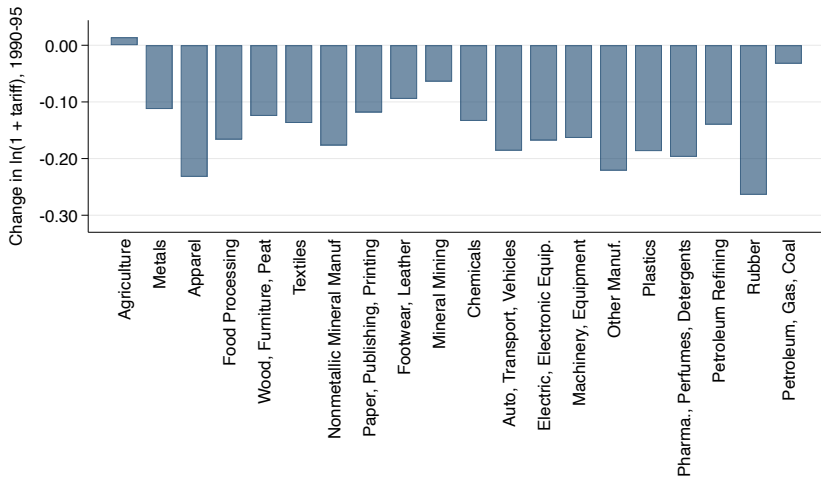
Roadmap

Data

Trade exposure

- Industry-specific tariff rates, 1987-1998 (Kume et al., 2003)

Outcome variables

- Labor market participation and school attendance (*Demographic Census*)

- School enrollment and educational measures (*School Census*)

- Earnings and employment in the formal sector (*RAIS*)

▶ Focus on population age 10-14 in 411 microregions

(▸ Child labor)

Local Exposure to Trade Liberalization

▶ The exposure of microregion m to the trade liberalization is given by

$$\Delta Tariff_m = -\sum_{j \in S} \omega_{mj} \times \Delta\log(1 + \tau_j)$$

- $\Delta\log(1 + \tau_j)$: log difference of tariff rates in industry j (1990-1995)

- ω_{mj} relative importance of industry j in microregion m's employment

$$\omega_{mj} = \frac{\lambda_{mj}/\varphi_j}{\sum_{j' \in S} \lambda_{mj'}/\varphi_{j'}}$$

- $\lambda_{mj} = L_{mj}/L_m$ and φ_j is one minus the wage bill share of industry j

Accounting for Age Differences

▶ Industries and regions employ varying shares of adults and children

▶ Two separate shocks to labor demand for adults and children

$$\Delta Tariff_m^{Child} = -\sum_{j \in S} Ch_{mj} \times \omega_{mj} \times \Delta\log(1 + \tau_j)$$

and

$$\Delta Tariff_m^{Adult} = -\sum_{j \in S} (1 - Ch_{mj}) \times \omega_{mj} \times \Delta\log(1 + \tau_j)$$

- where $Ch_{mj} = L_{mj}^{Ch} / L_{mj}$

▶ Maps

Empirical Strategy

$$\Delta y_m^{\tau-1991} = \beta^{Adult}\Delta Tariff_m^{Adult} + \beta^{Child}\Delta Tariff_m^{Child}$$
$$+ \theta\Delta y_m^{1991-1980} + W_m\gamma + \delta_s + \epsilon_m$$

Outcomes

- $\Delta y_m^{\tau-1991}$ is the first-difference between $\tau = \{2000, 2010\}$ and 1991

- Child activity: % school only, % work, % idle, and % paid jobs

Control vector includes

- Shares of urban population and population aged 10-14

- Log of population, poverty and illiteracy rates, income inequality

- Lag of the dependent variable and state fixed effects

Other specification features

- Weighted by population size and SEs clustered at mesoregion level

Roadmap

Child Labor and Schooling

	School only		Work		Idle		Paid work	
	1991-2000 (1)	1991-2010 (2)	1991-2000 (3)	1991-2010 (4)	1991-2000 (5)	1991-2010 (6)	1991-2000 (7)	1991-2010 (8)
Panel A. Overall tariff reduction								
$\Delta Tariff_m$	-0.132	-0.442^{**}	0.258^{**}	0.551^{***}	-0.101	-0.103	0.278^{***}	0.339^{***}
	(0.169)	(0.182)	(0.102)	(0.098)	(0.111)	(0.133)	(0.081)	(0.100)
R-squared	0.80	0.86	0.56	0.59	0.91	0.92	0.65	0.64
Panel B. Adult and child-specific tariff reductions								
$\Delta Tariff_m^{Adult}$	-0.267	-0.647^{***}	0.361^{***}	0.691^{***}	-0.084	-0.069	0.391^{***}	0.495^{***}
	(0.184)	(0.199)	(0.108)	(0.100)	(0.129)	(0.158)	(0.082)	(0.092)
$\Delta Tariff_m^{Child}$	7.456^{*}	11.058^{***}	-6.676^{***}	-8.822^{***}	-1.141	-2.131	-7.369^{***}	-10.213^{***}
	(3.975)	(3.740)	(2.182)	(2.273)	(2.411)	(2.550)	(1.722)	(1.821)
R-squared	0.81	0.87	0.59	0.63	0.91	0.92	0.70	0.71
Observations	411	411	411	411	411	411	411	411
Mean dep. var.	0.157	0.199	-0.024	-0.043	-0.133	-0.156	-0.035	-0.044

Moving a region from the 10th to the 90th percentile (1991-2010):

- Adult-specific shock: -6.7 pp; Child-specific shock: +3.3 pp
- Adult-specific shock: +7.2 pp; Child-specific shock: -2.6 pp

Heterogeneity: ▸ By income ▸ By educ ▸ By race ▸ By gender

Child Labor and Schooling

	School only		Work		Idle		Paid work	
	1991-2000 (1)	1991-2010 (2)	1991-2000 (3)	1991-2010 (4)	1991-2000 (5)	1991-2010 (6)	1991-2000 (7)	1991-2010 (8)
Panel A. Overall tariff reduction								
$\Delta Tariff_m$	−0.132	−0.442**	0.258**	0.551***	−0.101	−0.103	0.278***	0.339***
	(0.169)	(0.182)	(0.102)	(0.098)	(0.111)	(0.133)	(0.081)	(0.100)
R-squared	0.80	0.86	0.56	0.59	0.91	0.92	0.65	0.64
Panel B. Adult and child-specific tariff reductions								
$\Delta Tariff_m^{Adult}$	−0.267	−0.647***	0.361***	0.691***	−0.084	−0.069	0.391***	0.495***
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Robustness Checks

1. Longer pre-trends
2. Higher-order polynomials in income per capita
3. Characteristics of local labor markets
4. Exposure to social programs
5. Local supply of public goods and educational infrastructure
6. Other macroeconomic shocks
7. Controlling for industry shares
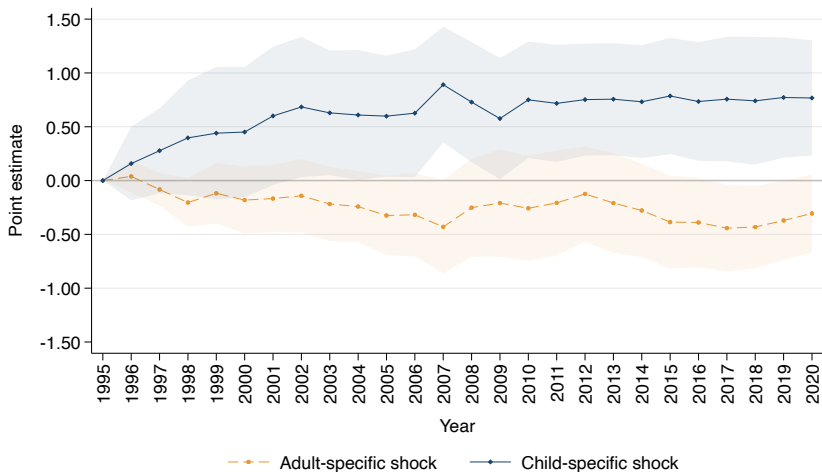8. Employment shares from the 1980 Census

▸ School only   ▸ Work   ▸ Industry shares   ▸ 1980 shares

Effects of Tariff Shocks on School Enrollment

Human Capital Accumulation

**How did trade reform affect long-term human capital accumulation?**

- Effects likely concentrated on specific age groups
- Alternative specification at the 'year-of-birth cohort'-'microregion' level

Outcomes

- % completed elementary school, high school and have some college
- Cohorts born from 1950 to 1992 (population age 18-60 in 2010)
- 1973 cohort as the baseline (18 years old in 1991)

Elementary School
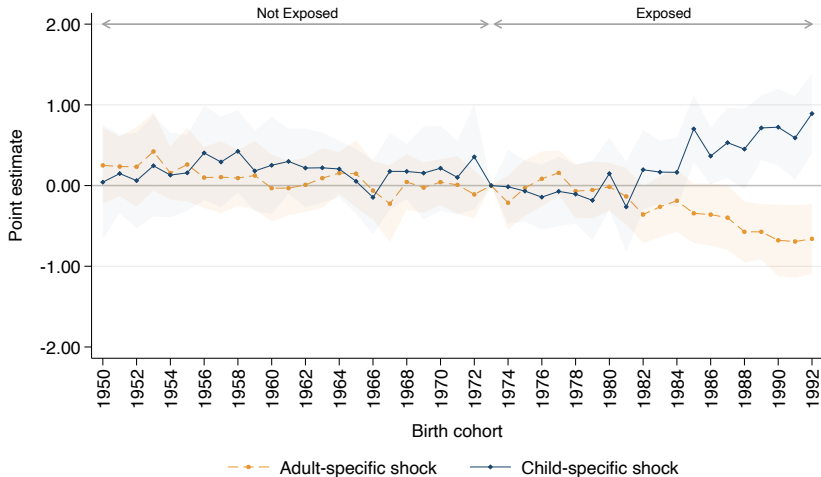
Structural Transformation

How did trade reform affect the structure of local economies?

- Link our findings with existing literature (Dix-Carneiro and Kovak, 2017, 2019; Ponczek and Ulyssea, 2021)

▶ Regions facing higher child-specific tariff reductions experienced

- Larger increases in formal employment and earnings
- Adult labor shifts from non-tradable to manufacturing sectors

▶ Adult-specific tariff reductions led to opposite results

▸ Census results

Log Formal Employment
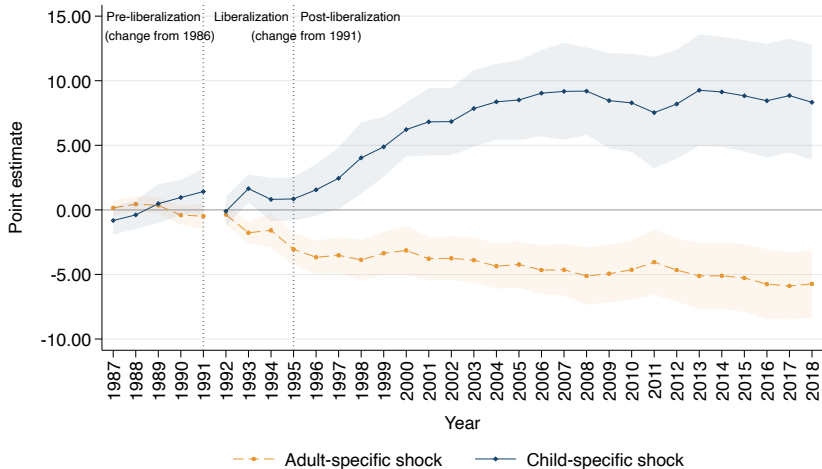
Roadmap

Conclusions

▶ Shocks affecting adults and children trigger distinct effects on child labor, schooling, and human capital accumulation

▶ Gradual process of reallocation of resources both across industries and between formal and informal sectors in opposite directions
  - Leading to persistent impacts on earnings
  - Consistent with the slow process of adjustment in educational investments

▶ Potential role of human capital in amplifying the initial effects of the shocks

Thank you!

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Appendix

Related Literature

- ▶ Effects of economic shocks on child labor and schooling (Edmonds and Pavcnik, 2005; Kruger, 2007; Bai and Wang, 2020; Carrillo, 2020)

  - **Extensive data and country-wide shock spanning all sectors**

- ▶ Households' decisions on human capital investments (Thomas et al., 2004; Beegle et al., 2006; Edmonds, 2006; Duryea et al., 2007; Soares et al., 2012)

  - **Two separate shocks to labor demand for adults and children**

- ▶ Dynamics of labor market adjustments to trade shocks (Gonzaga et al., 2006; Acemoglu et al., 2016; Dix-Carneiro and Kovak, 2017; Autor et al., 2019)

  - **Labor market adjustments accompanied by changes in human capital investments**

▸ Findings

Child Labor in Brazil

- ▶ Child labor is still a major challenge in Brazil
    - 5.1% of the children aged between 10 and 14 in 2010

- ▶ Higher in the poorer and more rural regions of the country
    - The rate of its reduction has also been slower over time

- ▶ More prevalent in the agricultural and extractive sectors than in the manufacturing and non-tradable sectors

▸ Data

Child Labor in Brazil

	1980	1991	2000	2010
Panel A. Children's activities				
% School only	0.652	0.765	0.893	0.919
% Work	0.128	0.084	0.064	0.051
% Idle	0.220	0.151	0.044	0.029
% Paid employment	0.079	0.057	0.029	0.023
Panel B. Child labor (% Work)				
By per capita income				
Low	0.163	0.109	0.103	0.084
High	0.111	0.072	0.045	0.037
By rural population				
Urban	0.107	0.070	0.043	0.035
Rural	0.174	0.113	0.113	0.092
By sector (conditional on working)				
Agriculture/Extractive	0.602	0.506	0.540	0.553
Manufacturing	0.106	0.106	0.084	0.077
Non-tradable	0.292	0.388	0.376	0.370

▸ Data

Accounting for Age Differences

(a) $\Delta Tariff_m^{Adult}$ (b) $\Delta Tariff_m^{Child}$

Adult−specific tariff shock
- −0.153 to −0.124
- −0.124 to −0.100
- −0.100 to −0.075
- −0.075 to −0.052
- −0.052 to −0.033
- −0.033 to −0.018
- −0.018 to −0.006
- −0.006 to 0.008
- Omitted

Child−specific tariff shock
- −0.0084 to −0.0063
- −0.0063 to −0.0034
- −0.0034 to −0.0023
- −0.0023 to −0.0015
- −0.0015 to −0.0008
- −0.0008 to −0.0002
- −0.0002 to 0.0004
- 0.0004 to 0.0015
- Omitted

▸ Back
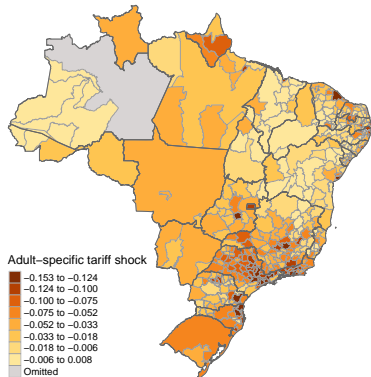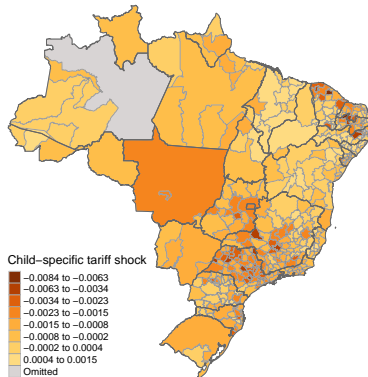
Heterogeneity By Income

	School only		Work		Idle		Paid work	
	Poor (1)	Non-poor (2)	Poor (3)	Non-poor (4)	Poor (5)	Non-poor (6)	Poor (7)	Non-poor (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	−0.424**	0.323**	0.456***	−0.008	−0.027	−0.325***	0.464***	0.118
	(0.211)	(0.161)	(0.121)	(0.103)	(0.149)	(0.091)	(0.094)	(0.077)
$\Delta Tariff_m^{Child}$	9.191**	1.600	−6.856***	−4.252**	−2.473	2.670**	−7.740***	−4.562***
	(4.556)	(2.830)	(2.423)	(1.930)	(2.774)	(1.320)	(2.047)	(1.633)
R-squared	0.79	0.76	0.64	0.31	0.91	0.85	0.72	0.40
Mean dep. var.	0.173	0.078	-0.021	-0.016	-0.152	-0.062	-0.035	-0.030
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	−0.888***	0.274*	0.854***	0.046	−0.002	−0.364***	0.598***	0.095
	(0.231)	(0.144)	(0.112)	(0.108)	(0.180)	(0.095)	(0.102)	(0.092)
$\Delta Tariff_m^{Child}$	13.745***	2.555	−9.636***	−4.623**	−3.757	2.365*	−10.748***	−6.898***
	(4.316)	(2.753)	(2.558)	(2.109)	(2.884)	(1.233)	(2.174)	(1.724)
R-squared	0.86	0.82	0.66	0.44	0.92	0.88	0.72	0.47
Observations	411	411	411	411	411	411	411	411
Mean dep. var.	0.223	0.084	-0.043	-0.014	-0.179	-0.069	-0.048	-0.027

Heterogeneity By Education

	School only		Work		Idle		Paid work	
	Low educ. (1)	Medium/ High educ. (2)	Low educ. (3)	Medium/ High educ. (4)	Low educ. (5)	Medium/ High educ. (6)	Low educ. (7)	Medium/ High educ. (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	−0.348*	0.143	0.414***	−0.049	−0.043	−0.097*	0.460***	0.025
	(0.198)	(0.102)	(0.124)	(0.076)	(0.136)	(0.049)	(0.096)	(0.073)
$\Delta Tariff_m^{Child}$	9.229**	1.174	−7.735***	−2.493**	−2.058	1.223	−8.634***	−2.338**
	(4.496)	(1.718)	(2.548)	(1.221)	(2.573)	(0.859)	(2.151)	(0.974)
R-squared	0.77	0.38	0.61	0.25	0.90	0.47	0.71	0.35
Mean dep. var.	0.166	0.030	-0.025	-0.007	-0.141	-0.023	-0.037	-0.016
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	−0.766***	0.085	0.770***	−0.043	−0.016	−0.046	0.577***	−0.004
	(0.220)	(0.108)	(0.119)	(0.073)	(0.170)	(0.056)	(0.111)	(0.073)
$\Delta Tariff_m^{Child}$	13.356***	3.478**	−10.137***	−3.725***	−3.309	0.201	−11.453***	−3.828***
	(4.464)	(1.604)	(2.764)	(1.110)	(2.750)	(0.858)	(2.305)	(0.940)
R-squared	0.84	0.39	0.65	0.30	0.91	0.54	0.71	0.46
Observations	411	410	411	410	411	410	411	410
Mean dep. var.	0.208	0.029	-0.043	-0.006	-0.165	-0.023	-0.046	-0.019

Heterogeneity By Race

	School only		Work		Idle		Paid work	
	Black	Non-black	Black	Non-black	Black	Non-black	Black	Non-black
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Medium-run (1991–2000)								
$\Delta Tariff_m^{Adult}$	−0.642***	−0.167	0.618***	0.277**	0.058	−0.115	0.575***	0.346***
	(0.217)	(0.192)	(0.133)	(0.112)	(0.152)	(0.130)	(0.109)	(0.081)
$\Delta Tariff_m^{Child}$	10.953**	8.640**	−8.385***	−6.662***	−2.991	−2.341	−9.098***	−7.074***
	(5.070)	(3.455)	(2.643)	(2.228)	(2.931)	(2.177)	(2.628)	(1.711)
R-squared	0.72	0.72	0.64	0.55	0.87	0.84	0.69	0.63
Mean dep. var.	0.183	0.128	-0.035	-0.015	-0.148	-0.113	-0.045	-0.026
Panel B. Long-run (1991–2010)								
$\Delta Tariff_m^{Adult}$	−1.147***	−0.452**	1.007***	0.571***	0.148	−0.128	0.755***	0.427***
	(0.255)	(0.172)	(0.134)	(0.104)	(0.187)	(0.130)	(0.123)	(0.097)
$\Delta Tariff_m^{Child}$	16.649***	10.866***	−11.455***	−8.501***	−5.368*	−2.541	−12.512***	−9.915***
	(4.987)	(2.879)	(2.789)	(2.199)	(3.048)	(2.169)	(2.760)	(1.760)
R-squared	0.81	0.81	0.68	0.62	0.88	0.87	0.71	0.66
Observations	411	411	411	411	411	411	411	411
Mean dep. var.	0.235	0.160	-0.059	-0.029	-0.176	-0.132	-0.058	-0.033

▸ Main results

Heterogeneity By Gender

	School only		Work		Idle		Paid work	
	Boys (1)	Girls (2)	Boys (3)	Girls (4)	Boys (5)	Girls (6)	Boys (7)	Girls (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	−0.399*	−0.191	0.429***	0.324***	−0.069	−0.089	0.473***	0.336***
	(0.204)	(0.172)	(0.146)	(0.081)	(0.136)	(0.132)	(0.115)	(0.062)
$\Delta Tariff_m^{Child}$	9.427*	6.090*	−7.100**	−6.396***	−2.425	0.022	−8.122***	−6.647***
	(4.920)	(3.180)	(3.321)	(1.457)	(2.768)	(2.225)	(2.997)	(1.142)
R-squared	0.79	0.79	0.51	0.64	0.90	0.89	0.64	0.67
Mean dep. var.	0.163	0.152	-0.040	-0.008	-0.123	-0.144	-0.050	-0.019
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	−0.930***	−0.398**	0.885***	0.509***	−0.033	−0.104	0.580***	0.433***
	(0.208)	(0.193)	(0.141)	(0.080)	(0.165)	(0.161)	(0.129)	(0.068)
$\Delta Tariff_m^{Child}$	13.368***	9.208***	−9.265***	−8.489***	−3.666	−0.693	−11.786***	−8.640***
	(4.259)	(3.277)	(3.171)	(1.674)	(2.883)	(2.342)	(3.027)	(1.228)
R-squared	0.90	0.81	0.62	0.67	0.92	0.90	0.67	0.68
Observations	411	411	411	411	411	411	411	411
Mean dep. var.	0.218	0.179	-0.074	-0.011	-0.144	-0.168	-0.061	-0.026

Robustness Checks: School Only

	Baseline (1)	No controls (2)	Longer pre-trends (3)	Income per capita (4)	Labor market (5)	Social programs (6)	Educ./Pub. spending (7)	Macro shocks (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	−0.267	−0.964***	−0.239	−0.294*	−0.277	−0.241	−0.323*	−0.182
	(0.184)	(0.072)	(0.172)	(0.169)	(0.201)	(0.159)	(0.169)	(0.154)
$\Delta Tariff_m^{Child}$	7.456*	9.805***	6.686*	5.503	10.900***	6.357*	6.159*	6.862**
	(3.975)	(2.543)	(4.003)	(3.714)	(3.711)	(3.217)	(3.338)	(3.160)
R-squared	0.81	0.73	0.81	0.83	0.83	0.82	0.84	0.83
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	−0.647***	−1.344***	−0.599***	−0.675***	−0.539**	−0.607***	−0.690***	−0.479***
	(0.199)	(0.069)	(0.166)	(0.191)	(0.229)	(0.159)	(0.189)	(0.148)
$\Delta Tariff_m^{Child}$	11.058***	12.817***	9.763***	9.246**	15.422***	9.570***	9.814***	10.103***
	(3.740)	(2.392)	(3.697)	(3.537)	(3.513)	(2.698)	(3.065)	(3.762)
R-squared	0.87	0.82	0.88	0.88	0.89	0.89	0.90	0.89
Observations	411	411	411	411	411	396	409	411

‣ Robustness checks

Robustness Checks: Work

	Baseline (1)	No controls (2)	Longer pre-trends (3)	Income per capita (4)	Labor market (5)	Social programs (6)	Educ./Pub. spending (7)	Macro shocks (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	0.361***	0.171***	0.358***	0.377***	0.454***	0.360***	0.393***	0.266**
	(0.108)	(0.063)	(0.101)	(0.106)	(0.119)	(0.100)	(0.104)	(0.102)
$\Delta Tariff_m^{Child}$	−6.676***	−9.663***	−6.496***	−5.262**	−8.361***	−6.215***	−6.044***	−5.847***
	(2.182)	(3.010)	(2.122)	(2.304)	(1.967)	(1.845)	(2.176)	(2.091)
R-squared	0.59	0.48	0.59	0.63	0.61	0.59	0.61	0.62
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	0.691***	0.354***	0.686***	0.723***	0.670***	0.691***	0.697***	0.623***
	(0.100)	(0.071)	(0.091)	(0.108)	(0.118)	(0.095)	(0.100)	(0.106)
$\Delta Tariff_m^{Child}$	−8.822***	−11.808***	−8.512***	−7.956***	−11.398***	−8.282***	−8.287***	−7.994***
	(2.273)	(2.960)	(2.204)	(2.517)	(2.003)	(1.938)	(2.334)	(2.887)
R-squared	0.63	0.51	0.65	0.66	0.66	0.64	0.64	0.67
Observations	411	411	411	411	411	396	409	411

▸ Robustness checks

Robustness Checks: Idle

	Baseline (1)	No controls (2)	Longer pre-trends (3)	Income per capita (4)	Labor market (5)	Social programs (6)	Educ./Pub. spending (7)	Macro shocks (8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	−0.084	0.793***	−0.052	−0.091	−0.209	−0.119	−0.074	−0.097
	(0.129)	(0.102)	(0.118)	(0.122)	(0.141)	(0.115)	(0.132)	(0.114)
$\Delta Tariff_m^{Child}$	−1.141	−0.142	−1.084	−0.590	−2.116	−0.396	−0.343	−1.264
	(2.411)	(2.525)	(2.703)	(2.107)	(2.236)	(2.099)	(1.920)	(1.998)
R-squared	0.91	0.79	0.92	0.91	0.92	0.91	0.93	0.91
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	−0.069	0.990***	−0.029	−0.093	−0.202	−0.116	−0.046	−0.192
	(0.158)	(0.115)	(0.141)	(0.151)	(0.186)	(0.136)	(0.164)	(0.120)
$\Delta Tariff_m^{Child}$	−2.131	−1.009	−2.062	−1.081	−3.274	−1.088	−1.166	−2.450
	(2.550)	(2.888)	(2.845)	(2.253)	(2.295)	(2.110)	(1.195)	(2.612)
R-squared	0.92	0.81	0.93	0.92	0.93	0.92	0.93	0.92
Observations	411	411	411	411	411	396	409	411

▸ Robustness checks

Robustness Checks: Paid Work

	Baseline	No controls	Longer pre-trends	Income per capita	Labor market	Social programs	Educ./Pub. spending	Macro shocks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Medium-run (1991-2000)								
$\Delta Tariff_m^{Adult}$	0.391***	0.236***	0.313***	0.398***	0.475***	0.406***	0.427***	0.374***
	(0.082)	(0.048)	(0.066)	(0.081)	(0.097)	(0.079)	(0.081)	(0.073)
$\Delta Tariff_m^{Child}$	−7.369***	−10.537***	−5.072***	−6.336***	−8.036***	−6.951***	−6.859***	−6.812***
	(1.722)	(2.903)	(1.787)	(1.738)	(1.685)	(1.372)	(1.673)	(1.456)
R-squared	0.70	0.55	0.75	0.74	0.71	0.72	0.73	0.73
Panel B. Long-run (1991-2010)								
$\Delta Tariff_m^{Adult}$	0.495***	0.306***	0.401***	0.495***	0.720***	0.512***	0.551***	0.491***
	(0.092)	(0.057)	(0.080)	(0.093)	(0.108)	(0.090)	(0.087)	(0.084)
$\Delta Tariff_m^{Child}$	−10.213***	−14.220***	−7.455***	−8.844***	−9.875***	−9.755***	−9.529***	−9.321***
	(1.821)	(3.174)	(1.993)	(1.904)	(1.697)	(1.476)	(1.783)	(1.973)
R-squared	0.71	0.56	0.76	0.74	0.73	0.72	0.74	0.72
Observations	411	411	411	411	411	396	409	411

▸ Robustness checks

Robustness Checks: 1980 Composition

|	School only		Work		Idle		Paid work	
	1991-2000 (1)	1991-2010 (2)	1991-2000 (3)	1991-2010 (4)	1991-2000 (5)	1991-2010 (6)	1991-2000 (7)	1991-2010 (8)
Panel A. Overall tariff shock								
$\Delta Tariff_m$	−0.330***	−0.544***	0.351***	0.562***	−0.049	−0.062	0.372***	0.444***
	(0.125)	(0.136)	(0.076)	(0.075)	(0.085)	(0.104)	(0.059)	(0.068)
R-squared	0.81	0.87	0.58	0.62	0.91	0.92	0.69	0.68
Panel B. Adult-specific vs child-specific tariff shocks								
$\Delta Tariff_m^{Adult}$	−0.417***	−0.626***	0.385***	0.583***	−0.022	−0.027	0.411***	0.507***
	(0.129)	(0.138)	(0.081)	(0.081)	(0.089)	(0.110)	(0.063)	(0.070)
$\Delta Tariff_m^{Child}$	6.830***	6.207***	−3.319***	−1.675	−3.107*	−4.075**	−3.289***	−5.412***
	(1.782)	(1.756)	(1.235)	(1.572)	(1.687)	(1.859)	(0.879)	(0.974)
R-squared	0.81	0.87	0.59	0.62	0.91	0.92	0.71	0.72
Observations	411	411	411	411	411	411	411	411

▸ Robustness checks

Controlling for Industry Shares in the Long Run
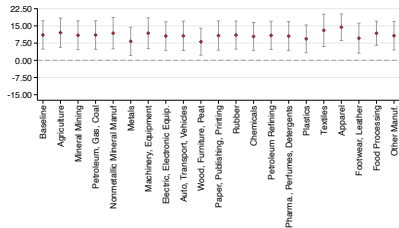

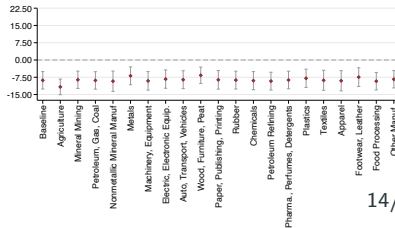(a) $\Delta Tariff_m^{Adult}$ (School Only)
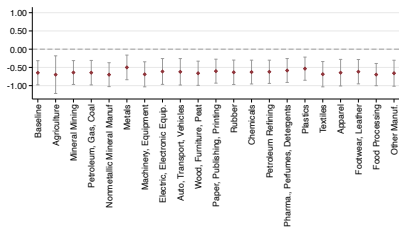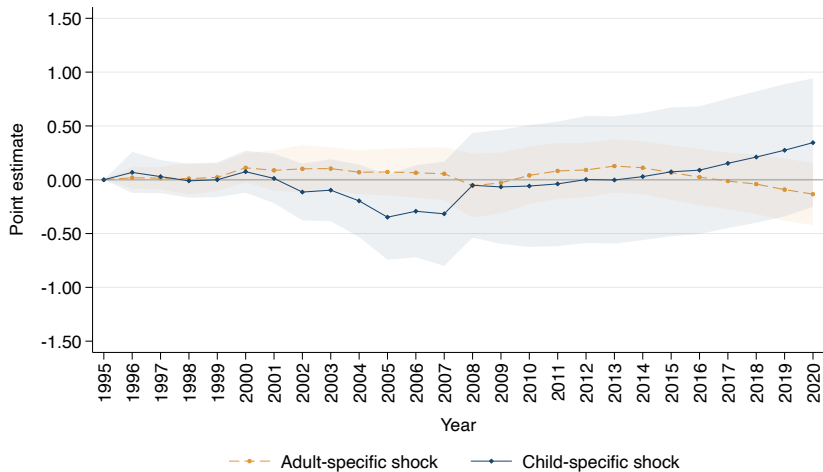
(b) $\Delta Tariff_m^{Adult}$ (Work)
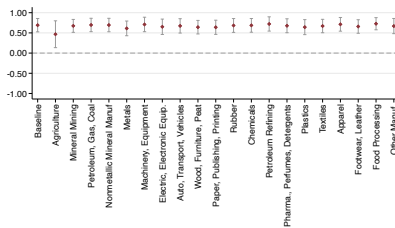
(c) $\Delta Tariff_m^{Child}$ (School Only)

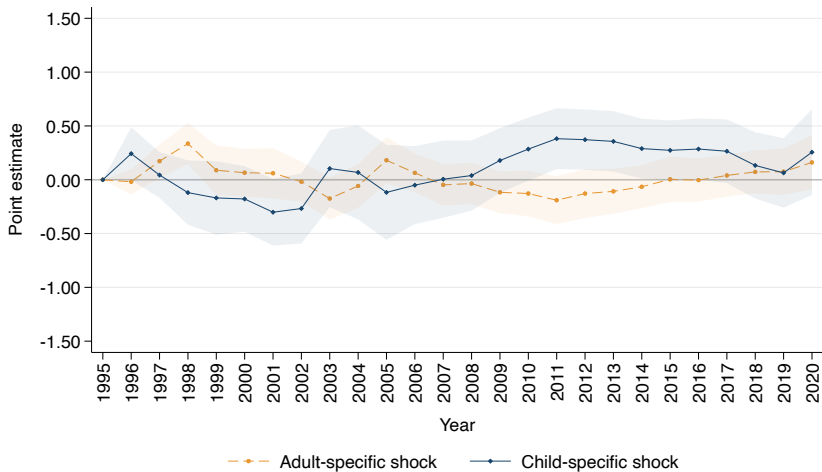(d) $\Delta Tariff_m^{Child}$ (Work)

# Age-Grade Distortion Rate


Enrollment

Approval Rate

Human Capital Accumulation

$$y_{cm}^{2010} = \sum_{\substack{j=1950 \\ j \neq 1973}}^{1992} \beta_j^{Adult}(\mathbb{1}\{c=j\} \times \Delta Tariff_m^{Adult}) + \sum_{\substack{j=1950 \\ j \neq 1973}}^{1992} \beta_j^{Child}(\mathbb{1}\{c=j\} \times \Delta Tariff_m^{Child})$$

$$+ \sum_{\substack{j=1950 \\ j \neq 1973}}^{1992} \gamma_c(\mathbb{1}\{c=j\} \times W_m) + \sum_{\substack{j=1950 \\ j \neq 1973}}^{1992} \theta_c(\mathbb{1}\{c=j\} \times \tilde{y}_{cm}^{1991}) + \lambda_m + \mu_c + \delta_{cs} + \epsilon_{cm}$$

- y_{cm}^{2010} is the human capital stock of cohort c in microregion m in 2010
- microregion fixed effects (λ_m), cohort fixed effect (μ_c), and cohort-state fixed effects (δ_{cs})
- interaction between cohort fixed effects and baseline microregion-specific characteristics (W)
- lag of the dependent variable ($\tilde{y}_{cm}^{1991}$), defined as stock of human capital of the cohort which, in 1991, was the same age as cohort c in 2010

▸ Human capital

High School
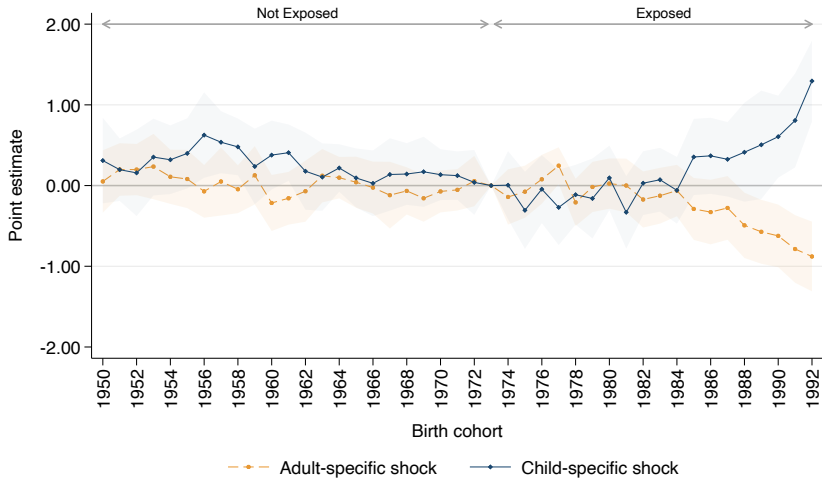
Some College
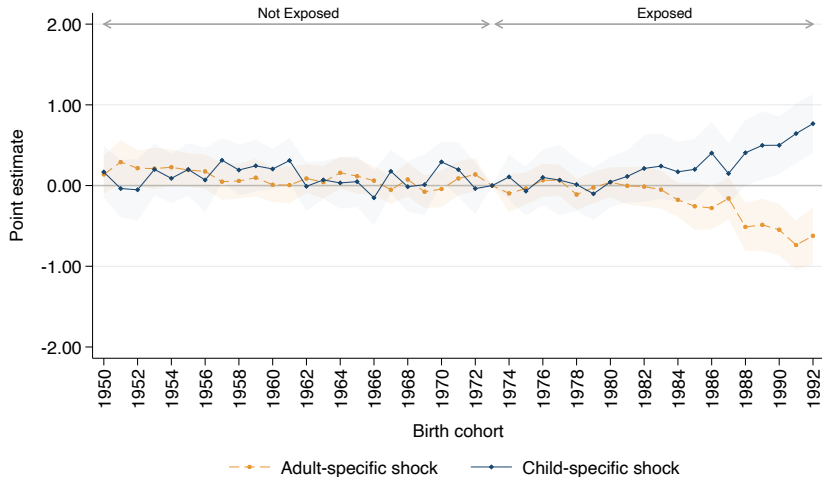
Structural Transformation

| | Formal Emp. (1) | Log Earnings (2) | Conditional on work | | |
			Agro./mining (3)	Manuf. (4)	Non-tradable (5)
Panel A. Medium-run (1991-2000)					
$\Delta Tariff_m^{Adult}$	-1.081^{***}	-0.290	0.426^{***}	-0.597^{***}	0.237^{**}
	(0.165)	(0.248)	(0.117)	(0.070)	(0.115)
$\Delta Tariff_m^{Child}$	11.754^{***}	5.964	-1.718	5.327^{**}	-6.186^{**}
	(2.005)	(3.840)	(2.266)	(2.077)	(2.426)
R-squared	0.67	0.72	0.52	0.60	0.28
Mean dep. var.	-0.019	0.006	-0.087	0.037	0.043
Panel B. Long-run (1991-2010)					
$\Delta Tariff_m^{Adult}$	-1.505^{***}	-0.833^{**}	1.063^{***}	-0.972^{***}	-0.016
	(0.216)	(0.319)	(0.173)	(0.097)	(0.160)
$\Delta Tariff_m^{Child}$	15.054^{***}	12.578^{**}	-2.908	6.864^{**}	-7.486^{**}
	(2.377)	(5.483)	(3.575)	(2.694)	(3.509)
R-squared	0.68	0.79	0.62	0.62	0.49
Observations	411	411	411	411	411
Mean dep. var.	0.086	0.810	-0.223	0.066	0.070

Log Formal Earnings