

# Resource Windfalls and Public-Sector Employment: Evidence from Municipalities in Chile

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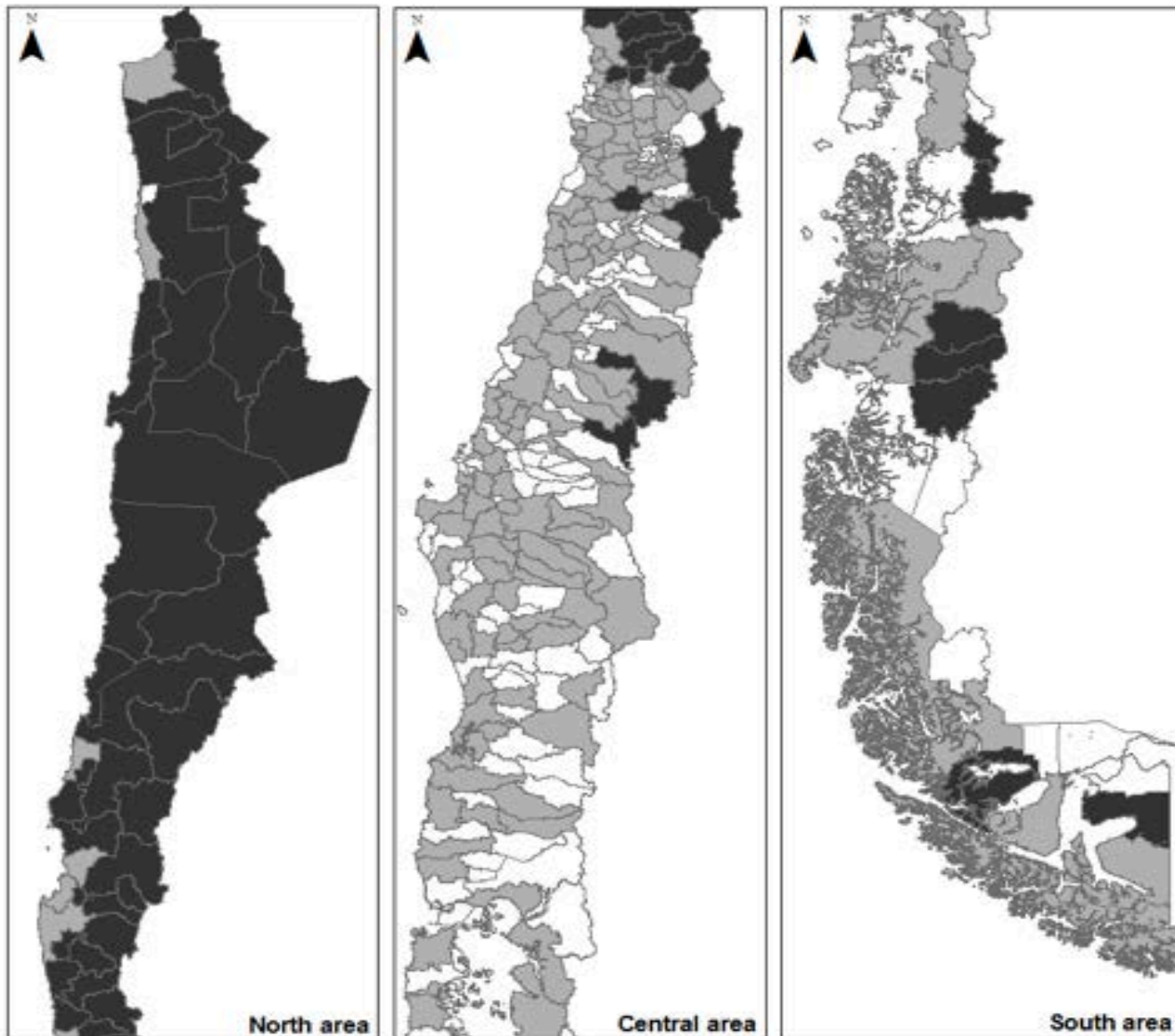
# What happens when a government increases its income from natural resources?

- Should the people be optimistic about this extra income? Will the additional resource revenues translate into better living standards?
- A large literature has analyzed the consequences of natural resource abundance on developing economies.
  - The resource curse hypothesis
  - Multiple possible channels
    - Competitiveness
    - Volatility
    - Institutions
    - **Political economy**
- We focus on the effects of resource revenues through the political process.
  - The government suddenly finds itself with a larger budget (a resource windfall).
  - Incentives to expand public employment in exchange of political support.
- **We study the effect of extra resource revenues on employment expenditures at the municipal level in Chile.**

# The 2005s change to mining law in Chile: A novel quasi-experiment

- Previous empirical evidence on the effect of natural resources is not conclusive: Limitations of cross-country comparisons.
- A new wave of empirical studies is focusing on within-country analysis and quasi-experiments (resource discoveries, legal reforms).
  - Caselli and Michaels (2013).
  - Dube and Vargas (2013).
  - Loayza and Rigolini (2016).
- **The 2005s mining reform in Chile: The portion of mining patents assigned to municipalities where mines operate increased from 30 to 50 per cent.**
  - Patents are the right that mining companies have to pay to operate in the territory.
  - This is the only income that municipalities receive from mining.
- **We analyze municipal spending's by comparing mining municipalities to their peers located in nonproducing areas, which were not affected by the mining reform.**

The mining municipalities group (black) is defined as having more than 5 per cent of their own income from mining patents in 2005, while the non-mining group (white) are those that did not have any income from mining.



# Theoretical framework: What should we expect from a resource windfall?

- The Robinson, Torvik and Verdier model (2006, 2014)
  - **An increase in fiscal revenues from natural resources induces the creation of unproductive jobs in the public sector.**
  - Since the probability of staying in power is an increasing function of active political supporters, the incumbent has incentives to expand public-sector employment in exchange of political support.
- **The role of institutions:** The feasibility of patronage is limited by the level of accountability.
  - A resource windfall increases total income if accountability is strong, but may decrease income if political institutions are weak due to the efficiency loss of unproductive public jobs.
- **The debate on fiscal decentralization:** Local governments may not face the same levels of accountability than the central government.
  - Chile 's overall institutions compare well to OECD countries, but what about municipalities?

# Empirical Strategy: A difference-in-differences approach

- **A extended diff-in-diffs estimation:**

$$Y_{ctr} = \alpha + \beta PostxMining_{ct} + \sum_{r=1}^{15} \rho_r Region_r + \sum_{t=2001}^{2015} \rho_t Year_t + \theta X_{ct} + \epsilon_{ctr}$$

$Y_{ct}$  = municipal outcomes

$Post$  = dummy that take a value of 1 the years after the legal reform

$Mining$  = a dummy that take a value of 1 if the municipality is a mining municipality

$X_{ct}$  = a set of geographical controls

- **A standard diff-in-diffs estimation:**

$$Y_{ct} = \alpha + \delta Post_{ct} + \gamma Mining_{ct} + \beta PostxMining_{ct} + \theta X_{ct} + \epsilon_{ct}$$

## Descriptive statistics

	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
<b>Mining municipalities (46)</b>						
	2001-2005			2006-2015		
Total salaries per capita	226	47.78	65.23	458	94.09	169.77
Long-term salaries per capita	226	36.08	46.17	458	68.74	120.4
Annual-term salaries per capita	226	7.77	11.47	458	18.14	35.55
Short-term salaries per capita	226	3.93	8.55	458	7.21	16.83
Allowances to municipal Council per capita	226	6.97	16.17	458	17.38	49.2
Travel expenses per capita	226	7.39	19.72	458	9.13	30.34
<b>Non-mining municipalities (123)</b>						
	2001-2005			2006-2015		
Total salaries per capita	609	32.76	36.32	1,226	56.99	80.35
Long-term salaries per capita	608	25.67	28.41	1,226	42.16	60.36
Annual-term salaries per capita	608	5.02	5.3	1,226	10.61	13.83
Short-term salaries per capita	608	2.08	5	1,226	4.21	11.88
Allowances to municipal council per capita	608	3.1	7.04	1,226	5.89	14.55
Travel expenses per capita	608	1.47	3.26	1,226	1.94	4.13

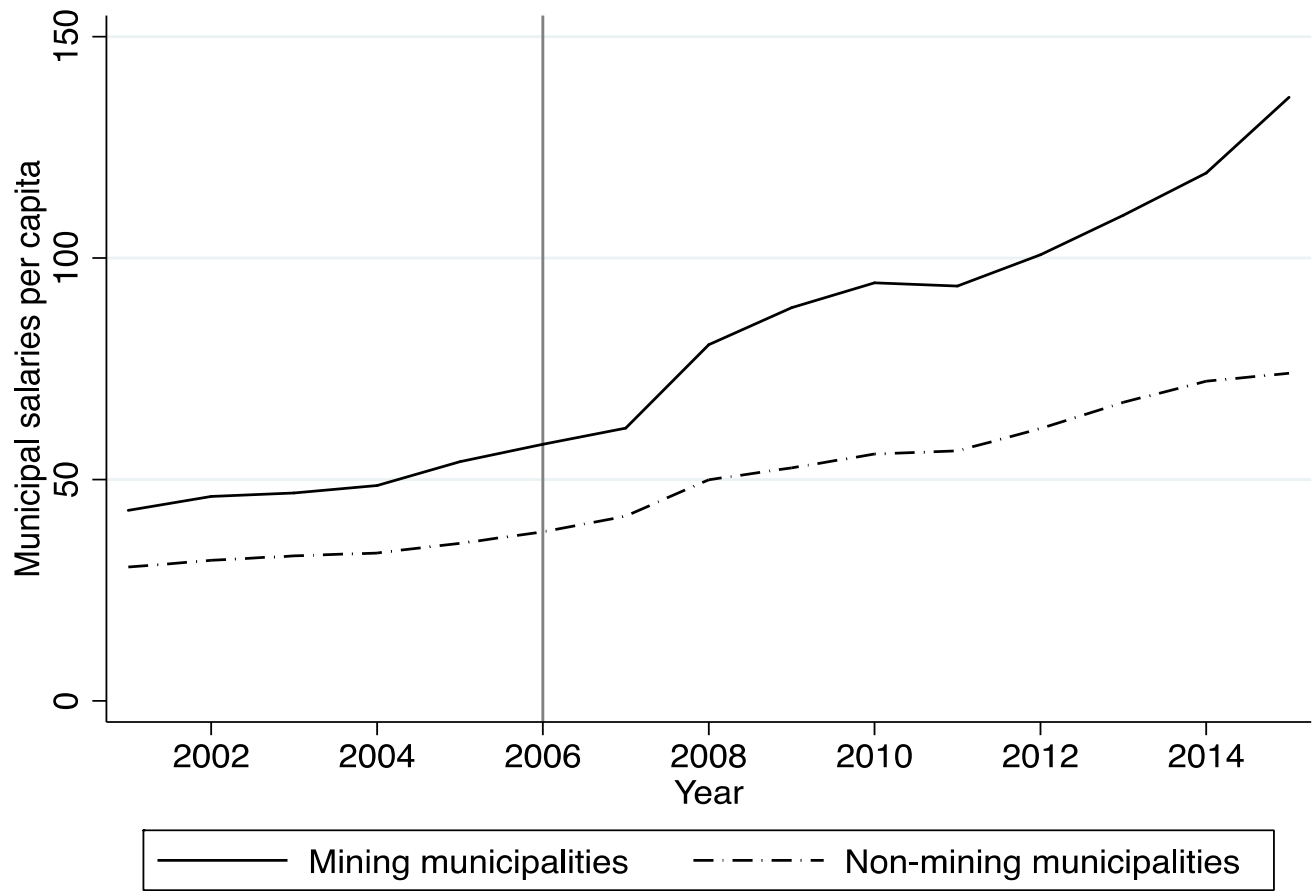
Notes: All variables are expressed in thousands of Chilean pesos at constant prices of 2015.

## More descriptive statistics

	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Mining municipalities (46)						
	2001-2005			2006-2015		
Municipal revenues per capita	228	314.6	447.4	458	527.58	805.9
Municipal investment per capita	226	58.72	88.4	458	82.59	118.6
Transfers to education per capita	226	23.44	32.42	459	40.47	54.38
Transfers to health per capita	226	12.43	15.03	458	19.92	26.38
Transfer to community programs per capita	226	1.57	4.56	458	3.46	7.24
Total communal area (km <sup>2</sup> )	225	64.12	67.3	457	64.63	66.83
Distance to the regional capital (km)	230	169.3	114.9	460	169.3	114.8
Province (=1, outside the Metropolitan region)	230	0.956	0.204	460	0.956	0.204
Non-mining municipalities (123)						
	2001-2005			2006-2015		
Municipal revenues per capita	609	176.2	197.6	1,226	284.6	369.5
Municipal investment per capita	608	30.62	50.11	1,226	44.59	101.4
Transfers to education per capita	608	15.17	24.34	1,226	23.15	43.1
Transfers to health per capita	608	7.93	9.79	1,226	13.41	24.9
Transfer to community programs per capita	608	0.74	1.43	1,225	1.83	3.06
Total communal area (km <sup>2</sup> )	587	5.42	7.17	1,218	6.63	10.91
Distance to the regional capital (km)	615	108.7	338.4	1,230	108.7	338.2
Province (=1, outside the Metropolitan region)	615	0.756	0.43	1,230	0.756	0.43

Notes: All variables are expressed in thousands of Chilean pesos at constant prices of 2015.





# Results

# A first check: Did extra mining patents significantly increase the municipal budget?

Dependent variable: Municipal revenues per capita	Treatment group: Mining >5%		Treatment group: Mining >0%		Treatment group: Mining >2.5%		Treatment group: Mining >10%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post x mining	93.5**	89.3*	-7.64	-13.16	64.84*	71.84*	160.10***	112.89*
	(41.19)	(48.72)	(12.02)	(17.10)	(35.04)	(43.10)	(60.09)	(48.00)
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	No	Yes	No	Yes	No	Yes	No
Time FE	Yes	No	Yes	No	Yes	No	Yes	No
Observations	2,479	2,479	4,825	4,825	2,584	2,584	2,322	2,322



## Additional evidence: We evaluate the effect on allowances received by the municipal Council and travel expenses in mining municipalities

Dependent variable:	Allowances to the Municipal Council per capita (1)	Allowances to the Municipal Council per capita (2)	Travel expenses of municipal employees per capita (3)	Travel expenses of municipal employees per capita (4)
Post x mining	8.09*** (2.54)	7.09*** (2.54)	3.27** (1.45)	0.85 (1.93)
Geographic controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Observations	2,476	2,476	2,476	2,476



# Robustness Check

# Alternative treatment groups

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Total municipal salaries per capita	Treatment group: Mining >4%	Treatment group: Mining >3%	Treatment group: Mining >2%	Treatment group: Mining >1%	Treatment group: Mining >0%
Post x mining	18.33** (7.81)	16.35** (7.54)	13.82** (6.38)	8.88* (4.65)	-1.52 (2.48)
Geographic controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes	Yes
Observations	2,506	2,536	2,640	2,850	4,821



# Alternative post-treatment periods

Dependent variable:	Post-treatment period from 2006 to:								
	2015 (1)	2014 (2)	2013 (3)	2012 (4)	2011 (5)	2010 (6)	2009 (7)	2008 (8)	2007 (9)
Total municipal salaries per capita									
Post x mining	19.86** (8.44)	18.08** (8.32)	17.83** (8.24)	17.42** (8.29)	17.08** (8.44)	16.83* (8.72)	15.66* (8.55)	13.59 (8.75)	8.74 (9.31)
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,476	2,309	2,140	1,971	1,803	1,634	1,465	1,298	1,135

## Alternative control groups

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Total municipal salaries per capita	Control group: Municipalities with mining <5% (full sample)	Control group: Municipalities with mining between 0% and 5%	Control group: Non-mining municipalities located in the North-center area	Control group: Non-mining municipalities located in the South-center area	Control group: Non-mining municipalities located in the Metropolitan region
Post x mining	34.11*** (6.73)	24.74*** (5.61)	23.60** (10.82)	15.71** (7.89)	30.19*** (7.07)
Geographic controls	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	No	Yes
Observations	4,821	3,021	986	2,166	1,126

# Concluding Remarks

## Concluding remarks

- We found that the increase in mining patents assigned to municipalities in Chile translated into a **significant expansion of municipal employment expenditures**.
  - This result is consistent to Robinson, Torvik and Verdier (2006, 2014) model.
  - Resource windfalls can induce the creation of unproductive jobs in the public sector.
- We also found a **positive effect on allowances to the municipal Council** and travel expenses. We did not find a significant effect on municipal investment, transfers to health or transfers to community programs, while the effect on educational spending's, is less than half the impact on municipal employment expenditures.
- Our findings have several **implications for the fiscal decentralization debate** in resource-abundant economies: a fiscal decentralization process should be accompanied by improvements in accountability at the local level.
- Further research: **Is natural resources income different to other sources of public income?**
  - Some previous works suggest that natural resource income is more likely to generate corruption. Work in progress!

Thanks!