

# Globalization and Factor Income Taxation

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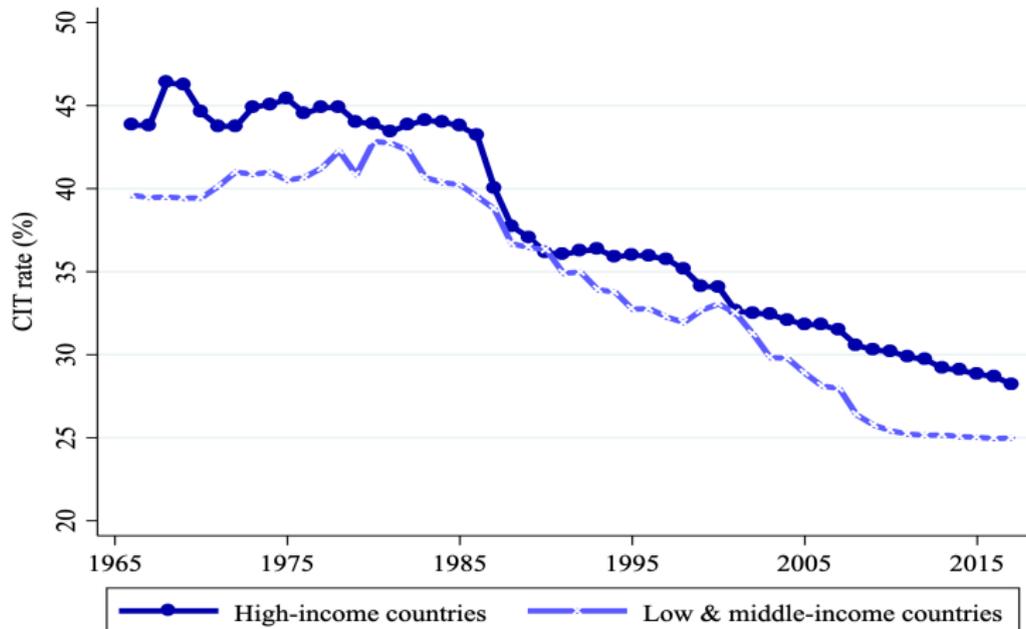
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World Bank ABCDE conference – June 2022

## Globalization & the Taxation of Capital vs Labor

- Has cross-border integration eroded the ability to tax capital and shifted the burden onto workers?

# Trends in Statutory Corporate Income Tax Rates



Plot of year fixed effects from unweighted OLS regression of CIT rate on country and year f.e. The inclusion of country f.e. eliminates the influence of changing sample composition. f.e. are normalized to equal the CIT rate level in 1965.

# Globalization & the Taxation of Capital vs Labor

- Has cross-border integration eroded the ability to tax capital and shifted the burden onto workers?
- Lack of global & homogeneous series on **effective taxation** of capital and labor:
  - Limited evidence for non-OECD countries
  - Limited credible evidence on mechanisms via which globalization might impact taxation of factor incomes

# This Paper

1. Constructs a new global dataset of macroeconomic effective tax rates on capital ( $ETR_K$ ) and labor ( $ETR_L$ )
  - Covering  $> 150$  countries and  $> 50$  years (1965-2018)
2. Establishes new stylized facts:
  - Global trends: effective taxation of capital & labor converged
  - Development trends:  $ETR_K$  fell in high-income countries but rose in developing countries since 1990s
3. Studies role of trade globalization:
  - trade integration  $\uparrow ETR_L$  everywhere
  - $\uparrow ETR_K$  **in developing countries but not in OECD**
  - **Tax capacity channel:** trade broadens enforceable capital tax base by  $\uparrow$  its visibility  $\Rightarrow$  effect dominates race-to-bottom in LMICs

## Methodology: construction of effective tax rates

Effective tax rate on factor  $f$  ( $=L,K$ ),  $ETR_f$ , relates total tax revenue ( $T_f$ ) raised from each factor, to its national income share ( $Y_f$ ):

$$ETR_f = \frac{T_f}{Y_f} = \frac{T_f}{\theta_f Y}$$

- $T_K$  = CIT, wealth and property taxes,  $\alpha$ \*PIT,
- $Y_K$  = corporate profits, rental income, mixed income from capital
- $T_L$  = payroll taxes,  $(1 - \alpha)$ \*PIT
- $Y_L$  = employee compensation and mixed income from labor

Note: Indirect taxes excluded (assumed proportional)

$ETR_f$  captures the macro-economic effective taxation of factors, based on realized tax revenues ('backward-looking'). [▶ details](#) [▶ allocation](#)

# Database construction

We build two new databases, which allows us to measure ETRs for >150 countries since 1965 (or independence / post-conflict)

## Harmonized national accounts database:

- Compiled from UN SNA 2008 & UN SNA 1968 archives  $\Rightarrow$  increase in coverage over time & space compared to Karabarbounis and Neiman 2014
- Known difficulties to measure labor share of mixed income: adjust with latest method using X's of self-employed (Gollin 2002, ILO 2019).
- Complete and balance panel using imputations à la Blanchet-Chancel (2016)

## Harmonized tax revenue database:

- Compiled from OECD, ICTD + archival records
- Separates PIT from CIT, includes social security & decentralized revenue
- Website with full dataset (<http://globaltaxation.world>) & working on country case-studies

# Tax revenue data: Historical archives (40% of obs)

Table 6.4.—CONSOLIDATED RECEIPTS OF THE BUREAU OF INTERNAL REVENUE AND THE BUREAU OF CUSTOMS: 1955 TO 1962

(In thousand pesos)

Period	Total <sup>1/</sup>	Import duties <sup>2/</sup>	Excise tax	Business taxes	Income tax and profits tax	Other taxes <sup>3/</sup>	Amount appropriated to local government	Other receipts <sup>4/</sup>
1955 .....	738,365	164,208	257,805	160,452	163,169	33,716	(69,206)	26,022
1959 .....	827,229	204,468	260,823	179,713	124,309	40,241	(67,282)	23,907
1960 .....	964,268	237,306	275,075	221,925	265,697	39,150	(95,806)	26,511
1961 .....	1,066,970	283,364	286,876	279,707	277,908	35,526	(119,687)	26,581
1962 .....	1,313,426	329,558	312,213	324,719	344,619	53,662	(126,713)	31,011
1963 .....	1,661,113	396,661	354,677	391,861	397,429	62,880	(129,925)	36,477
1964 .....	1,603,186	409,336	362,880	459,813	448,202	60,883	(21,118)	77,411
1965 .....	1,556,175	397,958	334,739	436,263	495,190	70,573	(227,611)	131,966
1966 .....	1,776,688	410,374	384,348	518,815	482,829	79,360	(200,714)	141,696
1967 .....	2,061,113	509,799	421,663	625,862	611,765	87,637	(303,495)	238,616
1968 .....	2,396,899	605,529	467,588	686,753	782,781	96,525	(376,722)	316,117

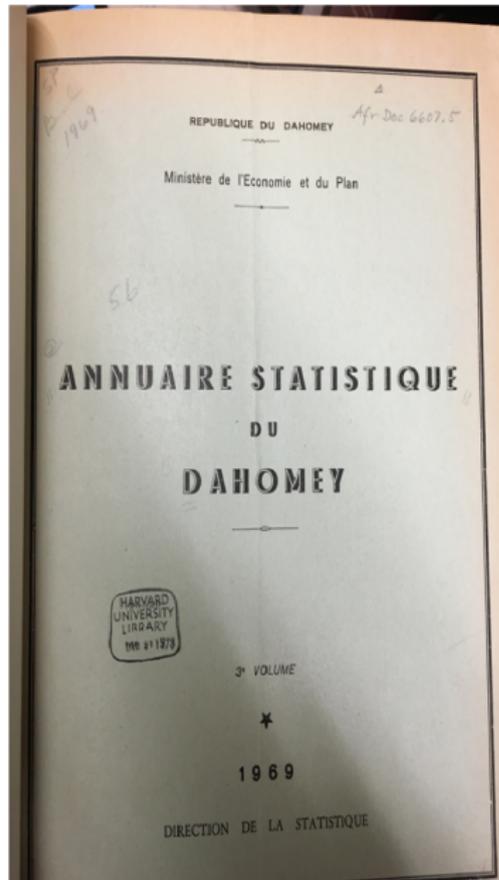
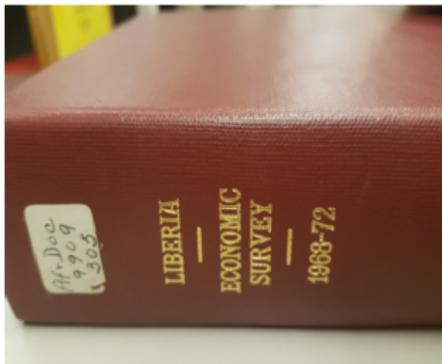
<sup>1/</sup> Includes refund of prior year's income.

<sup>2/</sup> Includes fines and forfeitures.

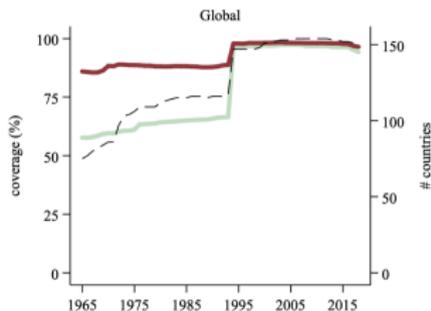
<sup>3/</sup> Consist of franchise tax; documentary stamp tax; tonnage dues; residence tax; estate, inheritance and gift taxes; revenue from public forest; up to December 31, 1963, of tonnage dues.

<sup>4/</sup> Consist of incidental revenue and other credits, receipts automatically appropriated and receipts of the special fund, other than loans; and starting from January 1, 1964, of tonnage dues.

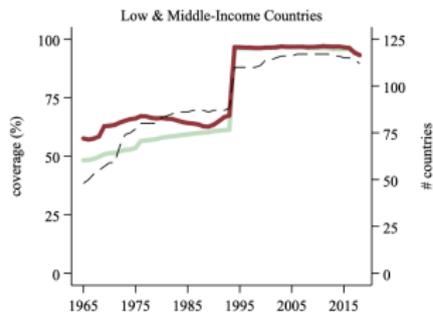
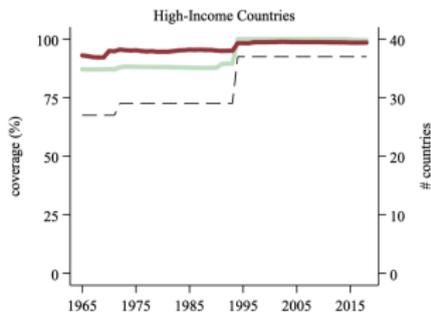
Source: Central Bank of the Philippines; *Statistical Bulletin*, December 1968, Vol. II, No. 4.



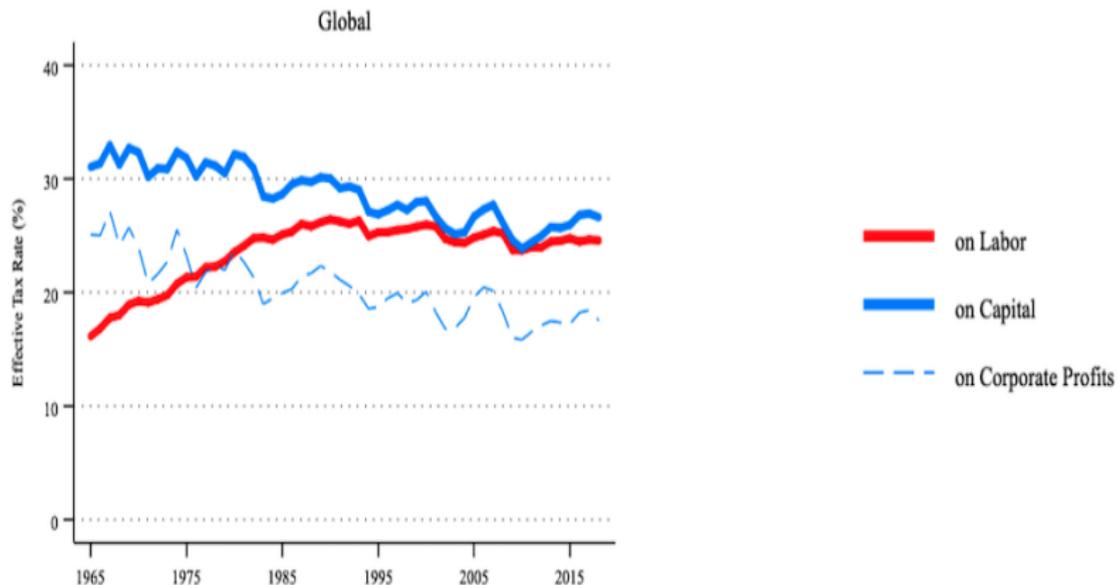
# Data Coverage of Effective Tax Rates



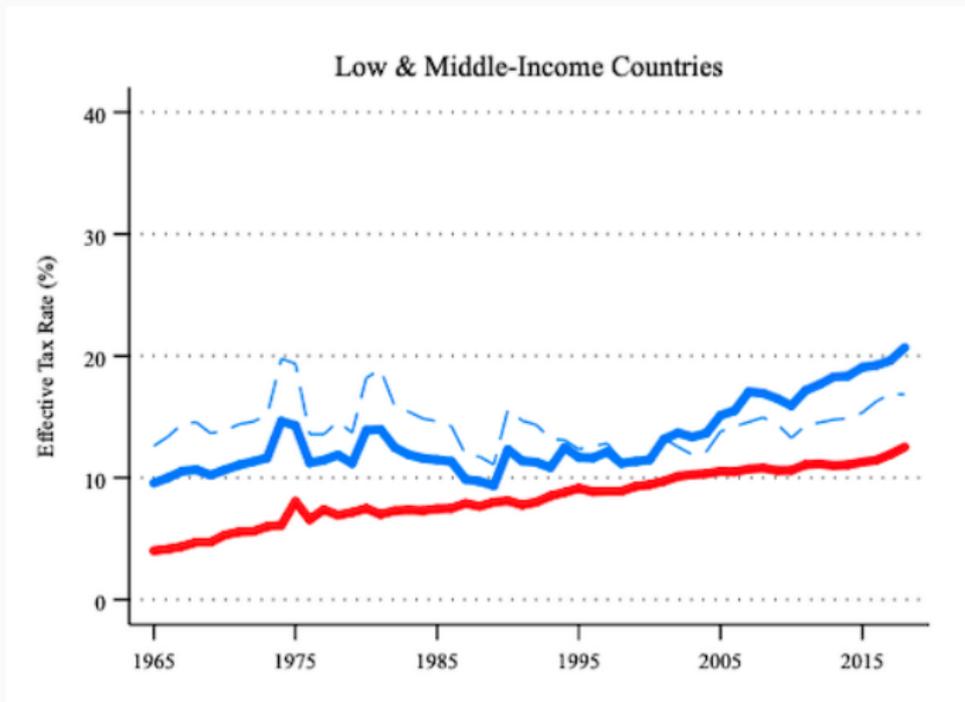
Population (% of total)  
GDP (% of total)  
# countries



# Global trends in ETRs, 1965 - 2018



# Global trends in ETRs, 1965 - 2018 (LMICs)

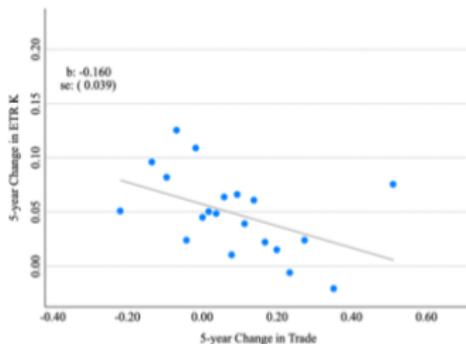


# Role of trade openness in determining trends

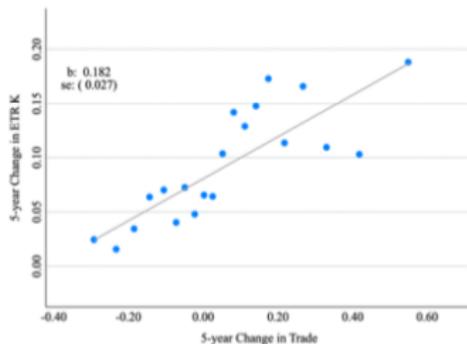
- In high-income countries, changes in factor taxation are consistent with cross-border mobility
  - Trade integration limits the taxation of the mobile factor
- In developing countries, trends are starkly different, &  $ETR_K$  rises simultaneous to 1990s “hyper-globalization”:
  - Motivates the analysis of trade openness on factor taxation
- Implement three distinct empirical strategies:
  - (1) Times series correlations
  - (2) Event-studies centered around trade liberalization reforms
  - (3) Instruments for trade following Egger, Nigai, and Strecker 2019
  - + study of capital liberalization events

# Panel OLS: Heterogeneity by development level

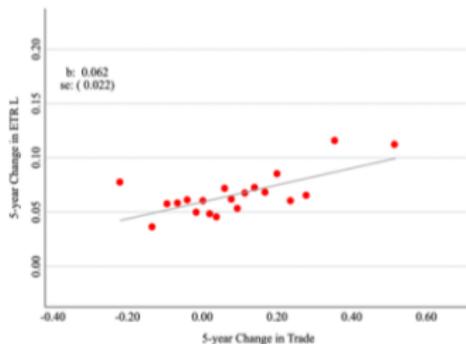
(a) ETR K: High-Income



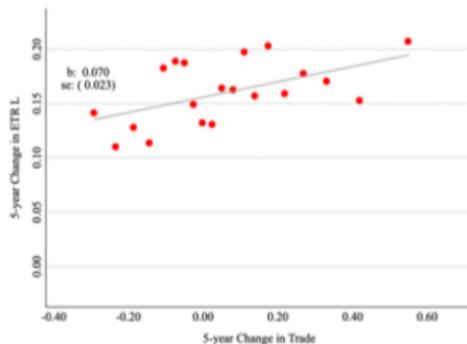
(b) ETR K: Low & Middle-Income



(c) ETR L: High-Income



(d) ETR L: Low & Middle-Income



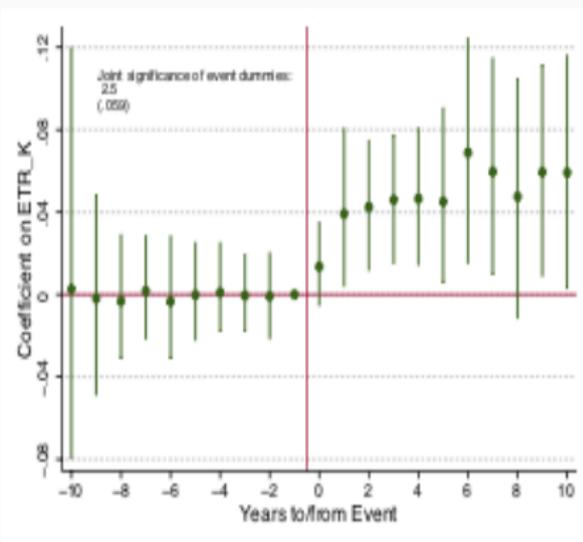
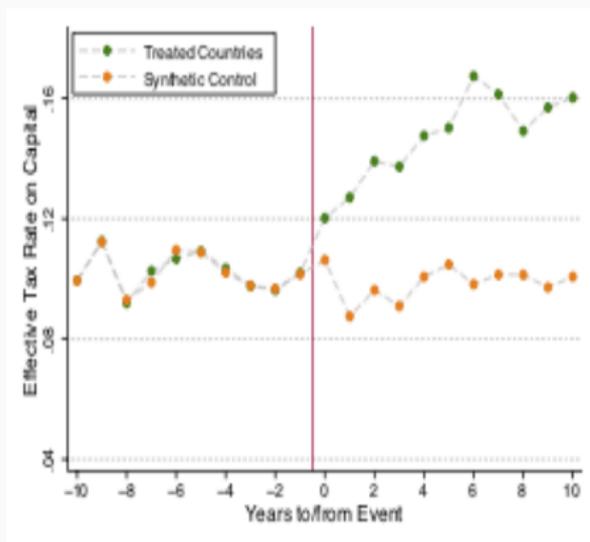
## Event studies around large tariff cuts

- Focus on large trade liberalization events in key dev. countries
- Choice of events based on Goldberg and Pavcnik (2006, 2016) + China's WTO accession (Brandt et al., 2017).
  - Colombia 1985; Mexico 1985; Brazil 1988; Argentina 1989; India 1991; Vietnam 2001; China 2001
  - Characterized by large reductions in tariff rates:
    - Brazil 59% to 15%; India 80% to 39%; China 48% to 20%
- Construct synthetic control country for each country-event and each outcome (Abadie et al., 2010)
  - Estimate dynamic regression model

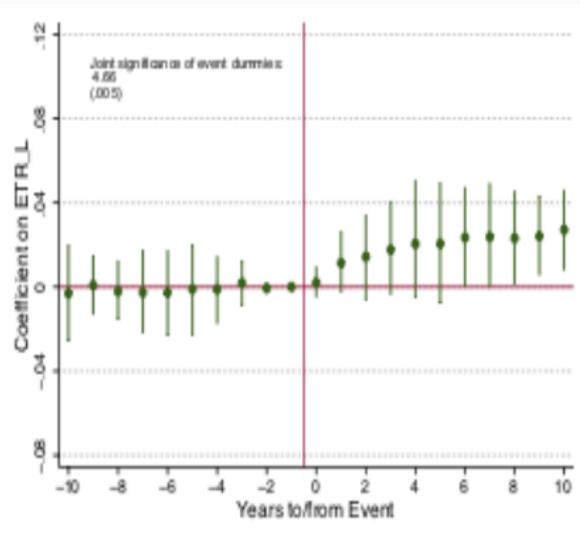
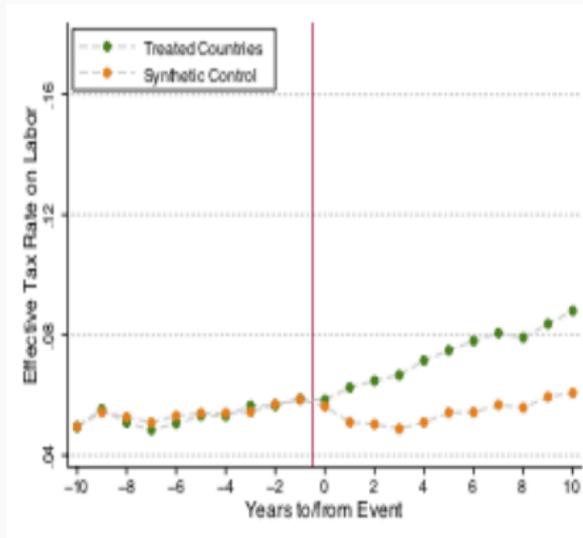
$$Y_{it} = \sum_{j=-10, j \neq -1}^{10} \mu_j * \mathbb{1}(j = t)_t * D_i + \theta_t + \kappa_i + \pi_{Year(it)} + \epsilon_{it}$$

- Robustness: match on all outcomes simultaneously

# Event study: impact on effective tax rate on capital



# Event study: impact on effective tax rate on labor



### 3<sup>rd</sup> research design: Instrumenting for trade

- Event-studies in specific developing countries, & magnitude of impacts not solely trade related (events don't occur in vacuum)
  - Motivates more general estimation
- We estimate versions of the regression model

$$y_{ct} = \mu * trade_{ct} + \Theta * X_{ct} + \beta_c + \pi_t + \epsilon_{ct}$$

- Use the 2 instruments from Egger, Nigai, and Strecker 2019
  1. Instrument I: Quantitative trade model; uses variation in average bilateral trade frictions between country-pairs
  2. Instrument II: Time-series variation in global oil prices interacted with country-specific geographical features

▶ Instrument I: Details

▶ Instrument II: Details

▶ Relevance of instruments

## IV: Trade Impacts on Factor Share and Factor Taxation

	Capital Share		Effective Tax Rate		
	overall	corp. sector	labor	capital	corp. profit
Panel A: OLS					
Trade	0.0195* (0.0109)	0.0217 (0.0148)	0.0246** (0.0101)	0.0168 (0.0302)	0.0120 (0.0220)
Panel B: IV estimate (NDP-weighted)					
Trade	0.151** (0.0698)	0.184** (0.0800)	0.163*** (0.0538)	0.375* (0.213)	0.342*** (0.121)
First-stage F-statistic	26.07	26.07	26.07	26.07	26.07
Panel C: IV estimate (unweighted)					
Trade	0.118* (0.0681)	0.122 (0.0826)	0.133** (0.0526)	0.250** (0.105)	0.359*** (0.0870)
First-stage F-statistic	8.42	8.42	8.42	8.42	8.42
Panel D: IV estimate (NDP-weighted, with controls)					
Trade	0.115** (0.0475)	0.142** (0.0546)	0.226*** (0.0551)	0.400*** (0.112)	0.205* (0.129)
First-stage F-statistic	19.02	19.02	19.02	19.02	19.02
<i>N</i>	4518	4518	4518	4518	4518

## IV Results and mechanisms

- An increase in trade openness causes both the capital share of national income and  $ETR_K$  to increase
  - Positive but less pronounced effect on  $ETR_L$
  - Consistent with findings from first two research designs
  - Results are robust to a battery of checks
- Mechanisms: stylized setting to fix ideas:

$$ETR_f = \frac{T_f}{Y_f} = \frac{\tau_f * Y_f^{Enforce}}{Y_f} = \tau_f * \theta_f^{Enforce}$$

- **Efficiency hypothesis**  $\tau_f$ : Cross-border integration makes capital relatively more mobile than labor
  - To prevent its flight, government limits  $\tau_K$  (race-to-the-bottom)
  - To balance the budget, government increases  $\tau_L$

## Mechanism: Tax Capacity Hypothesis ( $\theta_f^{Enforce}$ )

**Tax capacity hypothesis**  $\theta_f^{Enforce}$ : Openness changes firms and labor market structures thus relaxing enforcement constraints

- Trade induces adoption of modern accounting practices, extends value chains,  $\uparrow$  firm size  $\Rightarrow$  makes the tax base enforceable

Motivated by two distinct strands of research:

- PF/Development lit. shows that enforcement is only successful in larger firms with complex operations & many employees
- Trade lit. finds that openness can cause a rise in firm size within the formal sector (but debates on overall worker informality).

## IV: Mechanisms

	OLS	IV		
	(1)	Weighted (2)	Unweighted (3)	Controls (4)
CIT rate	-0.002 (0.003)	-0.064*** (0.017)	-0.051* (0.028)	-0.061*** (0.017)
Self-employment	-0.0117 (0.0145)	-0.220* (0.126)	-0.185*** (0.0460)	-0.174*** (0.0560)
Corporate profits	0.0339*** (0.0128)	0.175** (0.0767)	0.124*** (0.0321)	0.206*** (0.0726)
Employee compensation	0.00848 (0.0175)	-0.0749 (0.0904)	-0.0964 (0.0669)	0.0485 (0.0785)
Mixed income	-0.0231 (0.0182)	-0.0685 (0.105)	-0.0391 (0.0301)	-0.202** (0.0816)

## IV: Mechanisms

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Mixed income	-0.0231 (0.0182)	-0.0685 (0.105)	-0.0391 (0.0301)	-0.202** (0.0816)

## IV: Heterogeneity by Development Level

	$ETR_K$ (1)	$ETR_L$ (2)	CIT-rate (3)	K-share (4)	SE-share (5)	Corp-Share (6)
Trade	0.444** (0.181)	0.145 (0.093)	-0.043* (0.024)	0.182** (0.077)	-0.252** (0.107)	0.219*** (0.063)
Trade*1(H-Inc)	-0.441 (0.347)	0.120 (0.194)	-0.032 (0.047)	-0.219 (0.137)	0.232 (0.209)	-0.298 (0.143)
Trade in H-Inc Implied coefficient	0.003 (0.231)	0.265** (0.122)	-0.075*** (0.457)	-0.036 (0.083)	-0.021 (0.151)	-0.079 (0.102)
<i>N (country-years)</i>	<i>4518</i>	<i>4518</i>	<i>3810</i>	<i>4518</i>	<i>4518</i>	<i>4518</i>

## Conclusion: Nuanced Impacts of Globalization

New global database documents long-run trends in factor taxation

- Globally convergence of  $ETR_K$  and  $ETR_L$
- Heterogeneity in capital taxation in rich vs LMICs

Study effects of trade globalization on ETRs:

- Both  $ETR_K$  and  $ETR_L$   $\uparrow$
- Race-to-the bottom in statutory tax rates
- We highlight new channel: expansion of base via tax capacity effect, which empirically dominates in dev. countries

Globalization thus has nuanced effects on taxation of capital & labor

- $\uparrow$  K-shares  $\Rightarrow$  more unequal market income distribution?
- In developed countries, burden borne by labor taxes
- But in developing countries trade openness has not led to the erosion of capital taxation

# Appendix

## Methodology: ETR Formulas

$$Y = Y_L + Y_K = CE + OS_{PUE} + OS_{HH} + OS_{CORP} \quad (1)$$

$$T_f = \sum [\lambda_{if} \cdot \tau_i] \quad (2)$$

$$ETR_f = \frac{T_f}{Y_f} \quad (3)$$

where:

- $Y_L = CE + \alpha OS_{PUE}$
- $Y_K = (1 - \alpha) OS_{PUE} + OS_{HH} + OS_{CORP}$
- $T_f$  = factor tax revenue from taxes  $\tau_i$  with factor incidence  $\lambda_{if}$
- $ETR_f$  is the effective tax rate on each factor

# Methodology: Tax Allocation

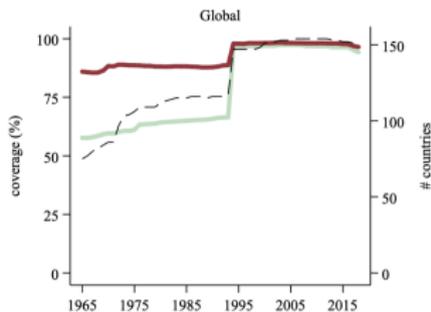
## Allocation of Taxes to Factor Incomes, by Type of Tax

Type of tax, $\tau$	Series	Allocation to $L$ , $\lambda_{\tau}$	Notes
<i>Panel A: Direct Taxes</i>			
Personal income tax (PIT)	1100	$\lambda_{i,t}^{PIT} = f(p, \alpha)$	most PIT attributed to $L$
Corporate income tax (CIT)	1200	0%	all CIT attributed to $K$
Other (unallocable) income tax	1300	50% PIT	rare; small magnitude
Social security & payroll taxes	2000	100%	all payroll taxes attributed to $L$
Property & wealth taxes	4000	0%	all asset taxes attributed to $K$
<i>Panel B: Indirect Taxes &amp; Other Revenues</i>			
Indirect taxes	5000	—	assumed proportional to $\theta_L$
Other taxes	6000	—	minor; assumed proportional
Non-tax revenues	7000	—	excluded

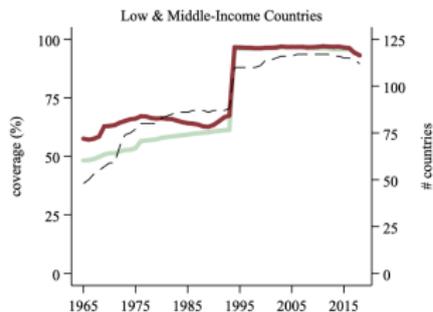
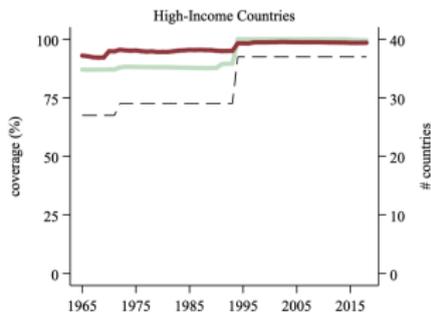
## Principal Data Sources

	country-year obs.	%
Panel A: Factor Share Data		
SNA2008	2403	34.8%
SNA1968	1484	21.5%
composite/imputed	3016	43.7%
<i>N</i>	<i>6903</i>	<i>100%</i>
Panel B: Tax Revenue Data		
OECD	2881	41.7%
Harvard/archives	2092	30.3%
ICTD	1276	18.5%
IMF historical	654	9.5%
<i>N</i>	<i>6903</i>	<i>100%</i>

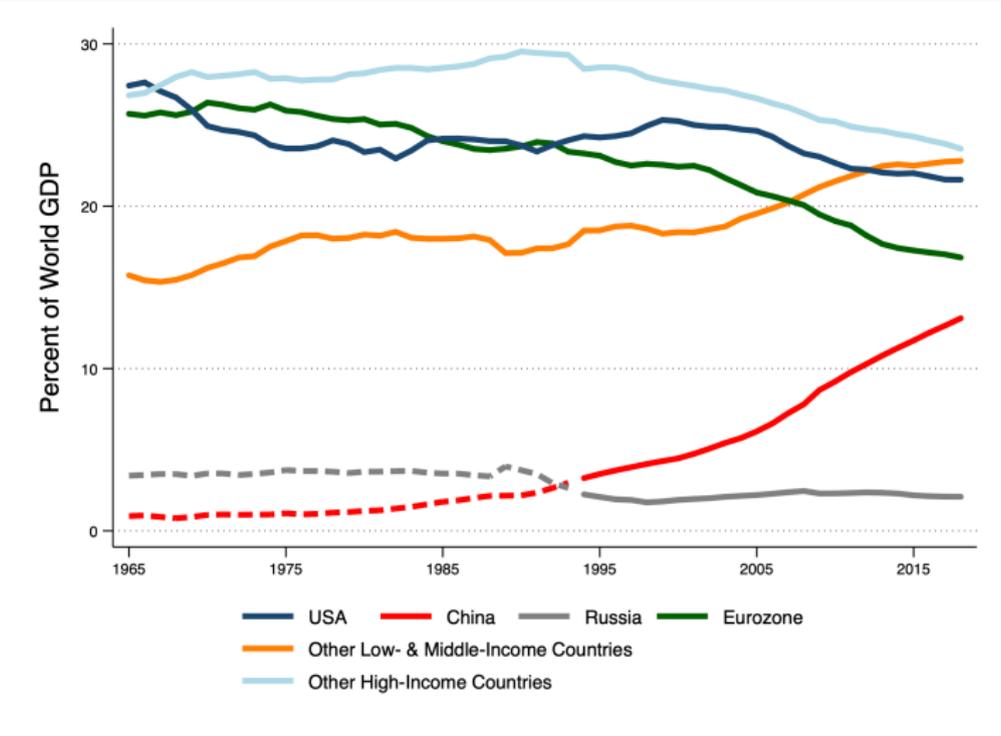
# Data Coverage: Effective Tax Rates



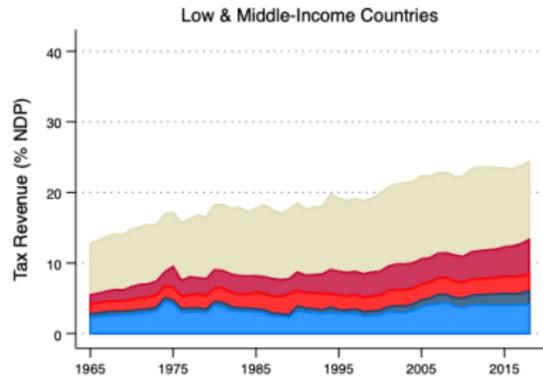
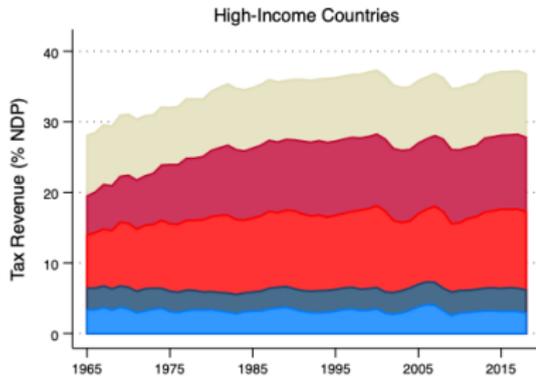
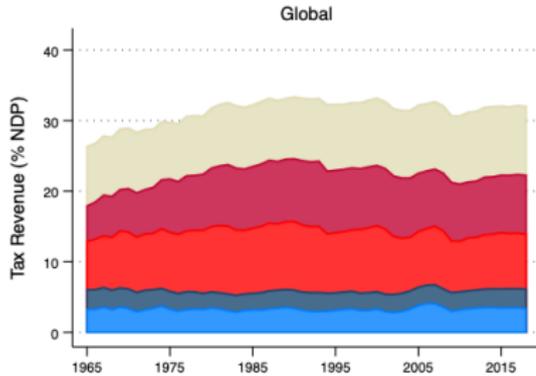
Population (% of total)  
GDP (% of total)  
# countries



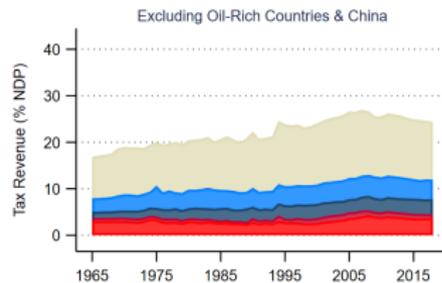
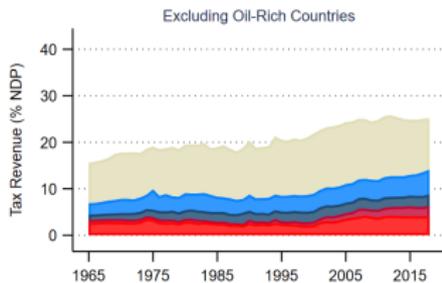
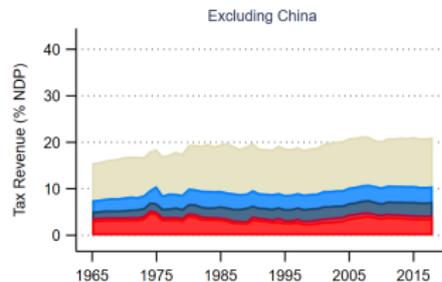
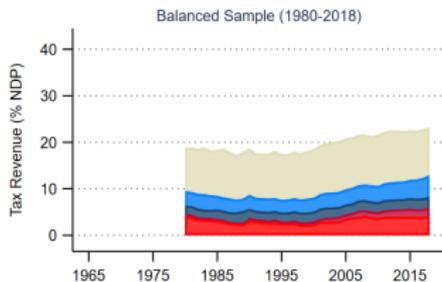
# Share of Global GDP, by Country



# Global Trends in Tax Revenues, 1965 - 2018

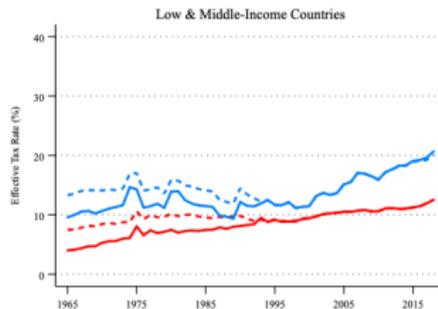
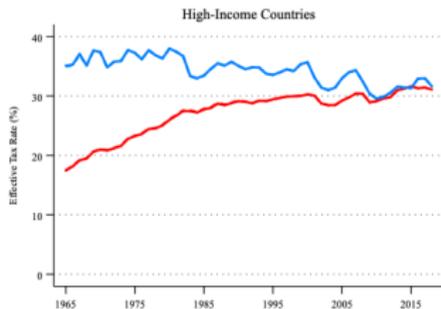
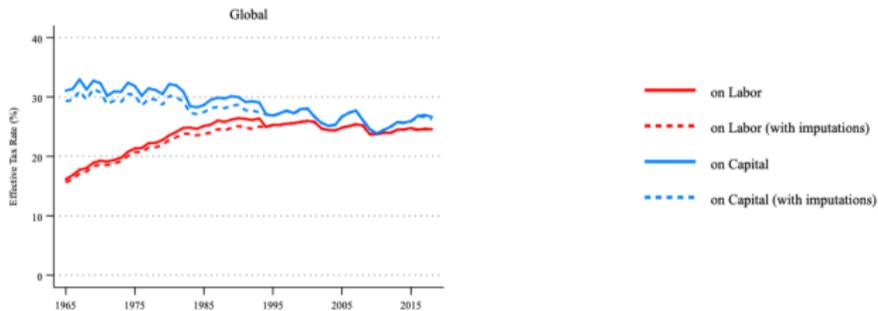


# Robustness: Tax Revenues in Developing Countries

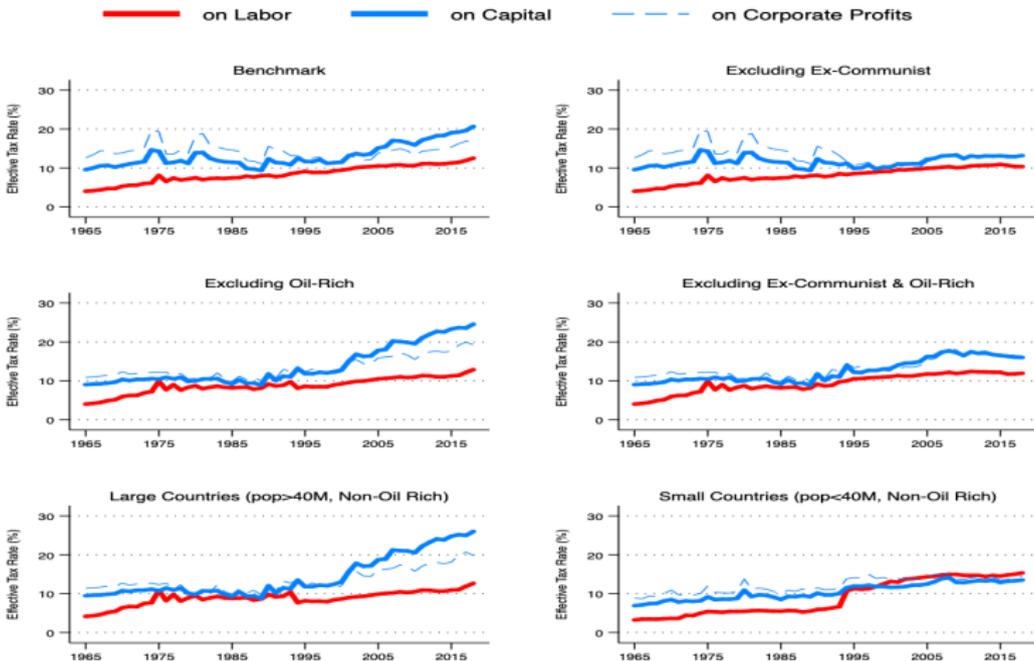


Indirect Tax    Payroll Tax    Personal Income Tax    Property Tax    Corporate Income Tax

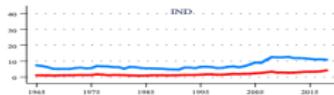
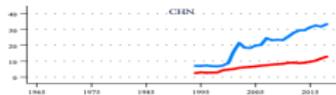
# Fully Balanced Panel via Imputations



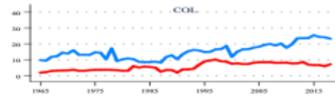
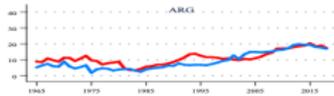
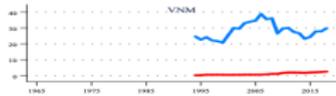
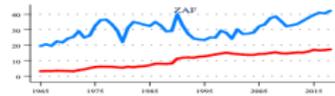
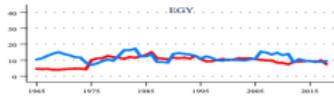
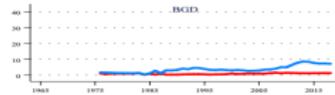
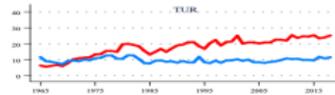
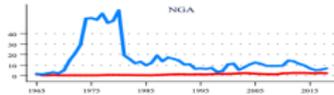
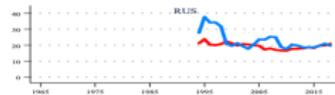
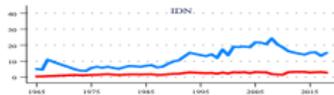
# Robustness: $ETR_K$ and $ETR_L$ in Developing Countries



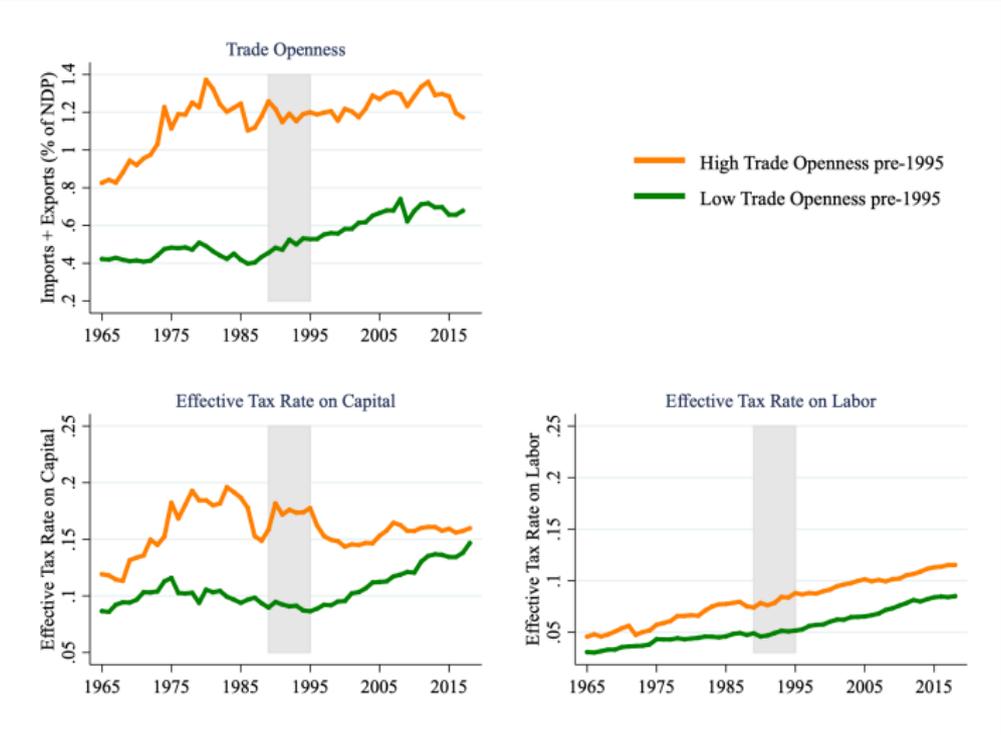
# Time-series in Largest Developing Countries



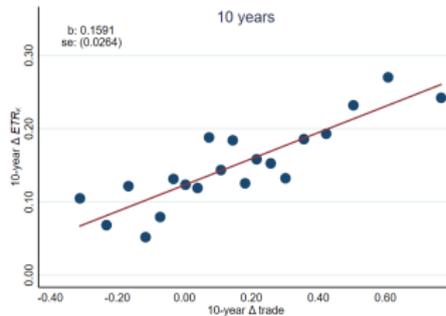
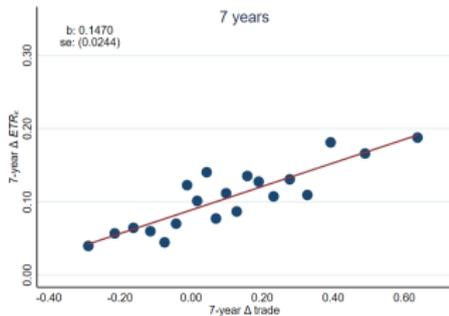
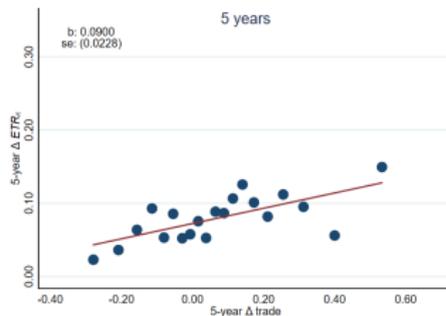
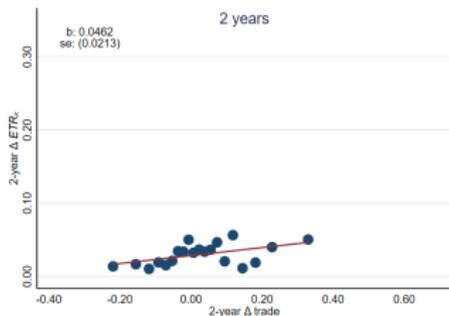
Effective Tax Rate  
on Labor  
on Capital



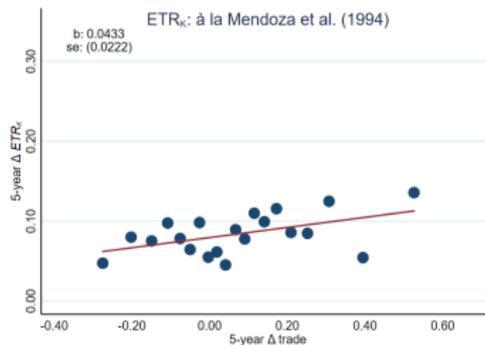
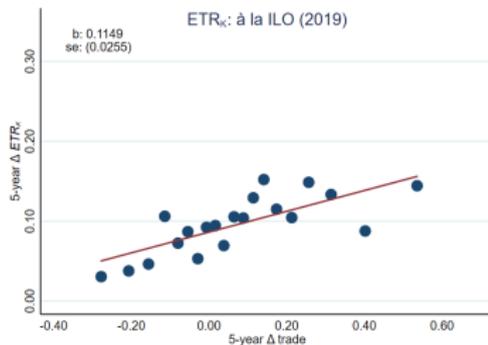
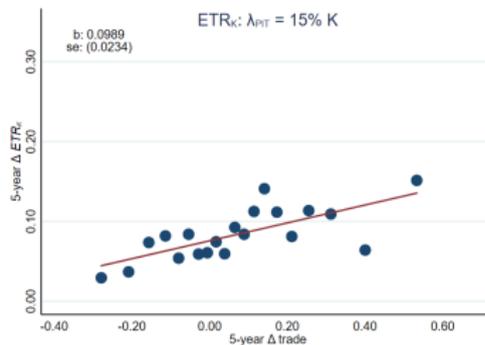
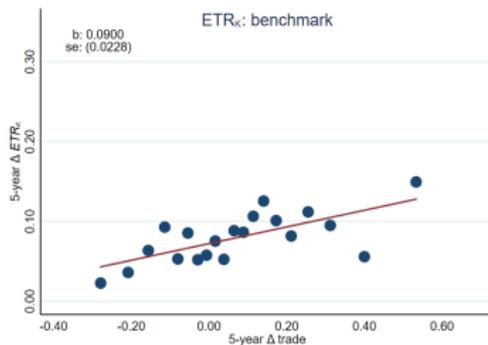
# Trends in factor taxes by initial trade openness (Dev. countries)



# OLS (binscatter): Robustness to Alternative Time Horizons



# OLS (binscatter): Robustness to Alternative Measurements



## Details about instrument I

- Instrument relies on model structure of quantitative general equilibrium models of trade

$$\pi_{ijt} = e_{jt} \times \iota_{it} \times \beta_{ijt}$$

- Under gravity model assumptions, the instrument uses average bilateral trade frictions between I-X pairs as source of variation

$$Z_{it}^{gravity} = \sum [\beta_{ijt} \cdot \beta_{jit}]$$

- *Exogeneity condition*: Trade costs distribution (not level) among I-X pairs is orthogonal to factor shares and factor taxation

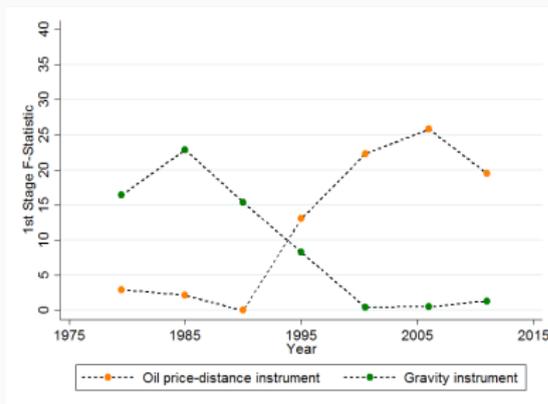
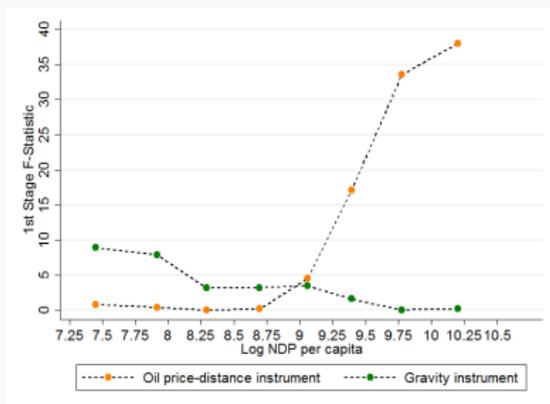
## Details about instrument II

- Exploit time-series variation in global oil prices interacted with country-specific measure of access to intl markets
- Construct access as variance of distance from three most populous cities to closest maritime port

$$Z_{it}^{pricedist} = \frac{1}{2} \sum_{k=1}^3 [(p_t d_i^k - p_t \bar{d}_i)^2]$$

- *Exogeneity condition*: Country-specific trade costs induced by global oil prices are orthogonal to factor shares and taxation
  - Robustness: Allow oil-rich countries to be on independent time-path

# Two Instruments: Strength Across Subsamples



## IV Results: Robustness to Alternative Trade Measurements

	Capital Share		Effective Tax Rate	
	overall	corp. sector	on capital	on labor
Trade in G&S (%NDP)	0.154** (0.0707)	0.192** (0.0817)	0.516** (0.208)	0.189*** (0.0568)
First-stage F-statistic	32.30	32.30	32.30	32.30
Trade in G&S (%NDP), winsorized	0.148** (0.0671)	0.185** (0.0774)	0.513** (0.203)	0.195*** (0.0537)
First-stage F-statistic	37.60	37.60	37.60	37.60
Trade in G&S (log levels)	0.0359*** (0.0117)	0.0436*** (0.0149)	0.0724* (0.0390)	0.00714 (0.0171)
First-stage F-statistic	8.562	8.562	8.562	8.562
Trade in Goods Only (%NDP)	0.205** (0.0980)	0.253** (0.113)	0.604** (0.270)	0.188** (0.0887)
First-stage F-statistic	30.05	30.05	30.05	30.05
<i>N</i>	4505	4505	4505	4505

## IV Results: Robustness to Alternative Weights

	Capital Share		Effective Tax Rate	
	overall	corp. sector	on capital	on labor
IV: with NDP weights	0.154** (0.0707)	0.192** (0.0817)	0.516** (0.208)	0.189*** (0.0568)
First-stage F-statistic	32.30	32.30	32.30	32.30
IV: with population weights	0.241** (0.116)	0.253* (0.136)	0.618** (0.287)	0.161* (0.0857)
First-stage F-statistic	11.13	11.13	11.13	11.13
IV: unweighted	0.116* (0.0638)	0.121 (0.0781)	0.278** (0.108)	0.138** (0.0536)
First-stage F-statistic	9.007	9.007	9.007	9.007
<i>N</i>	4505	4505	4505	4505

[◀ back](#)[▶ trade](#)[▶ controls](#)[▶  \$\theta\_K\$  à la ILO](#)[▶ ETR](#)

## IV: Robustness to Controls & Oil-Rich\*Time Fixed Effects

	Capital Share		Effective Tax Rate	
	overall	corp. sector	on capital	on labor
IV: without controls	0.154** (0.0707)	0.192** (0.0817)	0.516** (0.208)	0.189*** (0.0568)
First-stage F-statistic	32.30	32.30	32.30	32.30
IV: with controls	0.117*** (0.0418)	0.150*** (0.0488)	0.546*** (0.126)	0.250*** (0.0554)
First-stage F-statistic	21.78	21.78	21.78	21.78
IV: with oil-rich time FE	0.396* (0.213)	0.460* (0.245)	0.893* (0.503)	0.311** (0.153)
First-stage F-statistic	3.182	3.182	3.182	3.182
IV: with controls & oil-rich time FE	0.270** (0.121)	0.294** (0.131)	0.805*** (0.304)	0.429** (0.164)
First-stage F-statistic	3.830	3.830	3.830	3.830
<i>N</i>	4505	4505	4505	4505

## IV Results: Robustness to Estimating $\theta_K$ à la ILO (2019)

	Capital Share	Effective Tax Rate	
	overall	on capital	on labor
OLS	-0.00786 (0.0207)	0.00388 (0.0336)	0.0212** (0.0105)
IV: benchmark specification	0.214 (0.132)	0.314** (0.131)	0.232*** (0.0738)
First-stage F-statistic	32.30	32.30	32.30
IV: with controls	0.221** (0.110)	0.317*** (0.106)	0.300*** (0.0638)
First-stage F-statistic	21.78	21.78	21.78
IV: unweighted	-0.115 (0.117)	0.262** (0.131)	0.0910 (0.0606)
First-stage F-statistic	9.007	9.007	9.007
<i>N</i>	4505	4505	4505

## IV Results: Robustness to Alternative ETR Measurements

	OLS (1)		IV (2)		IV: with controls (3)		IV: unweighted (4)	
	<i>ETR<sub>K</sub></i>	<i>ETR<sub>L</sub></i>	<i>ETR<sub>K</sub></i>	<i>ETR<sub>L</sub></i>	<i>ETR<sub>K</sub></i>	<i>ETR<sub>L</sub></i>	<i>ETR<sub>K</sub></i>	<i>ETR<sub>L</sub></i>
à la Mendoza et al. (1994)	-0.00127 (0.0185)	0.0123 (0.00907)	0.354** (0.157)	0.161*** (0.0575)	0.381*** (0.0974)	0.206*** (0.0467)	0.180** (0.0712)	0.0785* (0.0461)
PIT = 0% on capital	0.0107 (0.0246)	0.0284** (0.0109)	0.526*** (0.194)	0.183*** (0.0586)	0.553*** (0.123)	0.246*** (0.0568)	0.296*** (0.109)	0.129** (0.0541)
PIT = 30% on capital	0.00940 (0.0313)	0.0243** (0.00989)	0.541** (0.224)	0.180*** (0.0558)	0.579*** (0.139)	0.236*** (0.0517)	0.289** (0.113)	0.130** (0.0511)
PIT = 15% on capital	0.0108 (0.0278)	0.0264** (0.0104)	0.533** (0.208)	0.182*** (0.0570)	0.565*** (0.130)	0.241*** (0.0541)	0.293*** (0.110)	0.130** (0.0525)
First-stage F-statistic			32.30	32.30	21.78	21.78	9.007	9.007
<i>N</i>	4505	4505	4505	4505	4505	4505	4505	4505

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