

Effective Tax Rates and Firm Size: Evidence from Micro Tax Data Across Countries

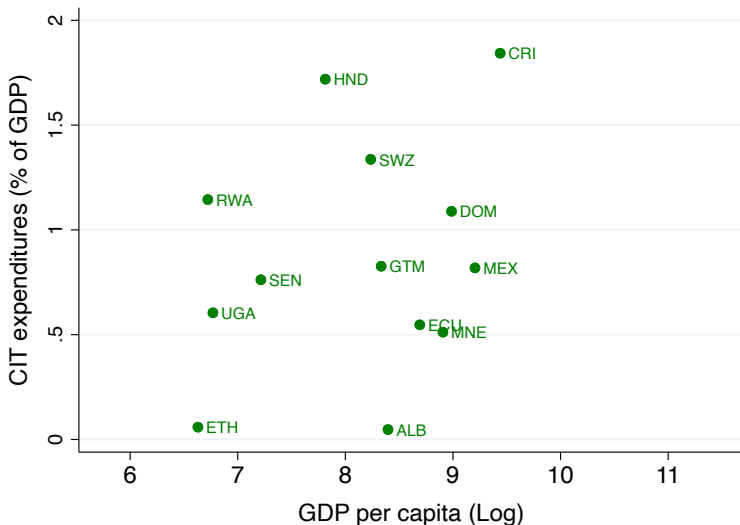
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Corporate Income Tax Expenditures as a Share of GDP



Comparison with GTED

Comparison with Country Stats

Research Questions

- 1. What drives the gap between effective and statutory tax rates?**
 - ▶ What tax provisions are used to lower ETRs and by which firms?
- 2. What is the relationship between effective tax rate (ETR) and firm size?**
 - ▶ Do some firms pay more taxes than others? If so, which firms?

Motivations

Tax Revenue Collection

- ▶ Revenue forgone is significant
- ▶ Developing countries heavily rely on CIT and large firms (Besley and Persson, 2014)

Efficiency

- ▶ Differences in ETRs → distortions & misallocation of resources (Diamond and Mirrlees 1971)
- ▶ e.g. Size-dependent taxation (Best et al. 2015, Bachas et al. 2019)

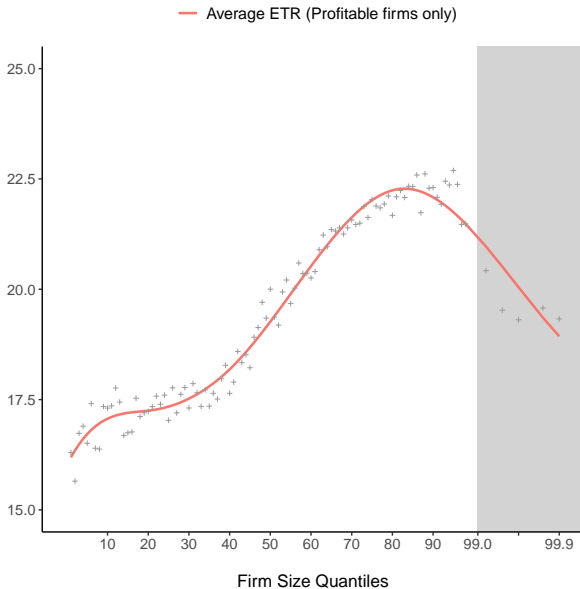
Equity

- ▶ Smaller firms are owned by poorer entrepreneurs (La Porta and Shleifer 2014, Ulyssea 2018, Brown and Medoff 1989)
- ▶ Taxes passed through employees' wages (Fuest et al. 2018, Arulampalam et al. 2012, Suárez Serrato and Zidar 2016)

Objectives and Contribution

- ▶ **Produce consistent methodology to compute comparable ETR measures:**
 - ▶ Different methodologies used in the literature Literature
 - ▶ Different data sources, mainly financial data
 - ▶ Mostly single-country studies
- ▶ **Establish stylized facts between firms' ETR and their characteristics:**
 - ▶ By size, sector, ownership, age, etc.
 - ▶ Describe the drivers of these differences
 - ▶ Discuss potential policy & research implications (e.g. tax competition, firms' dynamics etc.)

Preview of Results: ETR & firm size



Preview of Results: ETR & firm-size

- ▶ **Inverted U-shaped relationship:**

1. **ETR increases progressively across distribution for all countries**
2. **ETR decreases at the top for the largest firms in most countries**

Mostly explained by:

- ▶ Reduced tax rates and losses reduce ETRs for smaller firms
- ▶ Tax credits and tax exemptions claimed by larger firms

Administrative Data: Corporate Income Tax

- ▶ Panels of firm-level data from 13 countries, incl. low, middle and upper-income countries:
 - ▶ **LAC:** Costa Rica, Dominican Rep., Ecuador, Guatemala, Honduras, Mexico
 - ▶ **Sub-Saharan Africa:** Ethiopia, Eswatini, Rwanda, Senegal, Uganda
 - ▶ **the Balkans:** Albania, Montenegro
- ▶ Sample: whole universe of taxpayers
- ▶ Main variables: revenue, costs, profits, tax provisions and credits
- ▶ Firm characteristics: sectors, region, age, number of employees

Summary Statistics

Construction of the ETRs

Backward-Looking ETRs:

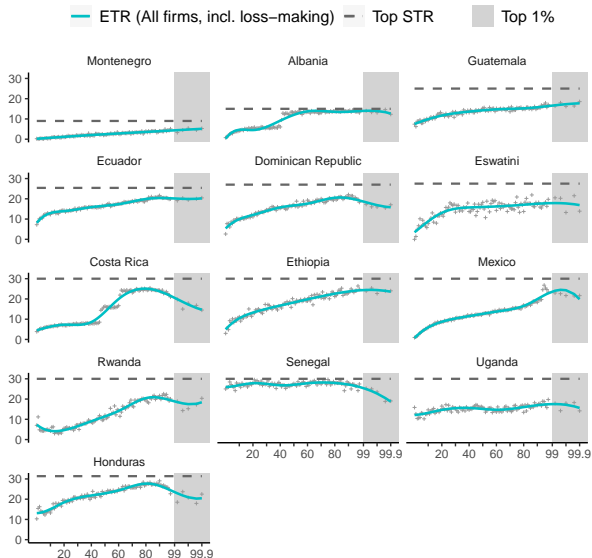
$$\text{ETR} = \text{CIT liability} / \text{Profit}$$

- ▶ Denominator: goal is to measure firms' economic profit without the influence of tax exemptions
 - ▶ Net profit= total income minus standard deductible costs (e.g. material, labor, operational, depreciation) Concept

Firm size:

- ▶ Firm size proxied by reported turnover
- ▶ Firms are ranked within their own countries

ETRs and Firm Size



Firm Size Quantiles

ETRs and Firm Size

1. ETRs increase over most of the firm-size distribution

- ▶ On average, a firm at the 80% percentile of size pays 6 percentage points more in taxes than a firm at the 20% percentile.
- ▶ The relationship holds in all 13 countries.

2. ETRs decrease at the very top of the firm-size distribution

- ▶ A firm in the top 1% of size pays on average 3 percentage points less in taxes than the average firm in the top 10%.
- ▶ The relationship exists in 10 countries (flat in the others).

Explaining the relationships

Why do ETRs increase with firm size? Why do they decrease at the top?

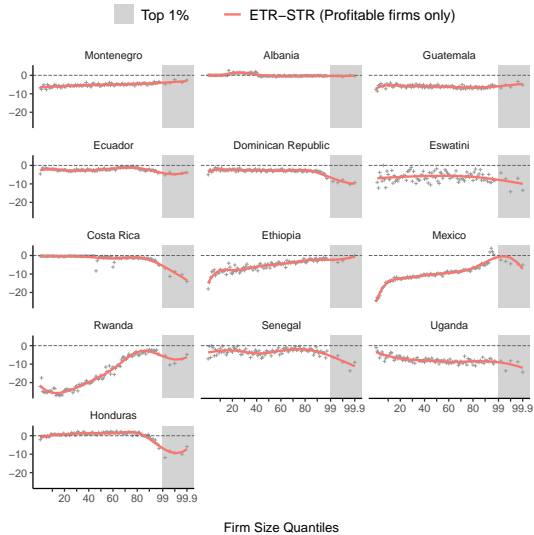
1. Graphically: ETR-STR for profitable firms

- ▶ Account for loss-making firms ($\text{ETR} = 0$) Profitable firms
- ▶ and tax systems with lower STR for small firms

2. Country specific regressions at the firm-level: add tax return variables one by one to explain the ETR-size slopes

- ▶ Separated samples: bottom 90% and top 10%
- ▶ Account for firms' claims in exempt income, tax provision, tax credits, loss-carry-forwards, and firm's characteristics.

1. ETR-STR: Profitable firms only



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2. Country specific regressions at the firm-level

Increasing slope for the Bottom 90%:

$$ETR_i = \beta_0 + \beta_1 Percentile_i + \beta_k X_{k,i} + \epsilon_i \quad (1)$$

X_k : exempt income, tax provision, tax credits, loss-carry-forwards, and firm's characteristics.

- ▶ Look at the average of the β_1 coefficients across countries Bottom 90
- ▶ **Results:**
 - ▶ Losses account for 35%
 - ▶ STRs account for 55%
 - ▶ Still some unexplained coefficients

2. Country specific regressions at the firm-level (cont.)

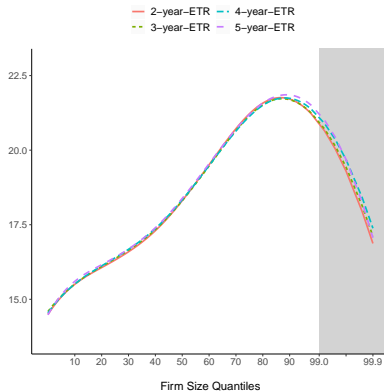
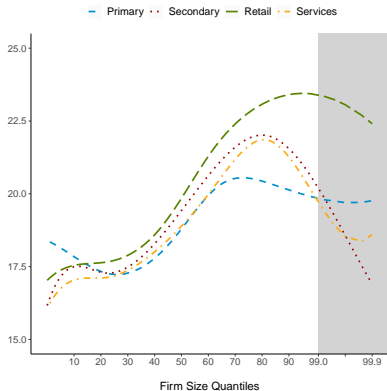
Decreasing slope for the Top 10%:

$$ETR_i = \gamma_0 + \gamma_1 D_i^{p99} + \underline{\gamma_k} X_{k,i} + \epsilon_i, \quad (2)$$

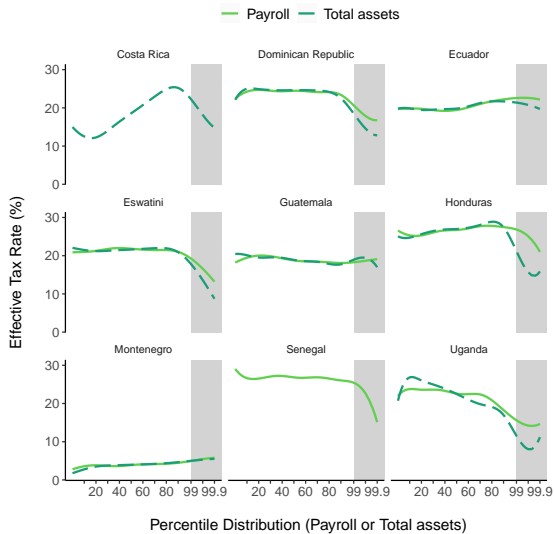
γ_1 : difference in ETR of the top 1%

- ▶ Look at the average of the γ_1 coefficients across countries Top 10
- ▶ **Results:**
 - ▶ Tax credits account for 40%
 - ▶ Firm characteristics for roughly 34%
 - ▶ Exempt income and loss carry-forward for 15% each
 - ▶ 17% is still unexplained

Robustness I: Sectors and Lifetime ETR



Robustness II: Alternative Firm-Size Measures



Discussion

Construct comparable ETR measures and find new stylized facts

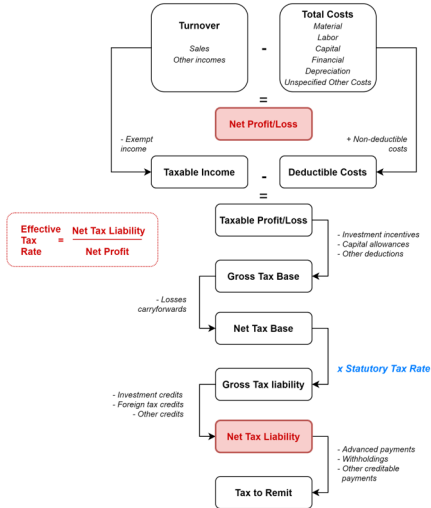
- ▶ Inverted U-shaped pattern between ETR & firm size:
 - ▶ Largest firms make use of tax provisions to lower their ETR
 - ▶ Medium-size firms bear a disproportionate share of the tax burden

Policy & Research Implications

- ▶ Consequences of tax distortions in terms of competition, firm's dynamics and growth in developing countries?
- ▶ Equity regarding tax provisions take-up: medium-size firms lack information/resources?
- ▶ Revenue implications: 40-70% of CIT revenue comes from top 1%

Thank you!

Concepts and Variables



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Summary Statistics

(1) Country	(2) ISO Code	(3) Year	(4) GDP pc (const. 2010 US\$)	(5) Nbr. of Firms	(6) Avg. Turnover (Thousand \$)	(7) Net Profit > 0 (%)	(8) Min [Max] Statutory Tax Rate (%)	(9) Avg. ETR (%) All firms	(10) Avg. ETR (%) Profitable firms
Albania	ALB	2019	5,209.4	19,237	1,146.5	80.7	5 [15]	9.4	11.6
Costa Rica	CRI	2019	10,046.9	58,621	1,687.9	79	10 [30]	14.8	18.7
Dominican Rep.	DOM	2015	6,661.9	38,028	1,785.3	64.7	27 [27]	15.5	24
Ecuador	ECU	2019	5,097.1	48,477	2,162.5	77.1	22 [25]	15.4	19.9
Eswatini	SWZ	2018	4,773.9	3,805	376	66.9	27.5 [27.5]	14.3	21.3
Ethiopia	ETH	2016	514.1	15,037	2,218.8	70.3	30 [30]	17.5	24.9
Guatemala	GTM	2019	3,413.3	22,994	3,321.9	67.1	25 [25]	12.7	18.9
Honduras	HND	2019	2,241.2	22,964	1,541.8	74.4	25 [30]	21.7	26.8
Mexico	MEX	2015	10,037.2	461,458	3,077.1	58.6	30 [30]	12.5	21.1
Montenegro	MNE	2019	8,545.5	19,402	607.3	58.9	9 [9]	2.4	4
Rwanda	RWA	2017	904.7	16,617	490	82.8	30 [30]	12.1	14.6
Senegal	SEN	2019	1,584.5	2,832	5,193.5	86.4	30 [30]	36.6	41.3
Uganda	UGA	2019	956.9	16,083	587.1	62.6	30 [30]	13.9	22.1

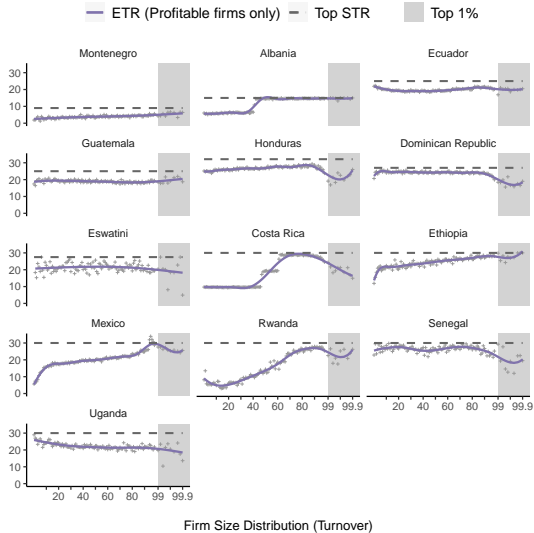
Note: This table presents summary statistics on firms in the 13 countries in our data. All statistics are from administrative corporate tax records, except for the GDP per capita (column 4) which is from the [World Development Indicators](#). The year chosen for this table is the most recent year available in the data for each country. The effective tax rate (ETR) can be larger than the statutory tax rate due to the reintegration of non-taxable deductions in our net profit definition. see Appendix B for a description of each country's corporate tax schedule. This table is discussed in Section 3.1.

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ETR Literature

Reference	Country	Data	ETR & Firm Size
Mascagni and Mengistu (2019)	Ethiopia	Tax return data	U-Shape
Carreras et al. (2017)	South Africa	Tax return data	U-Shape
Mascagni et al. (2016)	Rwanda	Tax return data	Negative
Lazăr (2014)	Romania	Financial data	No relationship
Wu et al. (2012)	China	Financial data	Positive
Richardson and Lanis (2007)	Australia	Financial data	Negative
Halleux and Valenduc (2007)	Belgium	Tax return data Financial data	Inconclusive
Guha (2007)	India	Financial data	Negative
Adhikari et al. (2006)	Malaysia	Financial data	Negative
Gauthier and Reinikka (2006)	Uganda	Survey data	Inverse U-Shape
Janssen (2005)	The Netherlands	Financial data	Negative
Clark (2004)	Canada, Belgium	Tax return data	Inverse U-Shape
Nicodème (2002)	OECD	Financial data	Negative
	Hong Kong, Korea,		
Kim and Limpaphayom (1998)	Malaysia, Taiwan, Thailand	Financial data	Negative
Gauthier and Gersovitz (1997)	Cameroon	Survey data	Inverse U-Shape
Gupta and Newberry (1997)	USA	Financial data	No relationship
Kern and Morris (1992)	USA	Financial data	No relationship
Wang (1991)	USA	Financial data	Positive
Porcano (1986)	USA	Financial data	Negative
Zimmerman (1983)	USA	Financial data	Positive
Stickney and McGee (1982)	USA	Financial data	No relationship

ETR for profitable firms only



Why Do ETRs increase with firm size?

<i>Sample:</i>	All Firms		Profitable Firms						
	Main		Main	Statutory Tax Rate	Loss Carryforward	Exemption	Other adjustments	Tax Credit	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regression A – Coefficient is Turnover Percentiles (1 to 89)									
Percentile (1-89)	0.13	0.08	0.08	0.05	0.08	0.09	0.08	0.09	0.04
N positive coeff.	13	10	10	10	9	11	10	11	9
Upper one-sided t-test	13	9	10	8	9	9	8	10	8
N country	13	13	13	13	13	13	13	13	13
<i>Sample:</i>									
All Firms	×								
Profitable Firms		×	×	×	×	×	×	×	×
<i>Controls:</i>									
Characteristics			×						×
Statutory Tax Rate				×					×
Loss Carry-forward					×				×
Exemption						×			×
Other adjustments							×		×
Tax Credits								×	×

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Why Do ETRs Decrease at the Top?

<i>Sample:</i>	All Firms		Profitable Firms						
	Main	Main		Statutory Tax Rate	Loss Carryforward	Exemption	Other adjustments	Tax Credit	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regression B – Coefficient is Top 1% Dummy (Within Decile 10 Only)									
Dummy Top 1%	-2.67	-2.90	-2.28	-2.84	-2.39	-2.80	-2.69	-1.88	-0.75
N negative coeff.	10	11	9	11	10	11	10	10	6
Lower one-sided t-test	5	8	7	8	5	8	8	6	2
N country	13	13	13	13	13	13	13	13	13
<i>Sample:</i>									
All Firms	×								
Profitable Firms		×	×	×	×	×	×	×	×
<i>Controls:</i>									
Characteristics			×						×
Statutory Tax Rate				×					×
Loss Carry-forward					×				×
Exemption						×			×
Other adjustments							×		×
Tax Credits								×	×

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Robustness Checks

► Different measures of ETR:

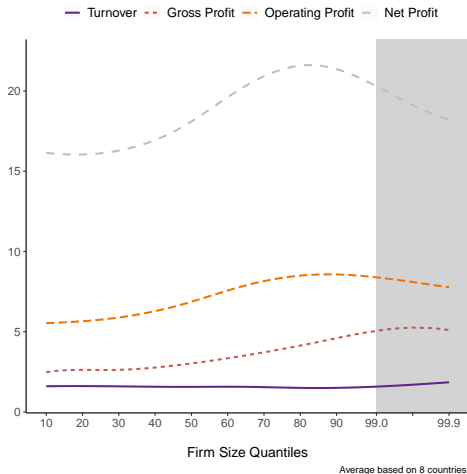


Table A.3: Number of Observations by Country and Quantile Bin

Percentiles	(1) MEX	(2) MNE	(3) CRI	(4) DOM	(5) GTM	(6) SEN	(7) ALB	(8) ECU	(9) HND	(10) RWA	(11) ETH	(12) UGA	(13) SWZ
Panel A: All Firms													
90	4614	194	586	380	230	28	192	484	229	129	150	160	38
98	4614	194	586	380	229	28	192	484	229	129	150	160	38
99	4614	194	586	380	229	28	192	484	229	129	150	160	38
Panel B: Profitable Firms													
90	3392	168	509	340	185	26	173	427	193	98	130	117	31
98	3746	174	500	341	187	28	167	418	189	95	133	134	36
99	3905	164	499	343	186	24	170	440	188	92	130	129	34

Table A.4: List of Available Tax Provisions by Country

Country	Exempt Income	Non-Deductible Costs	Loss Carry-Forward	Deduction Tax Base	Tax Credit
Albania	No	Yes	Yes	No	No
Costa Rica	Yes	Yes	No	Yes	Yes
Dominican Republic	No	No	Yes	Yes	Yes
Ecuador	Yes	Yes	Yes	Yes	Yes
Eswatini	Yes	Yes	Yes	Yes	Yes
Guatemala	Yes	Yes	No	Yes	No
Honduras	Yes	Yes	No	Yes	Yes
Mexico	No	No	Yes	Yes	Yes
Montenegro	No	No	No	No	No
Rwanda	Yes	Yes	Yes	No	Yes
Senegal	Yes	Yes	Yes	Yes	Yes
Uganda	Yes	Yes	Yes	Yes	No

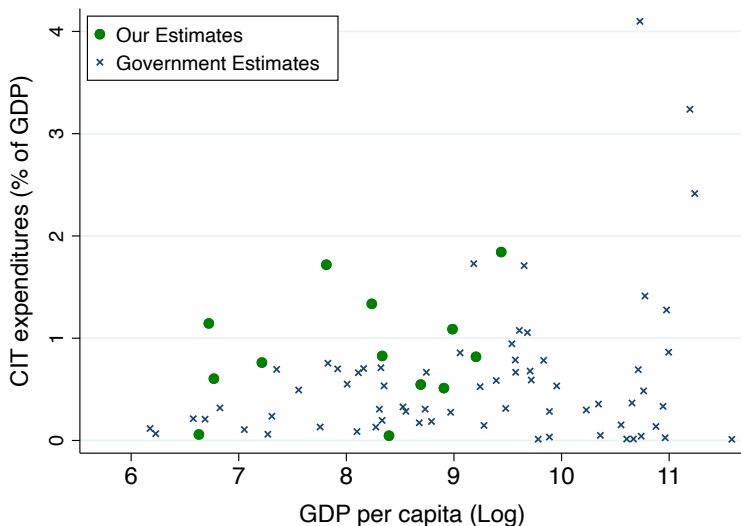
Table A.5: Regression Table with Country-Specific Coefficients

Sample:	All Firms		Profitable Firms						
	Main	Main		Legal Tax Rate	Loss Carryforward	Exemption	Other adjustments	Tax Credit	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regression A – Coefficient is Turnover Deciles (1 to 9)									
Decile (1-89)	0.13	0.08	0.08	0.05	0.08	0.09	0.08	0.09	0.04
ALB	0.16	0.15	0.14	0.00	0.14	0.15	0.14	0.15	0.00
CRI	0.28	0.31	0.30	0.01	0.31	0.31	0.31	0.31	0.02
DOM	0.15	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	0.00
ECU	0.08	0.01	0.02	0.00	0.02	0.01	0.01	0.02	0.00
ETH	0.18	0.09	0.05	0.09	0.05	0.09	0.09	0.09	0.05
GTM	0.07	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.01
HND	0.15	0.03	0.03	0.03	0.03	0.03	0.00	0.04	0.00
MEX	0.15	0.11	0.11	0.11	0.04	0.11	0.11	0.11	0.04
MNE	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
RWA	0.21	0.29	0.29	0.29	0.30	0.29	0.28	0.29	0.30
SEN	0.10	0.15	0.15	0.15	0.16	0.13	0.10	0.15	0.10
SWZ	0.11	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00
UGA	0.03	-0.04	0.01	-0.04	-0.02	0.01	-0.02	-0.04	0.01

Regression B – Coefficient is Top 1% Dummy (Within Decile 10 Only)

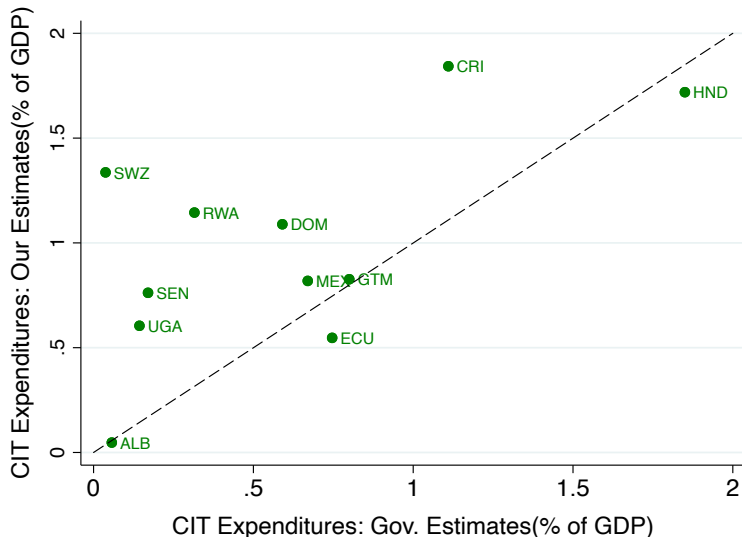
Dummy 1%	-2.67	-2.90	-2.28	-2.84	-2.39	-2.80	-2.69	-1.88	-0.75
ALB	-0.48	-0.01	0.10	-0.01	-0.03	-0.01	0.00	-0.01	0.02
CRI	-6.20	-7.23	-6.56	-7.23	-7.23	-7.23	-4.93	-2.87	0.31
DOM	-3.90	-4.67	-2.65	-4.67	-4.66	-4.51	-4.67	-4.77	-2.92
ECU	-0.36	-1.09	-1.06	-1.13	-1.09	-0.83	-1.12	-0.42	-0.50
ETH	-0.17	-0.11	0.03	-0.11	0.03	-0.11	-0.11	-0.11	0.02
GTM	0.40	0.72	1.07	0.72	0.73	0.72	0.72	0.68	0.76
HND	-6.53	-5.58	-4.54	-4.87	-5.58	-5.59	-6.53	1.68	0.54
MEX	-0.34	-2.91	-2.18	-2.91	-3.00	-2.91	-2.91	-2.83	-2.14
MNE	0.33	0.61	0.77	0.61	0.62	0.61	0.61	0.61	0.77
RWA	-4.49	-4.56	-4.29	-4.56	-0.63	-4.56	-3.19	-4.02	-0.16
SEN	-12.08	-9.03	-8.97	-9.03	-7.48	-8.66	-9.01	-9.03	-6.31
SWZ	0.18	-1.31	-0.32	-1.31	-1.49	-1.25	-1.28	-0.82	0.22
UGA	-1.09	-2.48	-1.01	-2.48	-1.23	-2.03	-2.54	-2.48	-0.36

Corporate Income Tax Expenditures as a Share of GDP



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Comparing Our Method to Country-Specific Estimates



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