State Capacities in Latin America: Structural Transformations, Elite Competition, and Fiscal Development (1850-2010)

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September 8, 2017

Outline

- Motivate the talk.
- Presenting two chapters:
  - Sectoral Origins of Income Taxation: Industrial Development in Latin America and The Case of Chile (1900-2010)

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  - Income Taxation and State Capacities in Chile: Measuring Institutional Development Using Historical Earthquake Data
    Main finding: the income tax served as an engine for the Chilean state.

Motivation

- Most political economists study political/economic development assuming there is a state in place.
- Also:
  1. Most theories emphasize how important fiscal capacities for state-building are. However, most theories don't explain where these capacities come from.
  2. Most theories provide **historical** explanations for state-building, and yet, these theories lack of **historical** measurements able to capture levels of state formation over time.
- I find that these gaps represent important theoretical and empirical **deficits**.

Sectoral Origins of Income Taxation: Industrial Development in Latin America and The Case of Chile (1900-2010)

Why Income/Direct Taxation

- **'Fiscal sociology'** theory. Direct taxation (income taxation) offers a theory of state formation.
- Monitoring private incomes, and converting them into public property *causes* state formation.
- Income taxation requires the state sending tax collectors to the entire territory, increasing state presence.
  1. Developed technologies to monitor individual incomes.
  2. Required trained bureaucracies.
  3. Generated routines and standard procedures.
  4. Domestic agreements, especially from the ones that carried a heavier burden (elites).

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Why?

Peru

1934

Chile

1924

Venezuela

1943

Colombia

1935

Argentina

1933

Mexico

1965

Ecuador

1945

Nicaragua

1974

Guatemala

1963

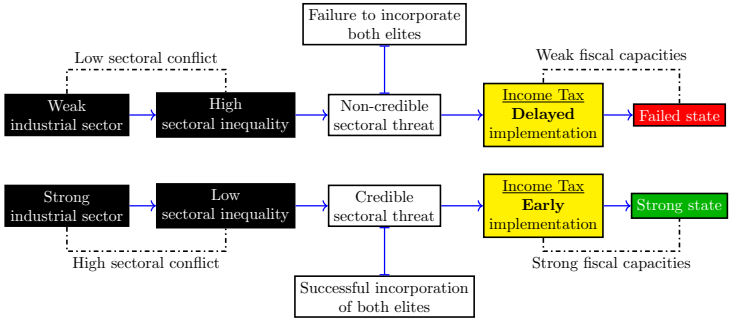
Context / 'Initial Stage of the Game'

Persistence of colonial institutions: agricultural elites were the most productive sector, controlling most of the politics.

'Baile del Santiago Antiguo.' Pedro Subercaseaux Errázuriz (1917).

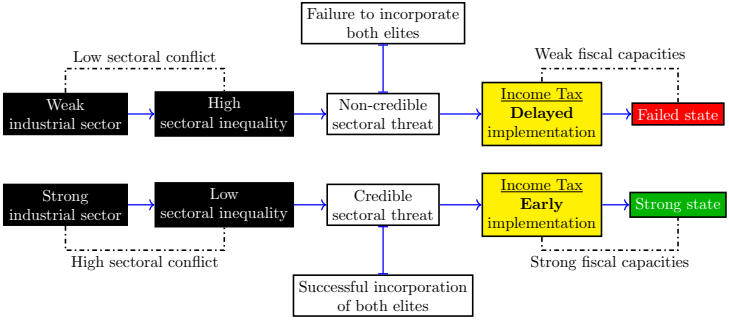
Argument

The emergence of industrial elites imposed tight constrains on the way politics was run by agricultural elites.



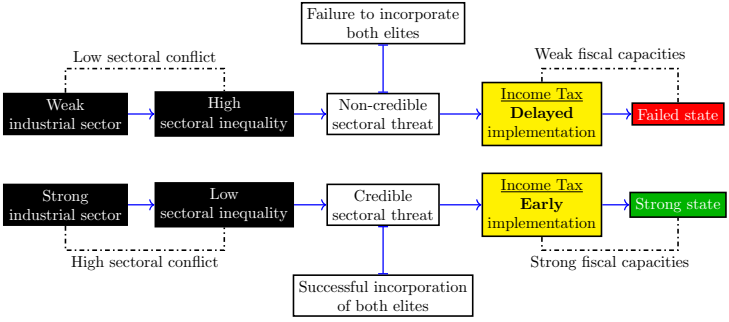
Argument

Industrial expansion reduced levels of inter-sectoral inequality, posing credible threats to agricultural incumbents.



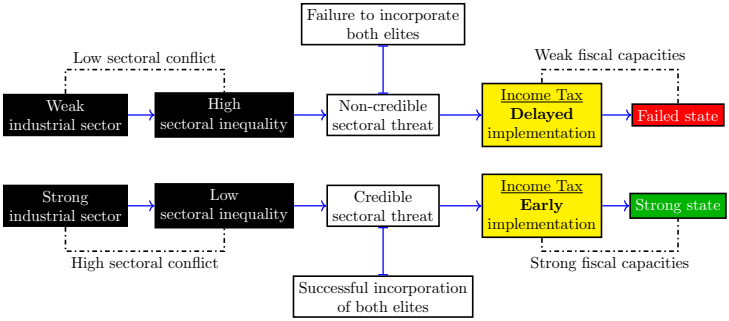
Argument

Given that both sectors were equally developed, both could get access to military resources of the same capacity.



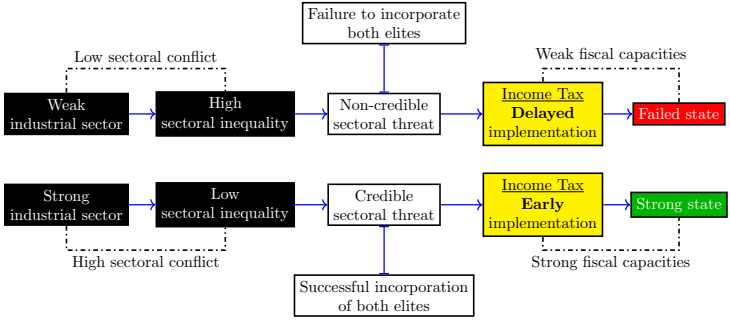
Argument

Balanced military capacities instead prevented conflict, fostering inter-sectoral compromises. **Income tax**.



Argument

I find that Chilean industrial elites accepted to be income taxed while demanding access to state power and public infrastructure beneficial for industrial production.



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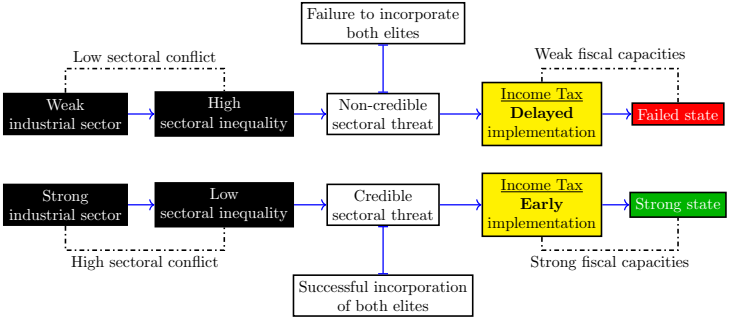
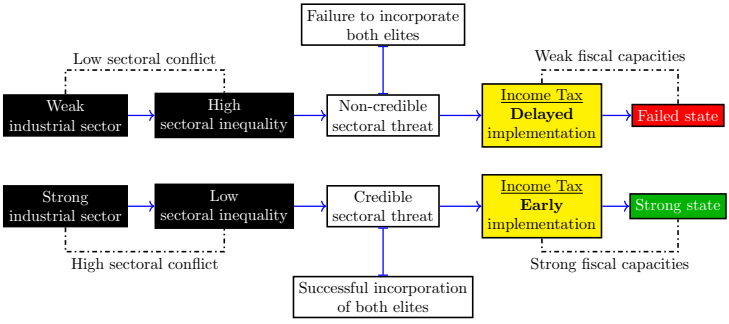
Argument

⋆ Relying on the fiscal sociology paradigm, I contend that the implementation of the **income tax** fostered **state development**.



Argument

However, a weak industrial sector engendered weak industrial elites unable to contest the institutional order. There was no need to make inter-sectoral alliances, compromising institutional investments.



When do countries implement the tax?

The 'when' is substantively important

An earlier implementation situated the **process** of implementing the law during the **country's formative period**.

Early implementers were able to **incorporate both elites** into the emergent national projects, **crystallizing** a series of reforms that reflected both elites' preferences, fostering political development.

When do countries implement the tax?

Late implementers?

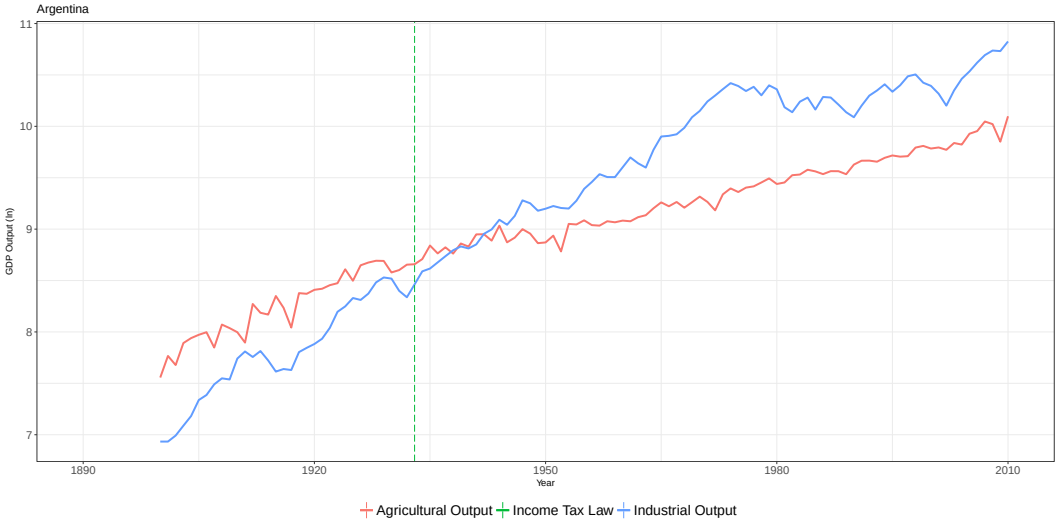
Late implementation situated the **process** of implementation **after** the country's formative period.

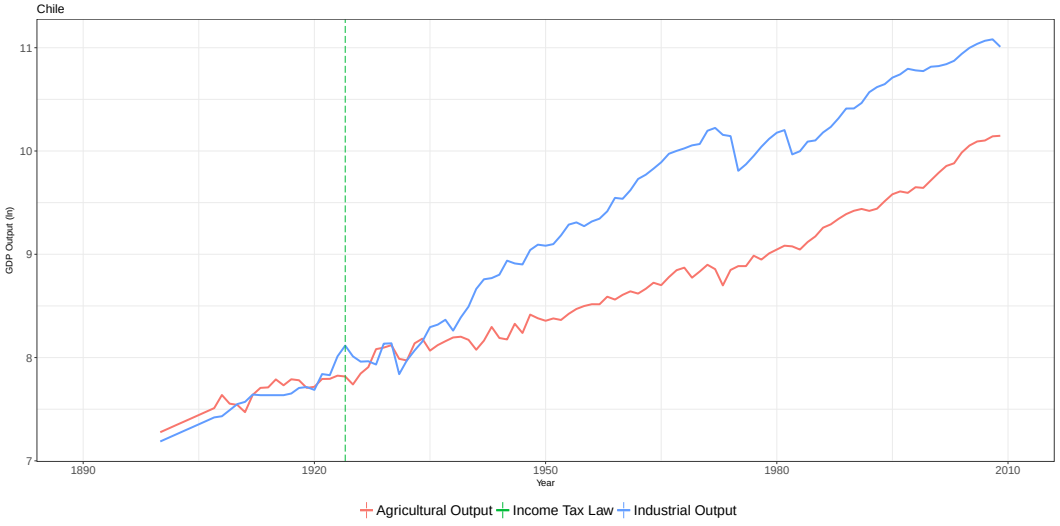
- While these countries eventually **did impose the tax**, it was not product of an **early** domestic/endogenous agreement.
- **No sectoral threat, no need for agreements**.
- **Guatemala**: it was exogenously imposed by the US-backed dictator Colonel Peralta, not necessarily reflecting the inter-sectoral domestic dynamics.

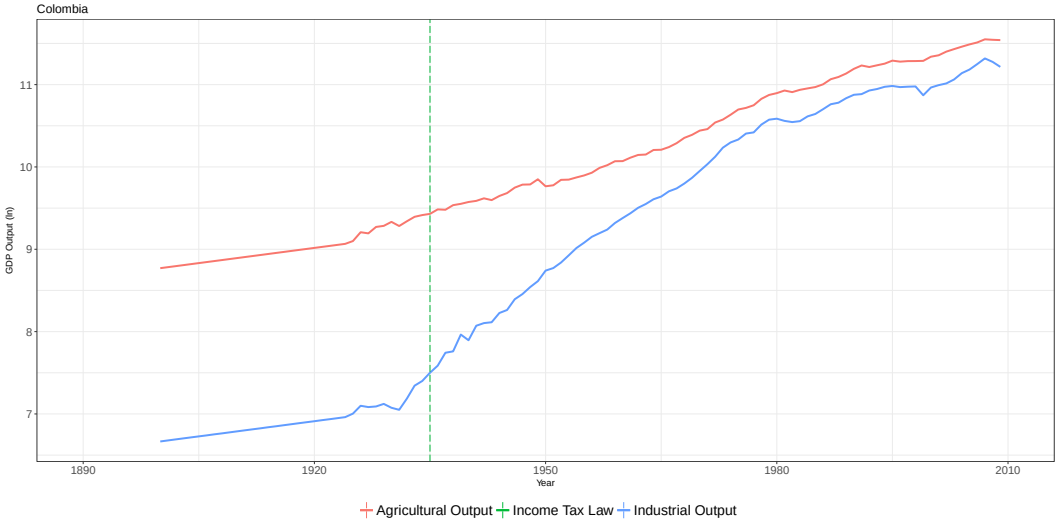
'Ingredients'

Data Proxy **sectoral contestation** exploiting data on sectoral outputs (1900-2010) for a number of LA countries (MoxLaD).

Model Duration models (Cox-Proportional & Generalized Estimating Equations) to find out 'who is to blame' for the early/late implementation of the income tax: *Industrial or Agricultural elites?*


Argentina
11
10
9
8
7
GDP Output (ln)
1890
1920
1950
1980
2010
Year
Agricultural Output
Income Tax Law
Industrial Output


Chile
GDP Output (ln)
11
10
9
8
7
1890
1920
1950
1980
2010
Year
Agricultural Output
Income Tax Law
Industrial Output


Colombia
GDP Output (ln)
11
10
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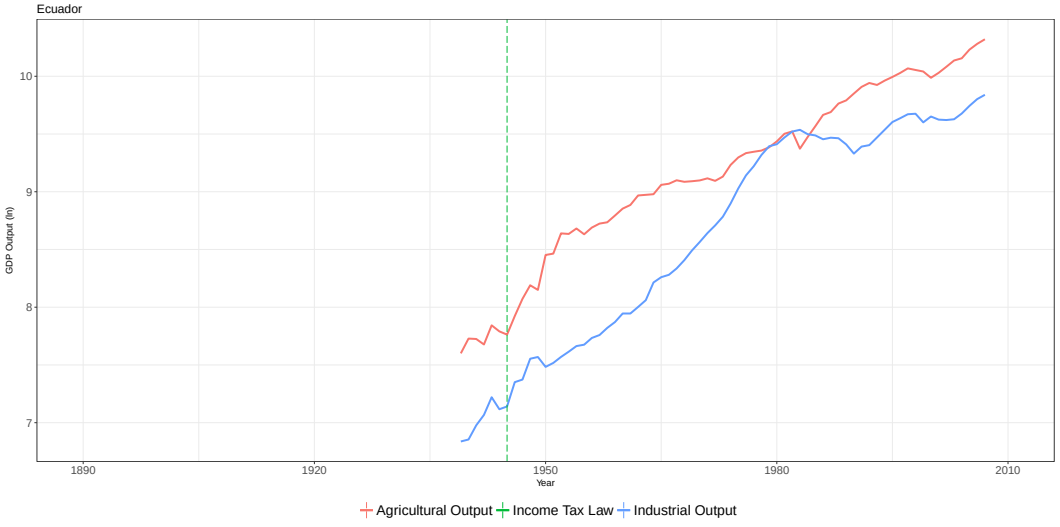
Ecuador
GDP Output (in)
10
9
8
7
1890
1920
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2010
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Agricultural Output
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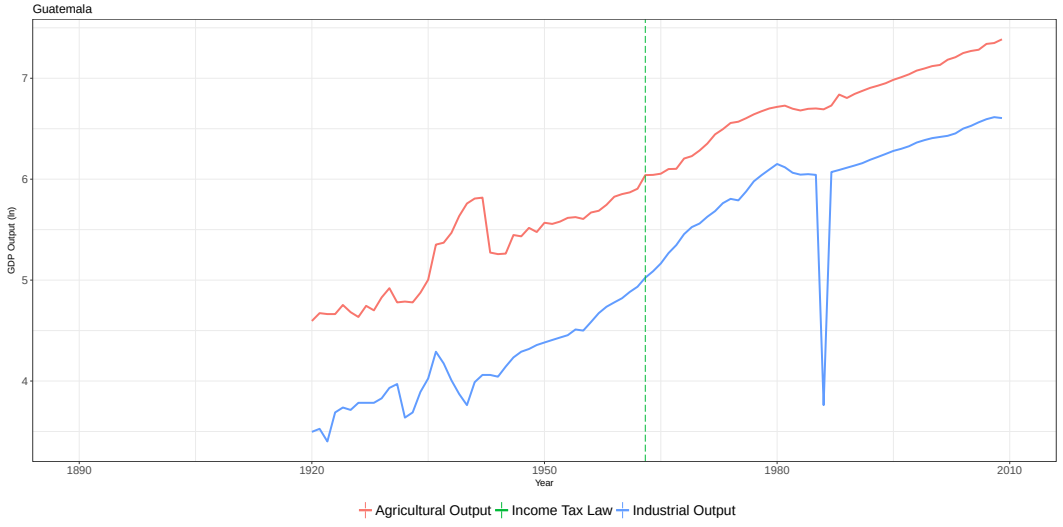
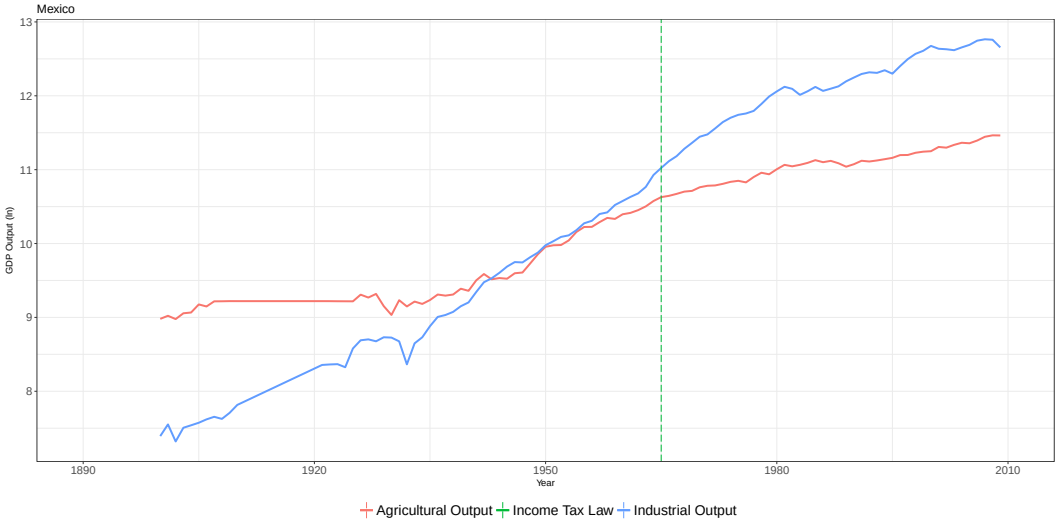

Guatemala
GDP Output (in)
7
6
5
4
1890
1920
1950
1980
2010
Year
Agricultural Output
Income Tax Law
Industrial Output


Mexico
GDP Output (ln)
13
12
11
10
9
8
1890
1920
1950
1980
2010
Year
Agricultural Output
Income Tax Law
Industrial Output


Nicaragua
8
7
6
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GDP Output (ln)
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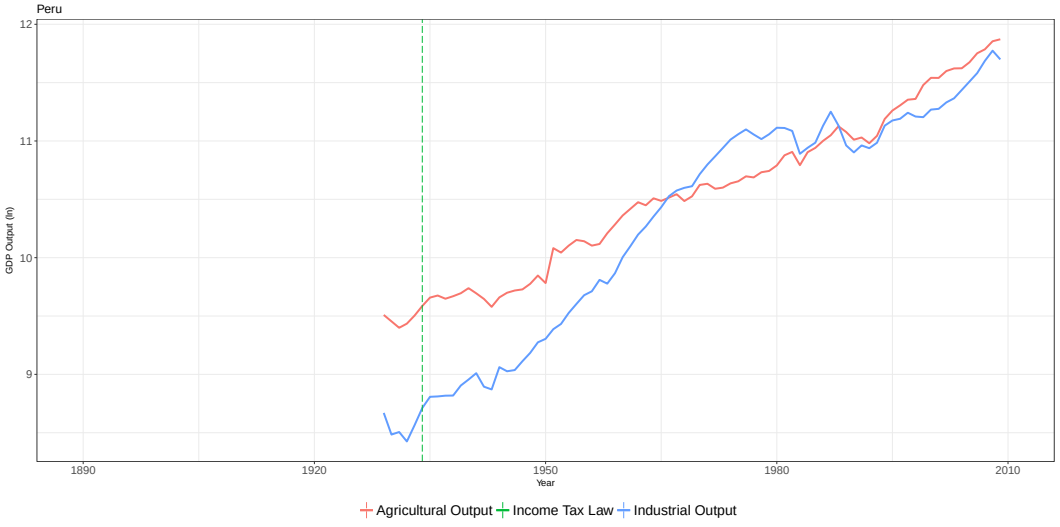
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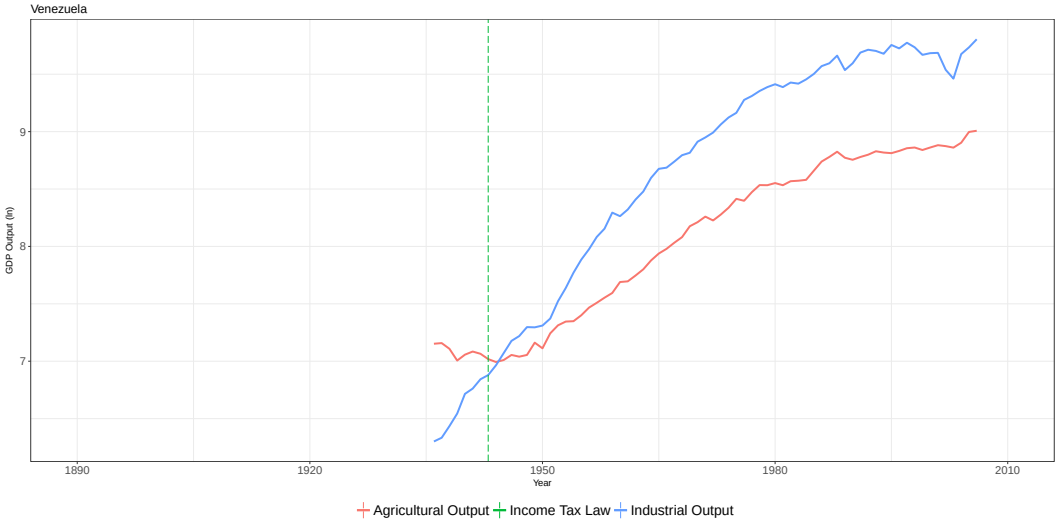
Venezuela
GDP Output (ln)
9
8
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1920
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2010
Year
Agricultural Output
Income Tax Law
Industrial Output

	Cox (1 lag)	Cox (1 lag, ln)	Logit GEE	Conditional Logit (FE)	Spatial Dependence
Manufacture Output$_{t-1}$	1.451*				
	(0.569)				
Agricultural Output$_{t-1}$	-0.859				
	(0.740)				
Total Population	-0.000***				
	(0.000)				
Manufacture Output$_{t-1}$ (ln)		1.279·			
		(0.710)			
Agricultural Output$_{t-1}$ (ln)		-0.819			
		(0.788)			
Total Population (ln)		-0.844	0.065	1.012*	-0.842
		(0.531)	(1.219)	(0.405)	(0.830)
Manufacture Output (ln)			1.543***	0.970***	1.277
			(0.333)	(0.161)	(1.036)
Agricultural Output (ln)			-1.107**	-1.185***	-0.818
			(0.369)	(0.292)	(1.071)
AIC	22.788	25.093		4135.812	25.091
R^2	0.021	0.013		0.392	0.013
Max. R^2	0.078	0.080		0.995	0.078
Num. events	9	9		570	9
Num. obs.	281	272	842	842	281
Missings	0	0		0	0
PH test	0.937	0.722			0.217
Num. clust.			9		

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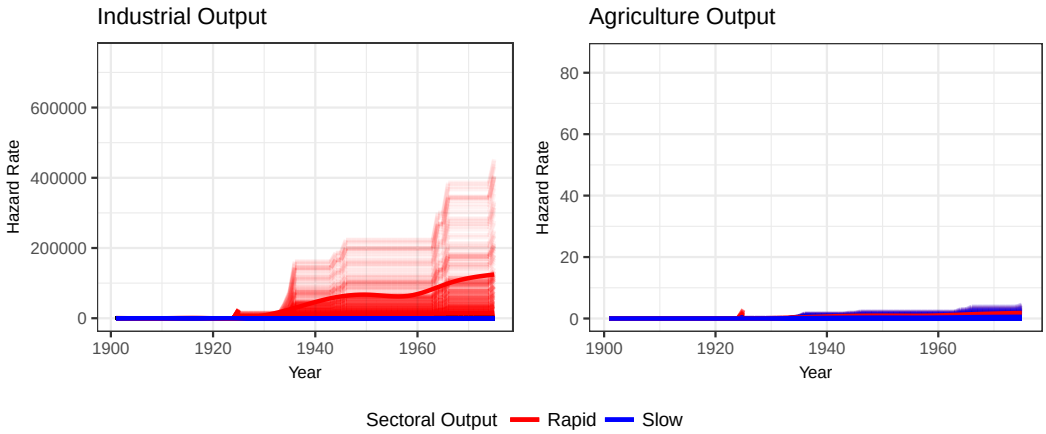
Simulated sectoral hazard rates of implementing the income tax law.
HR: probability that a case will fail at time t.



Income Taxation and State Capacities in Chile: Measuring Institutional Development Using Historical Earthquake Data

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⋆ Most **theories** of state-building in comparative politics are historical. Yet, most **measurements** capture *contemporaneous* levels of state-capacities.

⋆ I solve this deficit by providing a new measurement that captures **actual outcomes of state efforts**: Earthquake death tolls.

Why Earthquakes?

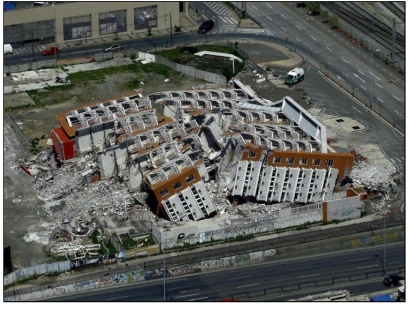
The **capacity** the state has of **enforcing** quake-sensitive **building codes** throughout the territory is a **reflection** of its **overall** state-capacities.

Haiti 2010: 7M, 100,000 casualties

Government Palace

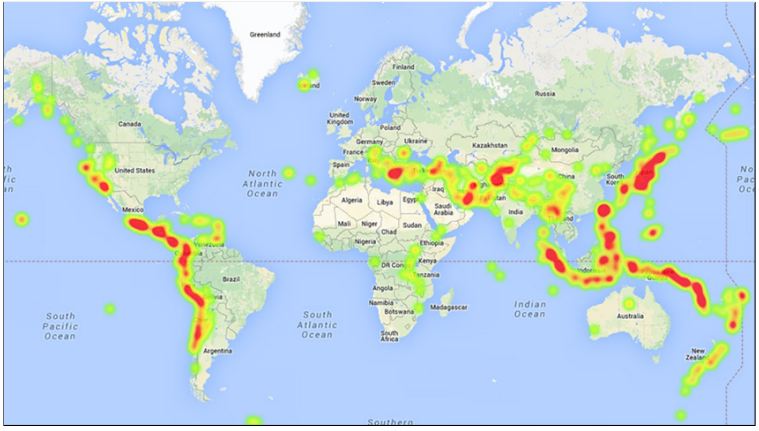
Chile 2010: 8.8M, 525 casualties

One of the **few** buildings that actually collapsed



Why Earthquakes?

Earthquakes are **exogenous** to regime type, levels of political/economic development, and other sources of variation.



State Capacities in Latin America: Structural Transformations, Elite Competition, and Fiscal Development (1850-2010)

Why Earthquakes?

Thus, there exists both a **scientific** and a **popular** consensus on that **building codes** *do* reduce death tolls. **Death tolls** are a function of state-capacities, only.


The New York Times

AMERICAS

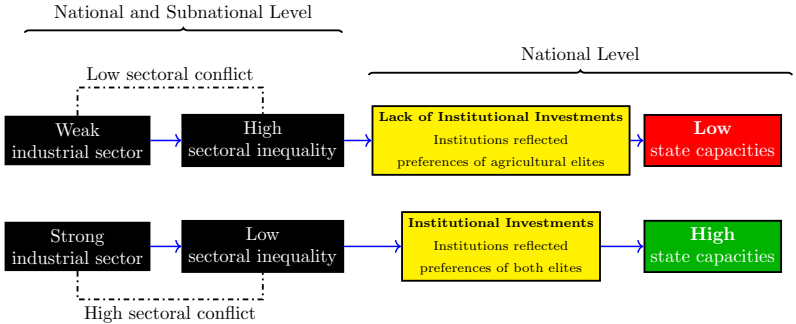
Why Chile's Latest Big Earthquake Has a Smaller Death Toll


CNN World | Africa | Americas | Asia | Europe | Middle East Live TV U.S. Edition

Experts: Strict building codes saved lives in powerful Chile earthquake

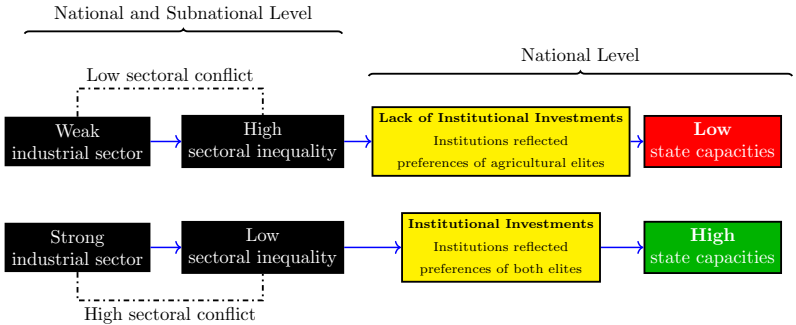
Thinking Subnationally

Since death tolls are a function of how well/bad building codes are enforced by the state throughout the territory, adopting a subnational approach seems more appropriate.



Argument

Argue that higher levels of subnational and national sectoral contestation fostered state-capacities overtime.



Incorporation of Subnational Elites into the National State-Making Project

Subnational/National Connection

Higher levels of subnational industrial expansion posed credible threats to the landed elites at the national level.

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Incorporation of Subnational Elites into the National State-Making Project

Subnational/National Connection

Higher levels of subnational industrial expansion posed credible threats to the landed elites at the national level. Agreements were required to avoid military conflicts: local elites were willing to cooperate with the central level (implementing nationally designed norms, **income tax**), contingent on the delivery of subnational public goods.

Argument

Increasing the density of state presence overtime

The implementation of the income tax improved state-capacities over time.

Argument

Increasing the density of state presence overtime

The implementation of the income tax improved state-capacities over time. Activities such as **deployment** of tax collectors to inspect accounting books and to supervise monetary transfers between individuals increased the density of state presence overtime.

Did the implementation of the income tax increase state-capacities over time?

The Theory Should Pass Two Tests

1. The state should have higher capacities (i.e. *lower death tolls*) when subnationally contested.
2. Implementation of the income tax should produce higher state-capacities (i.e. *lower death tolls*) overtime.

'Ingredients'

Data Subnational and national Chilean data (1907 to 2012).

- **National** Sectoral outputs. ▸ Just like before
- **Subnational** NOAA database as a starting point.

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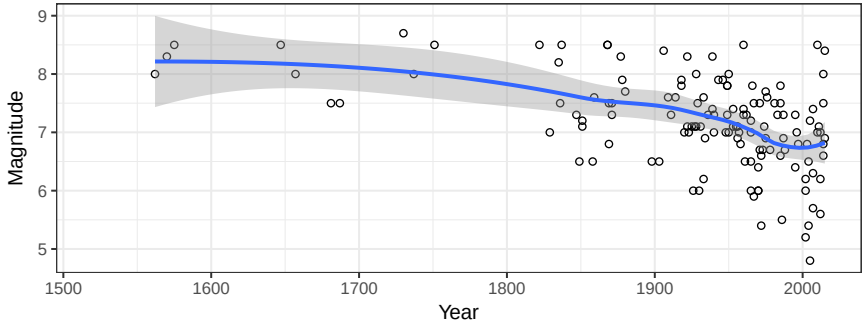
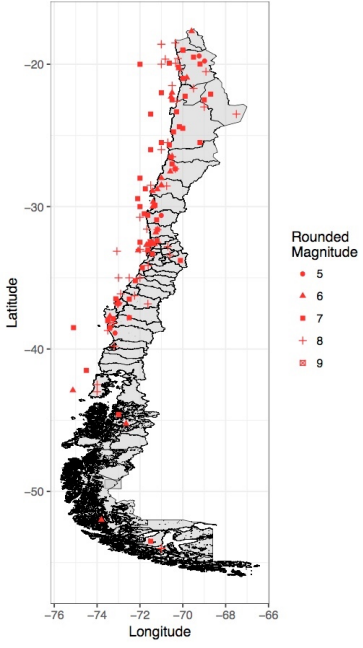
Model Bayesian Hierarchical Poisson model with year fixed-effects to account for the count of deaths. ▸ Jags Code


Magnitude
9
8
7
6
5
1500
1600
1700
1800
1900
2000
Year


Latitude
−20
−30
−40
−50
−76
−74
−72
−70
−68
−66
Longitude
Rounded Magnitude
5
6
7
8
9

Estimating Effects of Subnational Contestation on Death Tolls

$$\text{Deaths} \sim \text{Poisson}(\lambda_i)$$

▸ Distribution of Deaths

$$log(\lambda_i) = \mu + \beta_{1_j}\text{Proportion}_i + \beta_{2_j}\text{Magnitude}_i^2 + \beta_3\text{Latitude}_i + \beta_4\text{Longitude}_i + \beta_5\text{Population}_i + \beta_6\text{Urban}_i + \beta_{7_t}\text{Year}_i$$

where,

$$i_{1,\ldots I} \text{ where I} = 91 \text{ earthquakes}$$
$$j_{1,\ldots J} \text{ where J} = 3 \text{ sectors (agr, ind, mixed)}$$
$$t_{1,\ldots T} \text{ where T} = 59 \text{ years.}$$

4 chains, 200K iterations, burn-in of 5000.

▸ Densities ▸ Trace plots ▸ Model fit ▸ Table ▸ Download detailed diagnostics plots ▸ Proportion

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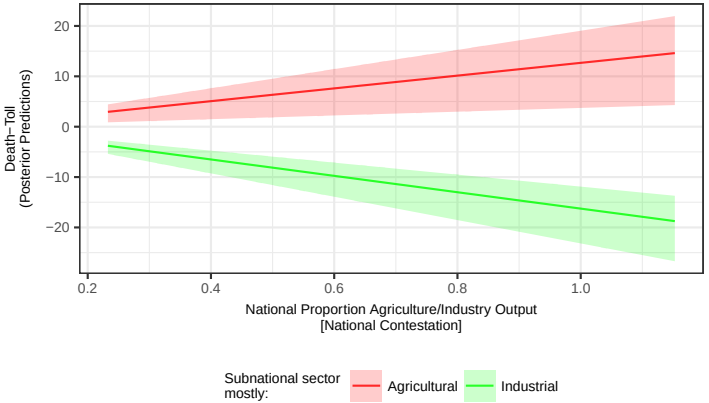

Estimating Effects of Income Taxation on Death Tolls Overtime

$$\text{Deaths} \sim \text{Poisson}(\lambda_i)$$

▸ Distribution of Deaths

$$log(\lambda_i) = \mu + \beta_1 \text{Income Tax}_i + \beta_2 \text{Magnitude}_i^2 + \beta_3 \text{Latitude}_i + \beta_4 \text{Longitude}_i + \beta_5 \text{Population}_i + \beta_6 \text{Urban}_i + \beta_{7_t} \text{Year}_i$$

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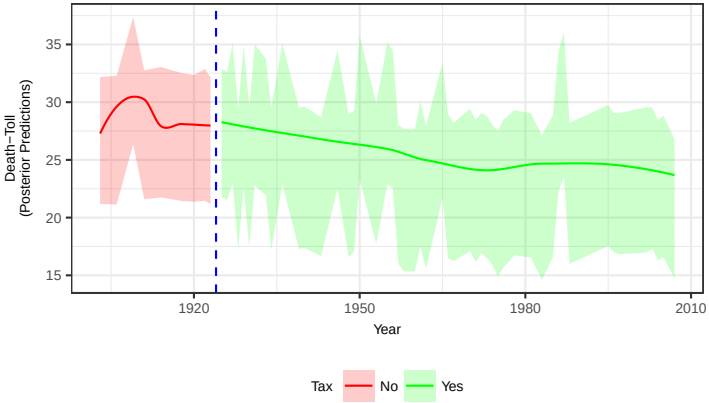
Estimating Effects of Income Taxation on Death Tolls Overtime

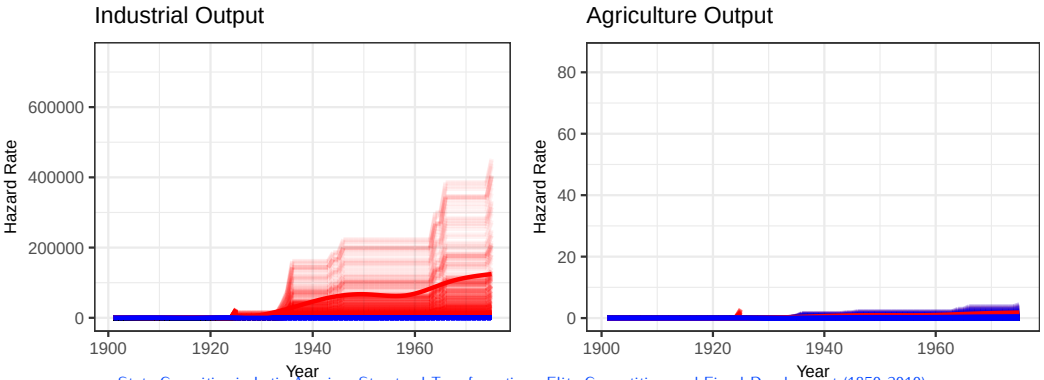


State Capacities in Latin America: Structural Transformations, Elite Competition, and Fiscal Development (1850-2010)

Summary

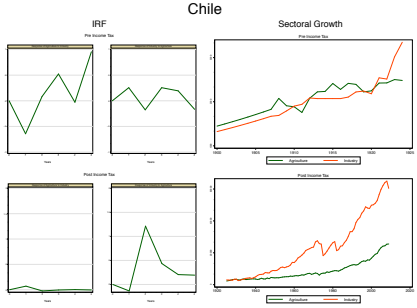
Income Tax Adoption

The emergence of the industrial sector *accelerated the implementation of the income tax*. The tax was not important for the new revenue it collected, but because it forced inter-elite compromises that were beneficial for sate-*making*.



Balanced Growth and Income Tax

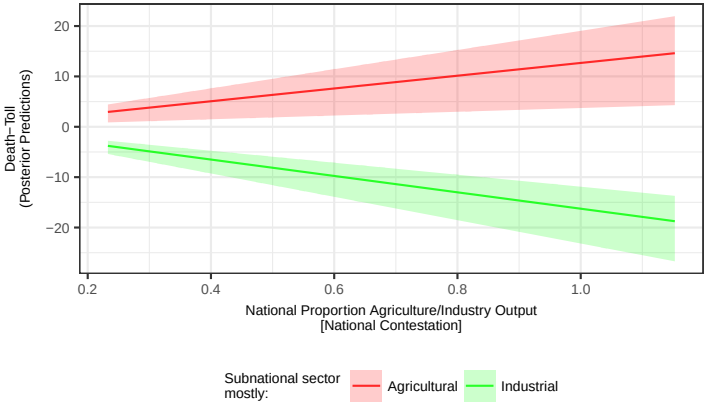
When the income tax was implemented under *contested* scenarios,[1] elite incorporation changed the institutional order, fostering long-term economic growth.



[1] When sectoral cleavage was *strong*, i.e. (1) cointegration and (2) reversal / Granger tests.

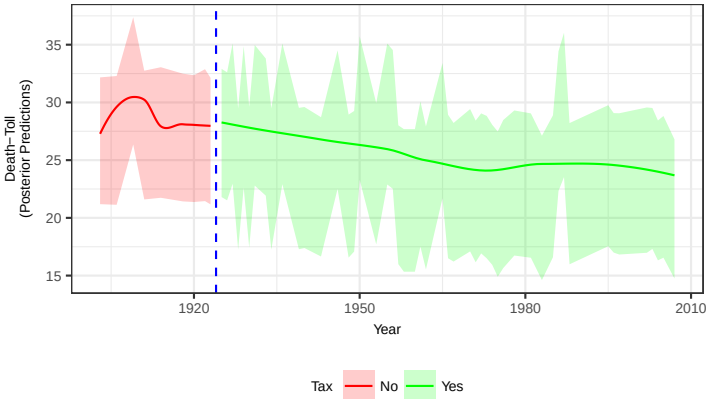
Earthquakes, Income Tax and State Capacities

Subnational sources of sectoral contestation increased state-capacities.



Earthquakes, Income Tax and State Capacities

The implementation of the income tax was a state-*making* institution, increasing state-capacities overtime.



State Capacities in Latin America: Structural Transformations, Elite Competition, and Fiscal Development (1850-2010)

What's Ahead

- I will collect more earthquake data for more countries.
- I will add more historical evidence, and try to see what's beyond the Chilean case.
- Others.

TOC

▸ Thank You ▸ Cover

Why Not *In*direct Taxation

Indirect taxes (like import taxes) require less **state efforts** to capture revenue.

Staffing an office, **waiting** for the ships to come in and **count** the goods. **Sacks of wheat**, for ex.

Talcahuano Port, Chile 19th Century.

```
model.jags.sectoral <- function() {
for (i in 1:N){ # number of earthquakes

Deaths[i] ~ dpois(lambda[i]) log(lambda[i]) <-
            b.propagrmanu[Sector[i]]*propagrmanu[i] + # multi-level
            b.Magnitude[Sector[i]]*Magnitude[i] + #  multi-level
            b.p.Population*p.Population[i] +
            b.Urban*Urban[i] +
            b.year[yearID[i]] + # year fixed-effects
            b.r.long*r.long[i] +
            b.r.lat*r.lat[i] +
            mu ## intercept
}

## Non-Informative/Flat Priors
b.r.lat ~ dnorm(0, 0.01)
b.r.long ~ dnorm(0, 0.01)
mu  ~ dnorm(0, 0.01) ## intercept
b.p.Population ~ dnorm(0, 0.01)
b.Urban ~ dnorm(0, 0.01)

## Year Fixed-Effects
for (t in 1:yearN){
    b.year[t] ~ dnorm(m.b.year[t], tau.b.year[t])
    m.b.year[t] ~ dnorm(0, 0.01)
    tau.b.year[t] ~ dgamma(0.5, 0.001) # uninformative Gamma priors
}

## Varying Slopes for Magnitude (unmodeled)
for (k in 1:NSector){#
    b.Magnitude[k] ~ dnorm(m.Magnitude[k], tau.Magnitude[k])
    m.Magnitude[k] ~ dnorm(0, 0.01)
    tau.Magnitude[k] ~ dgamma(0.5, 0.001) # uninformative Gamma priors
    }

## Varying Slopes for Agr/Ind Proportion (unmodeled)
for (k in 1:NSector){#
    b.propagrmanu[k] ~ dnorm(m.b.propagrmanu[k], tau.b.propagrmanu[k])
    m.b.propagrmanu[k] ~ dnorm(0, 0.01)
    tau.b.propagrmanu[k] ~ dgamma(0.5, 0.001) # uninformative Gamma priors
    }


 }
```

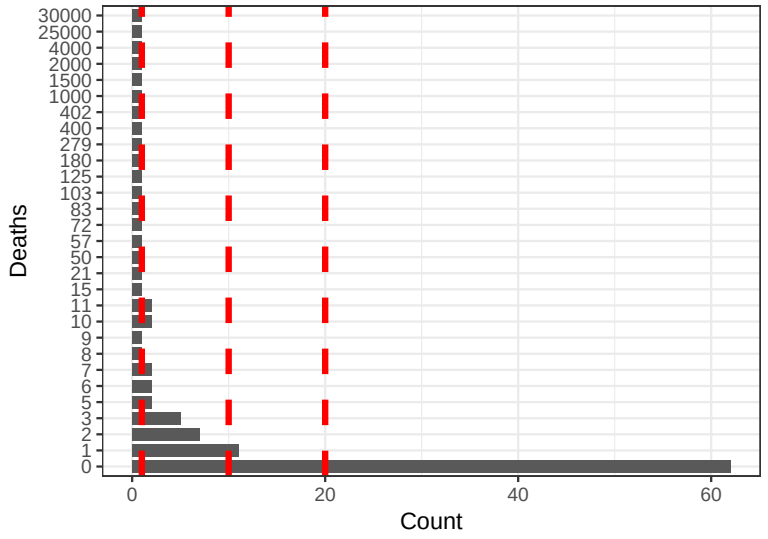
Sectoral Competition and Taxation?

Agricultural production, as it needs mostly land, it does not rely on capital as much as the industrial sector does. Moreover, they oppose taxation because their main asset (land) is fixed, hence landowners not being able to move their asset, resist taxation. On the contrary, industrial elites rely on public goods that are beneficial for their business (railroads, bridges, etc.). And while industrialists would prefer imposing higher import taxes (NOT the income tax), that increases the price of importing industrial capital (for ex., machines). Consequently, their second best choice is imposing an income tax.
For these reasons, the emergence of the industrial sector (which implies higher levels of sectoral/elite contestation) leads to the implementation of the income tax.

Where does industry come from?

p. 20 of dissertation. Industry, as predicted by the dual sector model, came from agriculture:

- After the mining boom, mining elites shifted their focus to what is considered the first *true* industrial work which began under agricultural auspices: the cotton mills: "[t]he first power looms were brought [in Perú, Ecuador, and Venezuela] in the 1840s, 1850s; but in all three they were a failure, some of the early mills in Ecuador being destroyed by an earthquake. It was not until after 1890 that the textile industries of these nations began to operate with reasonable success. Guatemala's first cotton mill was established in 1882, and between that date and 1910 a few mills appeared in Chile, Argentina, Uruguay, and Colombia."
- The first industries were called *obrajes* and beyond textiles, early industrialists processed other agricultural goods. For example, animal grease and tallow, dried and cured meats, flour, bread, beer, wines and spirits, being most of them for domestic consumption. Sugar was used in the production of chocolate, candies and biscuits.
- The industrial sector was boosted by favorable international conditions, many times stimulating a positive complementarity between the two sectors. Industrial activities started very small, progressing "from the shop to the factory during the latter half of the nineteenth century."
- Importantly, modern industrialization did *not* begin with ISI, but around 1900. Others find that the "fact that manufacturing was alive and thriving in Latin America before the 1929 crash is now beyond question." And that the "development of large-scale, mechanized (and even "heavy") industry can be dated back to the 1890s." By the 1870's the carriage industry was on a firm basis.


Deaths
30000
25000
4000
2000
1500
1000
402
400
279
180
125
103
83
72
57
50
21
15
11
10
9
8
7
6
5
3
2
1
0
0
20
40
60
Count

From Conflict to Cooperation

Why do lower levels of **sectoral inequality** (which implied **higher military threats**) lead to **sectoral cooperation**?
The rising of the industrial sector allowed industrial political elites to get access to military capacities that were as good as the agricultural elite's. The **threat** is what leads to **cooperation** rather than **conflict**. It makes no sense to engage in conflict when (1) both groups have the same 'fire power' and (2) when there is a cheaper exit (sectoral bargains).

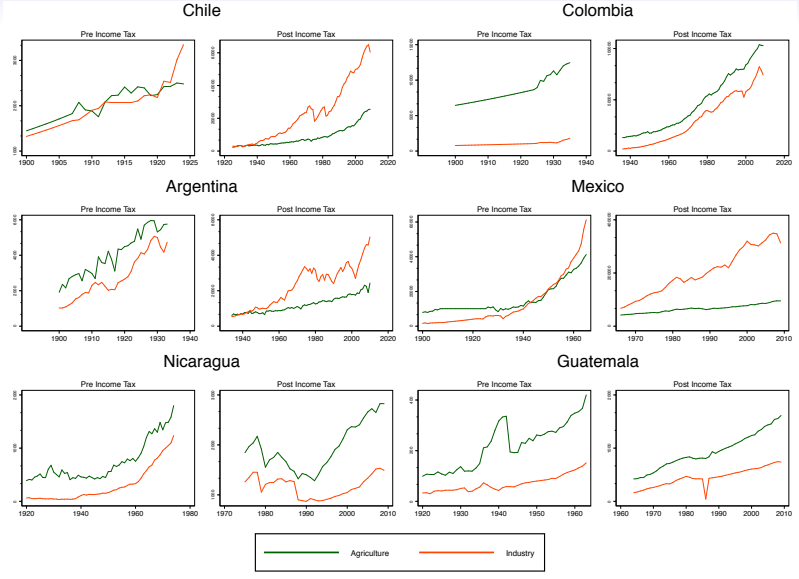
War was in 1891, but Income Tax in 1924?

- Civil wars of **1851-859** and **1891** between a "**large landed property** [**elite against a**] **productive capital** [**elite**]."
- President **Balmaceda's overthrowing in 1891** explains the sectoral nature of these conflicts.
- He was mainly supported by the landed elites, but later overthrown in 1891 by a mainly industrial/mining coalition:
  - His agenda on "industrial" infrastructure benefited mostly agricultural areas.
  - his attitude towards the banking sector (closely linked to the mining sector) confiscatory.
- At the same time, however, he failed to secure a coalition with his own sector.
  - Decline of wheat exports. Balmaceda's policies fostered sectoral dependence of agriculture on industrial production, forcing the "landed proprietors [to] become dependent to a considerable extent on the continuing prosperity of the major nitrate capitalists." (Zeitlin).
  - While it would be inaccurate to say that Balmaceda was *completely* supported by agriculturalists and *completely* opposed by industrialists, this example illustrates how (failed) inter-sectoral alliances and biased public goods provision against industrialists led these two groups to a military conflict in 1891.
  - The conflict left a permanent scar in the Chilean society. While the civil war lasted only nine months, it took 10,000 lives (out of a total population of 3 million people) and cost more than $ 100 million,a significant amount for a small country.
  - There was an intention to avoid more violence. For instance, while all "ministers, counselors of state, members of the constituent congress [,] municipal officials, provincial governors and intendants, members of the judiciary and even the lowest functionaries and ordinary employees of Balmaceda's government were investigated [or] brought to trial," there were a number of amnesties issued. Similarly, there were a number of *aborted* coups in 1907, 1912, 1915 and 1919. I identify a third additional factor. War was more likely to exhaust all existent assets without producing positive outcomes for either sector, putting pressures for a sectoral compromise.

Country	Time Frame	Sector	Augmented Dickey-Fuller	Phillips-Perron	KPSS	Conclusion
Chile	Pre	Agriculture	-1.185 (0.68)	-1.241 (0.66)	.1027	I(1)
		Industry	2.310 (0.99)	2.556 (0.99)	.1137	I(1)
	Post	Agriculture	4.557 (1.00)	5.40 (1.00)	.289	I(1)
		Industry	0.908 (0.99)	1.458 (0.99)	.249	I(1)
	All	Agriculture	5.521 (1.00)	6.722 (1.00)	.31	I(1)
		Industry	1.582 (0.99)	2.385 (0.99)	.314	I(1)
Columbia	Pre	Agriculture	2.709 (0.99)	2.414 (0.99)	.204	I(1)
		Industry	2.103 (0.99)	3.257 (1.00)	.183	I(1)
	Post	Agriculture	2.392 (0.99)	3.156 (1.00)	.282	I(1)
		Industry	0.520 (0.98)	1.044 (0.99)	.241	I(1)
	All	Agriculture	4.256 (1.00)	5.893 (1.00)	.372	I(1)
		Industry	1.674 (0.99)	2.707 (0.99)	.374	I(1)
Argentina	Pre	Agriculture	-0.849 (0.80)	-1.201 (0.67)	.08017	I(1)
		Industry	-0.495 (0.89)	-0.378 (0.91)	.1157	I(1)
	Post	Agriculture	1.197 (0.99)	1.093 (0.99)	.277	I(1)
		Industry	0.228 (0.97)	0.381 (0.98)	.09017	I(1)
	All	Agriculture	1.484 (0.99)	1.401 (0.99)	.332	I(1)
		Industry	1.007 (0.99)	1.237 (0.99)	.183	I(1)
Mexico	Pre	Agriculture	4.601 (1.00)	5.552 (1.00)	.288	I(1)
		Industry	5.803 (1.00)	10.776 (1.00)	.29	I(1)
	Post	Agriculture	0.599 (0.9875)	0.497 (0.99)	.1067	I(1)
		Industry	-1.255 (0.65)	-0.582 (0.75)	.1137	I(1)
	All	Agriculture	3.431 (1.00)	3.607 (1.00)	.341	I(1)
		Industry	0.672 (0.99)	2.020 (0.99)	.397	I(1)
Nicaragua	Pre	Agriculture	2.473 (0.99)	2.335 (0.99)	.25	I(1)
		Industry	4.958 (1.00)	9.100 (1.00)	.244	I(1)
	Post	Agriculture	-0.154 (0.94)	0.154 (0.97)	.2	I(1)
		Industry	-1.237 (0.6577)	-1.176 (0.68)	.189	I(1)
	All	Agriculture	0.636 (0.99)	0.759 (0.99)	.1167	I(1)
		Industry	-0.164 (0.94)	-0.090 (0.95)	.123	I(1)
Guatemala	Pre	Agriculture	-0.393 (0.91)	-0.343 (0.92)	.06397	I(1)
		Industry	1.358 (0.99)	1.704 (0.99)	.199	I(1)
	Post	Agriculture	1.786 (0.99)	1.965 (0.99)	.162	I(1)
		Industry	-0.998 (0.75)	-1.352 (0.61)	.09157	I(1)
	All	Agriculture	3.349 (1.00)	3.714 (1.00)	.321	I(1)
		Industry	0.413 (0.98)	0.017 (0.96)	.288	I(1)

Country	Number of Cointegrated Vectors (rank)	Restrictions	Lags	Log-Likelihood	Trace
Chile	at least 1	Restricted Constant	5	-1665.9736	0.3799
Argentina	at least 1	Restricted Constant	3	-1802.292	4.7657
Colombia	at least 1	Restricted Trend	2	-1805.6773	10.0076
Mexico	at least 1	Restricted Constant	4	-1978.1322	1.0274
Nicaragua	0	Restricted Constant	2	-1020.221	11.5297
Guatemala	0	Trend	3	-859.2802	16.5493

Country	Time Frame	Number of Lags	LM	Normally Tests			Stability Condition
				Jarque-Bera	*Skewness*	*Kurtosis*	
Chile	Pre	4	✓	✓	✓	✓	✓
	Post	2	✓	✓⁻	✓⁻	✓⁻	✓
Colombia	Pre	1	✓⁻	✗	✗	✗	✓
	Post	1	✓	✓⁻	✓⁻	✓⁻	✓
Argentina	Pre	2	✓	✓	✓	✓	✓
	Post	2	✓	✓⁻	✓	✓⁻	✓
Mexico	Pre	1	✓	✓⁻	✓⁻	✓⁻	✓
	Post	2	✓	✓	✓	✓	✓
Nicaragua	Pre	2	✓	✓⁻	✓⁻	✓⁻	✓
	Post	1	✓	✓⁻	✓⁻	✓⁻	✓
Guatemala	Pre	3	✓	✗	✓⁻	✓⁻	✓
	Post	1	✓⁻	✓⁻	✓⁻	✓⁻	✓



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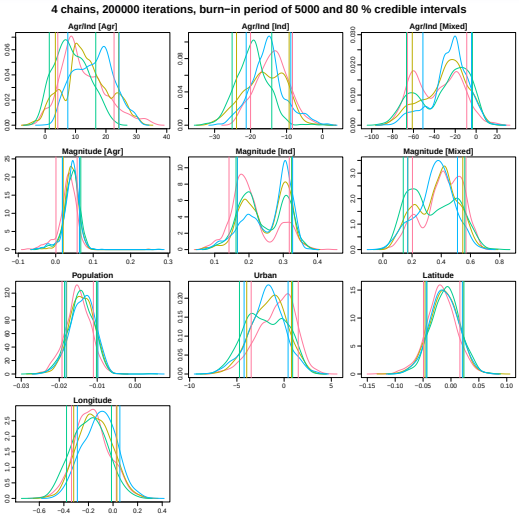
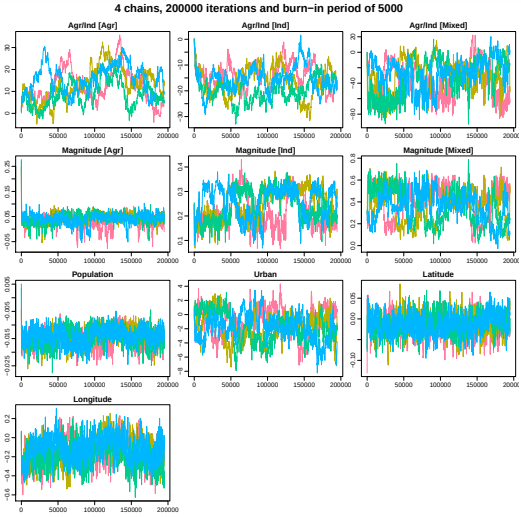
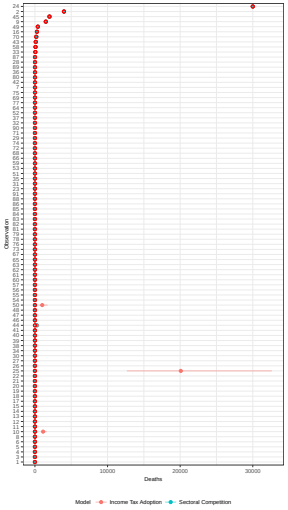
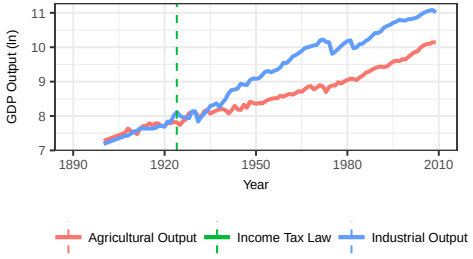
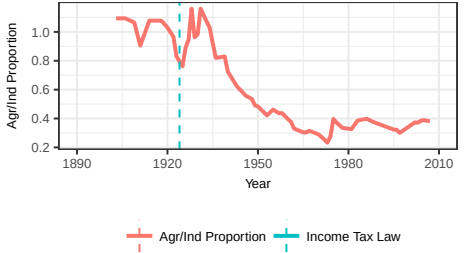
Country	Pre/Post Income Tax	Sample	Directionality	chi2	P-value
Chile	Pre	1905 - 1924	Agriculture → Industry	3.55	0.47
			Industry → Agriculture	12.13	0.02
	Post	1928 - 2009	Agriculture → Industry	11.92	0.00
			Industry → Agriculture	5.37	0.07
Colombia	Pre	1902 - 1935	Agriculture → Industry	4.96	0.03
			Industry → Agriculture	10.44	0.00
	Post	1938 - 2009	Agriculture → Industry	4.32	0.04
			Industry → Agriculture	1.63	0.20
Argentina	Pre	1903 - 1933	Agriculture → Industry	4.19	0.12
			Industry → Agriculture	.42	0.81
	Post	1937 - 2010	Agriculture → Industry	.18	0.91
			Industry → Agriculture	1.37	0.50
Mexico	Pre	1902 - 1965	Agriculture → Industry	.73	0.39
			Industry → Agriculture	11.57	0.00
	Post	1969 - 2009	Agriculture → Industry	5.56	0.06
			Industry → Agriculture	1.32	0.52
Nicaragua	Pre	1923 - 1974	Agriculture → Industry	.48	0.79
			Industry → Agriculture	6.83	0.03
	Post	1977 - 2009	Agriculture → Industry	.014	0.91
			Industry → Agriculture	4.96	0.03
Guatemala	Pre	1924 - 1963	Agriculture → Industry	2.18	0.54
			Industry → Agriculture	6.72	0.08
	Post	1966 - 2009	Agriculture → Industry	.58	0.45
			Industry → Agriculture	6.05	0.01


4 chains, 200000 iterations, burn−in period of 5000 and 80 % credible intervals
Agr/Ind [Agr]
Agr/Ind [Ind]
Agr/Ind [Mixed]
Magnitude [Agr]
Magnitude [Ind]
Magnitude [Mixed]
Population
Urban
Latitude
Longitude


4 chains, 200000 iterations and burn−in period of 5000
Agr/Ind [Agr]
Agr/Ind [Ind]
Agr/Ind [Mixed]
Magnitude [Agr]
Magnitude [Ind]
Magnitude [Mixed]
Population
Urban
Latitude
Longitude


Observation
Deaths
0
10000
20000
30000
Model
Income Tax Adoption
Sectoral Competition


GDP Output (ln)
11
10
9
8
7
1890
1920
1950
1980
2010
Year
Agricultural Output
Income Tax Law
Industrial Output


Agr/Ind Proportion
1.0
0.8
0.6
0.4
0.2
1890
1920
1950
1980
2010
Year
Agr/Ind Proportion
Income Tax Law

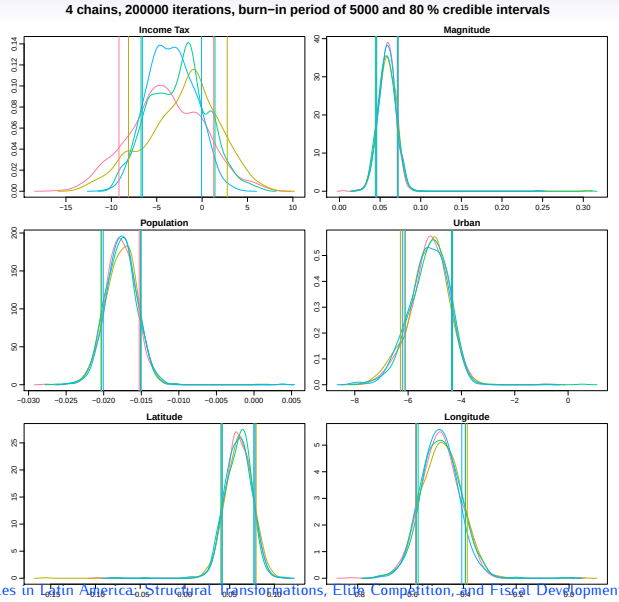
	Mean	SD	Lower	Upper	Pr.
Agr/Ind [Agr]	12.68	7.21	3.73	22.65	0.98
Agr/Ind [Ind]	-16.26	5.30	-23.17	-9.62	1.00
Agr/Ind [Mixed]	-30.73	21.74	-63.78	-4.89	0.95
Magnitude [Agr]	0.04	0.02	0.01	0.06	0.95
Magnitude [Ind]	0.24	0.07	0.16	0.32	1.00
Magnitude [Mixed]	0.37	0.14	0.17	0.55	1.00
Latitude	-0.01	0.03	-0.05	0.02	0.69
Longitude	-0.16	0.14	-0.34	0.03	0.85
Population	-0.01	0.00	-0.02	-0.01	1.00
Urban	-1.54	2.01	-4.22	1.00	0.76

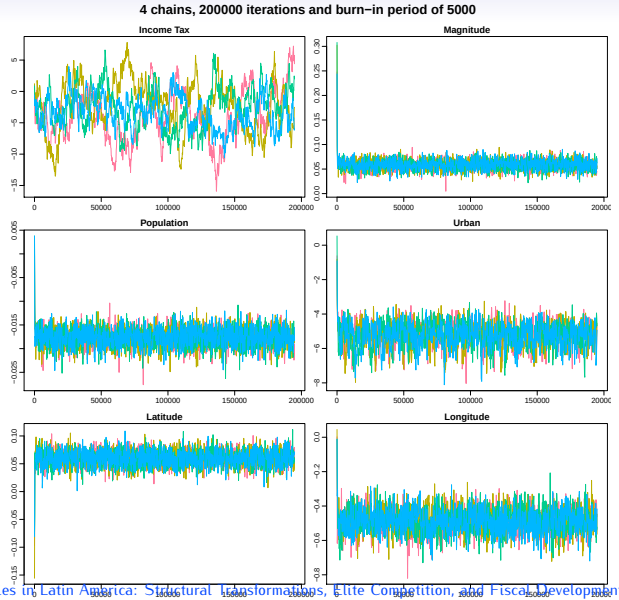
Note: 200000 iterations with a burn-in period of n = 5000 iterations discarded.

80% credible intervals (upper/lower bounds). All R-Hat statistics below critical levels.

Standard convergence diagnostics suggest good mixing and convergence.

Year fixed effects were omitted in the table.


4 chains, 200000 iterations, burn−in period of 5000 and 80 % credible intervals
Income Tax
Magnitude
Population
Urban
Latitude
Longitude


4 chains, 200000 iterations and burn−in period of 5000
Income Tax
Magnitude
Population
Urban
Latitude
Longitude

	Mean	SD	Lower	Upper	Pr.
Income Tax	-3.01	3.55	-7.55	1.41	0.81
Magnitude	0.06	0.01	0.04	0.07	1.00
Latitude	0.06	0.01	0.04	0.08	1.00
Longitude	-0.49	0.07	-0.58	-0.39	1.00
Population	-0.02	0.00	-0.02	-0.02	1.00
Urban	-5.22	0.73	-6.19	-4.35	1.00

Note: 200000 iterations with a burn-in period of n = 5000 iterations discarded.

80% credible intervals (upper/lower bounds). All R-Hat statistics below critical levels.

Standard convergence diagnostics suggest good mixing and convergence.

Year fixed effects were omitted in the table.

A total of 4 chains were run. Detailed diagnostic plots available here.

Thank you!

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- **Code/Data**: GitHub hbahamonde

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