

The effect of high dismissal protection on bureaucratic turnover and productivity

Ricardo Estrada¹ María Lombardi²

¹CAF-Development Bank of Latin America

²Universidad Torcuato Di Tella

Dismissal protection in the public sector

- Job stability is a key feature of most public sector jobs (including **teaching**) → firing is restricted to exceptional circumstances
- Yet, we know little about its effect on the quality of public services

Impact of dismissal protection on the quality of education

- Job security can improve education quality:
 - reduces switching costs of teacher turnover
 - increases appeal of teaching for people with good outside options → **improves** pool of teachers
 - increases schools' and teachers' returns to investing in their jobs → **improves** productivity
- But it comes at a cost:
 - inability to fire teachers with poor performance → **worsens** pool of teachers
 - weaker incentives to perform on the job → **worsens** productivity
 - less flexibility to adapt teaching workforce to changes in demand for education across disciplines/geographical areas

- **Research question:** What is the impact of high dismissal protection on turnover and productivity?
- **Context:** public sector teachers in Chile. Focus on dismissal protection granted on the basis of seniority
- **Identification:** 2015 law mandated the granting of permanent contracts to temporary teachers that had a minimum level of seniority by 2014
- **Model:** difference-in-differences estimation comparing outcomes of teachers who are affected and unaffected by the law

Hiring of teachers in Chilean public schools

- Public education in Chile is run by municipal governments (346 municipalities)
- Municipalities can hire teachers under permanent or temporary contracts
 - Permanent teachers are hired through a competitive process
 - Temporary teachers are hired by direct appointment, and their contracts last up to two years (but can be renewed)
- Both types of contracts have same pay, but very different dismissal protection
 - Temporary workers can be fired without severance pay when their contract runs out
- Law caps share of temporary contracts at 20 %, but compliance is low Temporary contracts
 - 59 % of teachers had a temporary contract in 2014



Regularization of temporary teachers in Chile

- In January 2015, Congress enacted a law requiring that municipal governments grant permanent contracts to public school teachers with temporary contracts
- Covered teachers that by mid-2014 had worked in the same municipality for at least 3 consecutive or 4 non-consecutive years (for 20+ hours a week)
 - Almost 1/3 of temporary K-12 teachers fulfilled these conditions
- This was a **one-off event**
- Once the law was passed, eligible teachers had the right to high dismissal protection, even if their contractual status did not instantly change Implementation

Impact on turnover

1) Database with every teaching position in Chile since 2003

- Characteristics of the position: number of contract hours and type of contract (temporary or permanent)
- Teacher identifiers allow tracking teachers across years and positions

2) Teacher evaluation results → measure of teacher ability

Descriptive statistics

Treatment and comparison groups

Sample: public school teachers that in each year of 2010–2014 had exactly 2 or 3 years of consecutive experience in a municipality under a temporary contract

- **Treatment group**: teachers with 3 years of consecutive experience
- **Comparison group**: teachers with 2 years of consecutive experience

Exclude teachers working less than 20 hours a week, and teachers who are 55 years or older due to proximity to retirement age (< 6 % of the sample)

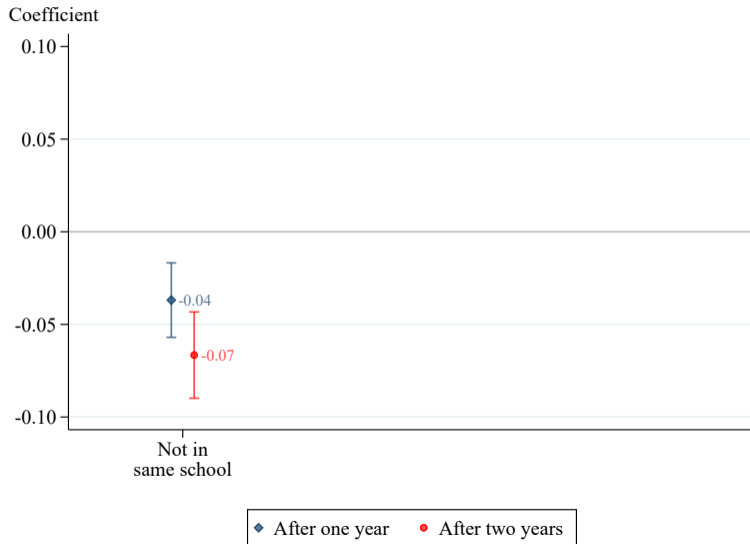
Estimation strategy

$$Y_{ic} = \beta_1 Treated_{ic} + \beta_2 Treated_{ic} \times I[c = 2014] + \gamma_c + U_{ic}$$

- Y_{ic} : dummies for whether teacher i from cohort c is not in the same school after 1 and 2 years
- $Treated_{ic}$: dummy or whether teacher i has three years of consecutive experience in the municipality of their school by year c , with $c \in [2010, 2014]$
- $I[c = 2014]$: dummy for 2014 cohort (0 for 2010-2013)
- γ_c : cohort FE
- Standard errors are clustered at the teacher level

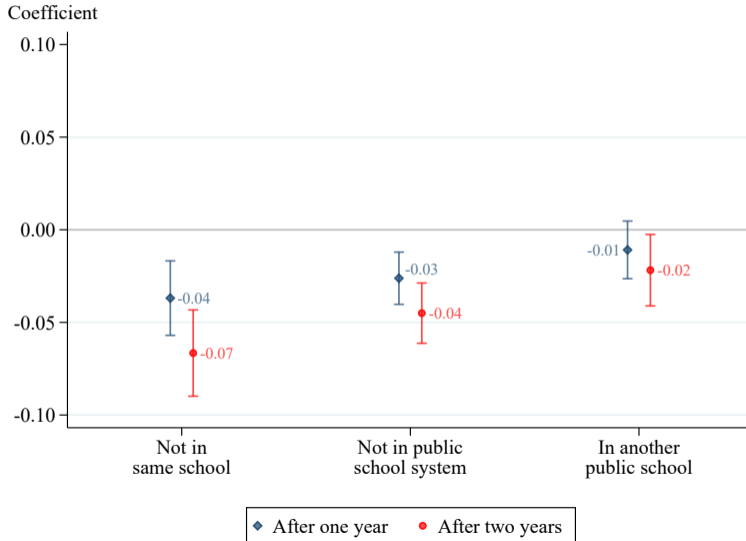
Identifying assumption: → **parallel trends**

Impact of dismissal protection on teacher turnover



Dismissal protection leads to a **6.7 pp (25 percent) reduction in turnover after two years**

Impact of dismissal protection on teacher turnover

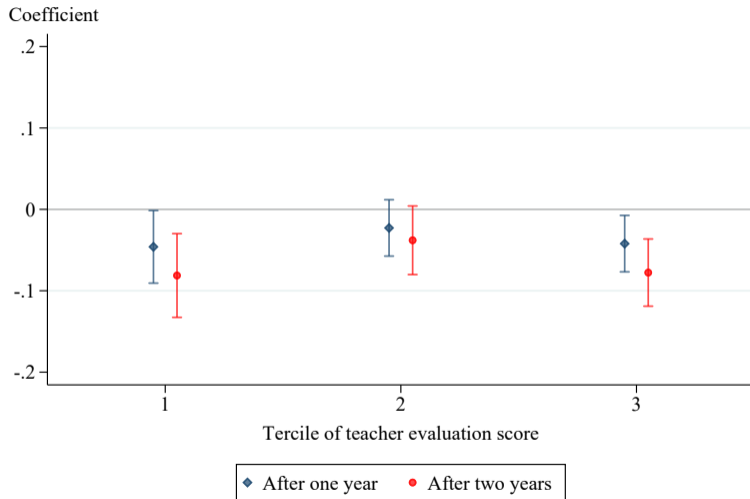


- 2/3 of the reduction in turnover is driven by a drop in the likelihood of not working in the public school system
- Remainder comes from lower probability of working in another public school

[More results](#)

[Validity checks](#)

Heterogeneous effects by (baseline) teacher evaluation scores



Statistically significant
reduction in turnover for the
bottom and top terciles



**Average quality of teachers
unchanged**

Impact on student learning

Estimating the effect of dismissal protection on teacher productivity

- We proxy teacher productivity by value-added to student achievement
- Use math and literacy scores from a national standardized test that all students take at the end of grade 6 (and we control for grade 4 scores)
- We use the 2015 law as an exogenous shifter in the probability of obtaining high dismissal protection
- Differences in differences estimation comparing performance of students taught by:
 - “treated teachers” (had a temporary contract and at least three years of seniority the previous year) vs
 - the other teachers

Estimating the effect of dismissal protection on teacher productivity

- Identification assumption: parallel trends
- Potential concern: sorting of students in 2015 (e.g., best students are assigned to treated teachers in 2015)
- Take advantage of the fact that students may be taught by treated teachers in some subjects but not in others → **within-student, across-subject estimation**
- Unlikely that sorting is subject-specific

Estimation strategy

We use data on 6th grade students in 2013–2015, and estimate the following equation:

$$Score_{is} = \beta_1 Treated_{is} + \beta_2 Treated_{is} \times 2015_i + \beta_3 Lagged\ Score_{is} + \theta_i + \delta_s + U_{is}$$

- $Score_{is}$: score of student i in subject s (math or literacy) in grade 6 (z-score)
- $Treated_{is}$: dummy for whether the teacher of student i in subject s (math or literacy) had a temporary contract and at least three years of seniority the year before
- 2015_i : dummy for the year 2015 (0 in 2013-2014)
- $Lagged\ score_{is}$: score of student i in subject s (math or literacy) in grade 4
- θ_{ic} and δ_s : student and subject FE
- We include teacher FE in some estimations

Standard errors clustered at the teacher-year level (Abadie et. al, 2017)

Impact of dismissal protection on student test scores

	(1)	(2)
Treated × 2015	-0.017 (0.015)	-0.010 (0.018)
Treated	0.025*** (0.010)	0.023 (0.020)
Lagged score	0.426*** (0.003)	0.417*** (0.003)
Observations	416,948	416,898
R ²	0.833	0.852
Student-year FE	✓	✓
Teacher FE		✓

We find **no effect on student learning** (can reject a drop in test scores larger than 4.6 % of a SD, and an increase larger than 1.2 % of a SD) Validity checks

Heterogeneous effects by teacher evaluation score

	(1)	(2)
Treated × 2015	-0.034 (0.023)	-0.057** (0.028)
Treated × 2015 × Teacher evaluation above median	0.038 (0.032)	0.091** (0.036)
R ²	0.834	0.852
P-value: sum coefficients=0	0.888	0.176
Treated × 2015	-0.003 (0.029)	-0.068* (0.035)
Treated × 2015 × Middle tercile teacher evaluation	-0.017 (0.039)	0.065 (0.045)
Treated × 2015 × Top tercile teacher evaluation	-0.008 (0.040)	0.103** (0.046)
R ²	0.834	0.852
P-value: sum coefficients middle tercile=0	0.463	0.919
P-value: sum coefficients top tercile=0	0.672	0.276
Observations	319,592	319,562
Lagged scores and student-year FE	✓	✓
Teacher FE		✓

- Keeping the pool of teachers constant (including teacher FE), we find a **negative effect** on student learning for students of **teachers with low evaluation scores**
- Mechanism: **lower effort**

Direct evidence on changes in effort

Conclusion

- We find that granting permanent contracts **on the basis of seniority** leads to a large reduction in teacher turnover throughout the teacher quality distribution
- Also find a decline in student learning for students of teachers with low baseline performance
- High dismissal protection is a double-edged sword:
 - Helps retain high-performing employees with good outside options,
 - but makes it more difficult to separate and motivate low-performing employees

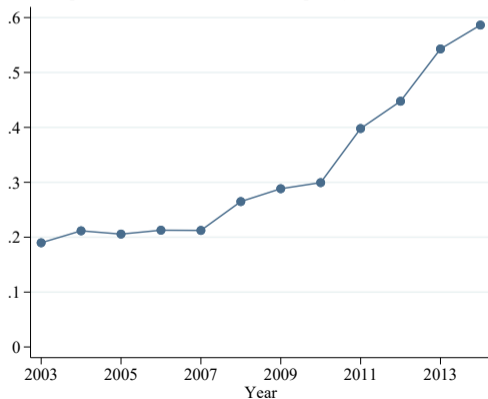
Temporary teachers in Chile

To retain certain flexibility in response to waning enrollment, municipal governments started relying more on temporary contracts (without reducing the size of the teaching force)

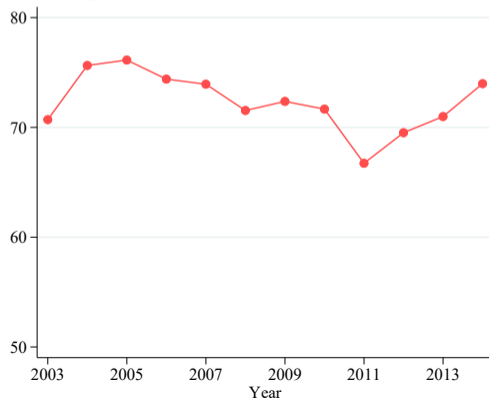
[Stats enrollment](#)

[Back](#)

Share of public school teachers with temporary contracts

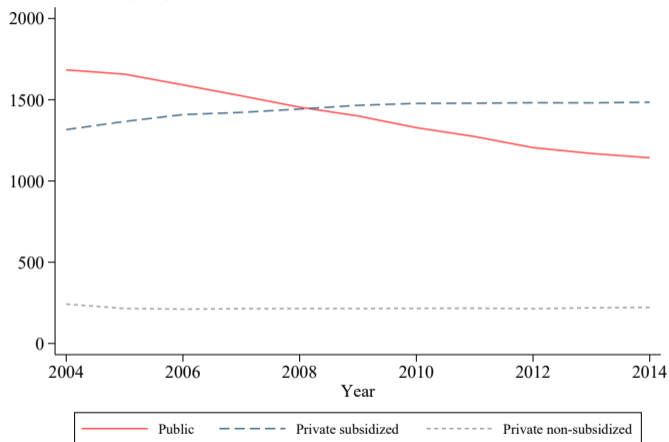


Number of public school teachers (000s)



Public education in Chile

Total enrollment (000s)



Public schools have been losing students to private subsidized schools

[Back](#)

Implementation of the reform

Share of teachers



Not all eligible teachers were granted a permanent contract right away

But once the law was passed, eligible teachers had the right to high dismissal protection, even if their contractual status did not instantly change [Back](#)

Descriptive statistics

	Two years experience	Three years experience
<i>Baseline characteristics</i>		
Age	33.701	34.754
Female	0.751	0.750
Has an education degree	0.928	0.934
Rural school	0.252	0.257
Number of weekly hours teaching	33.157	33.247
Teaches primary school	0.786	0.784
Works in more than one school	0.090	0.089
Share students low SES	0.610	0.618
Was evaluated	0.761	0.831
Percentile in teaching evaluation	51.014	51.440
<i>Outcome variables (after two years)</i>		
Not working in the same school	0.295	0.248
Left public school system	0.138	0.104
Working in private school	0.061	0.043
Not teaching	0.077	0.060
Working in a different public school	0.157	0.145
Working in a different public school in the same municipality	0.113	0.109
Working in a public school in another municipality	0.044	0.036

[Back](#)

Validity checks

- No differential pretrends in likelihood of obtaining a permanent contract and leaving the school
- Differential characteristics of teachers with 2 and 3 years of experience are time invariant
- No differential turnover in placebo estimations with: (i) teachers with permanent contracts and 2 and 3 years of experience, and (ii) teachers with temporary contracts with 3 and 4 years of experience
- Our results are not driven by a change in turnover of the comparison group (spillovers)

[Pretrends](#)

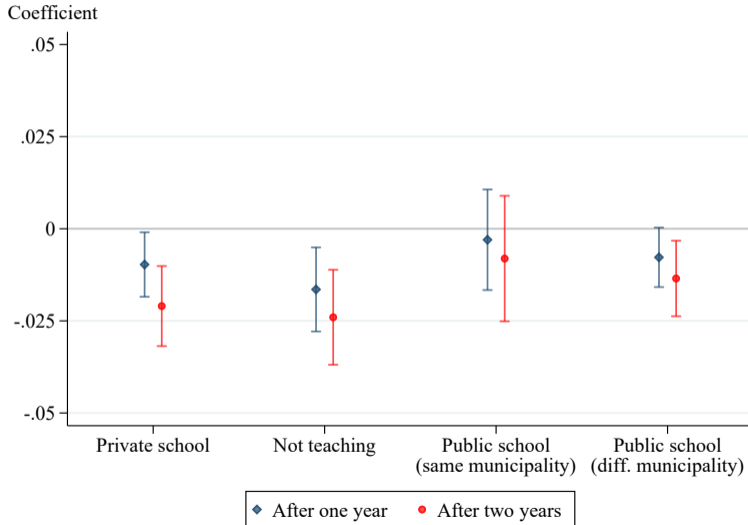
[Balance](#)

[Placebo](#)

[Spillovers](#)

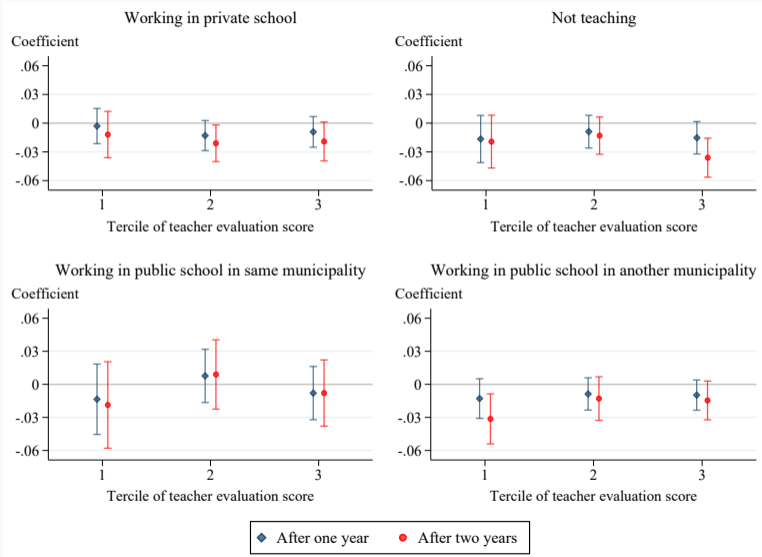
[Back](#)

Impact of dismissal protection on teacher turnover



- Lower likelihood of leaving public school system equally driven by jobs in private schools and exit from the profession
- Lower movements within public school system driven by teachers who would have gone to another municipality

Impact of dismissal protection on teacher turnover – by evaluation score



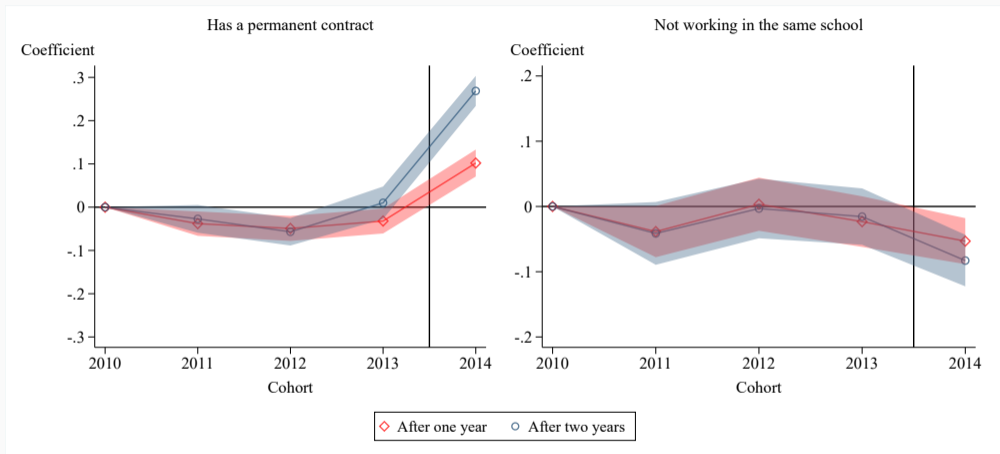
Identification assumption – Parallel trends

We examine the validity of this assumption with the following dynamic difference-in-differences estimation:

$$Y_{ic} = \beta_0 + \beta_1 \mathit{Treated}_{ic} + \sum_{k=2011}^{2014} \beta_k \mathit{Treated}_{ik} \times I[c = k] + \gamma_c + U_{ic},$$

, where Y_{ic} is either the dummy for obtaining a permanent contract, or the dummy for not working in the same school (our main outcome)

No differential pretrends



Back

Balance in observables

	Age	Female	Has education degree	Rural school	Weekly hours teach.	Teaches primary	Share low SES students	Main role teacher	More than one school	Was evaluated	Evaluation score percentile
Treated × I[c=2014]	-0.200 (0.211)	0.013 (0.012)	-0.006 (0.007)	0.001 (0.012)	0.334 (0.223)	0.021* (0.011)	0.001 (0.004)	0.003 (0.007)	0.001 (0.008)	0.018 (0.012)	0.016 (0.882)
Treated	1.176*** (0.075)	-0.005 (0.004)	0.007** (0.003)	0.005 (0.004)	0.066 (0.101)	-0.011*** (0.004)	0.004* (0.002)	0.009*** (0.003)	-0.001 (0.004)	0.063*** (0.004)	0.299 (0.284)
Observations	24,002	24,002	24,002	24,002	24,002	24,002	23,975	24,002	24,002	24,002	19,839
R ²	0.007	0.001	0.002	0.001	0.002	0.002	0.260	0.006	0.001	0.010	0.000
Dependent variable mean (control)	33.309	0.764	0.941	0.237	32.891	0.800	0.680	0.922	0.077	0.734	51.818

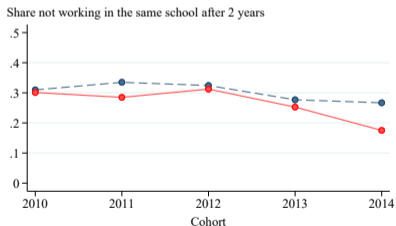
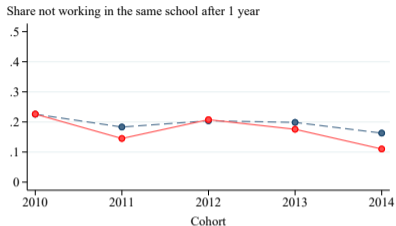
Differences in the baseline characteristics of teachers with 2 and 3 years of experience are time invariant [Back](#)

Placebo estimations

	(1)	(2)
Three years \times I[c=2014]	0.032 (0.033)	
Four years \times I[c=2014]		0.017 (0.015)
Observations	6,409	15,357
R ²	0.004	0.016
Dependent variable mean (control)	0.205	0.175
Sample: type of contract	Permanent	Temporary
Sample: years of experience	2-3	3-4

Back

No spillovers to the comparison group



Results are not driven by an increase in turnover of the comparison group [Back](#)

Validity checks

Main identifying assumption: In the absence of the law, the difference in test scores across math/literacy for students that have both treated and untreated teachers would have been the same as in previous years → **parallel trends**

Validity checks:

- No differential pretrends in student learning by teacher type
- No sorting of students *by subject* in 2015: placebo exercise using lagged grades (from 4th grade) as the outcome variable

[Pretrends](#)

[Placebo](#)

[Back](#)

No differential pretrends in student test scores

	(1)	(2)
Treated \times 2015	-0.001 (0.017)	0.012 (0.022)
Treated \times 2014	0.029 (0.019)	0.032 (0.020)
Treated	0.009 (0.013)	0.001 (0.023)
Observations	416,948	416,898
R ²	0.833	0.852
Lagged scores and student-year FE	✓	✓
Teacher FE		✓

Back

Placebo - Impact of dismissal protection on lagged test scores

	(1)	(2)
Treated \times 2015	0.002 (0.012)	0.004 (0.014)
Treated	0.002 (0.007)	0.006 (0.016)
Observations	416,948	416,898
R ²	0.838	0.849
Student-year FE	✓	✓
Teacher FE		✓

No evidence of sorting across subjects in 2015 [Back](#)

Impact of dismissal protection on language teacher's effort

	(1)	(2)
Treated x 2015	-0.077*** (0.027)	-0.065** (0.031)
Treated	0.099*** (0.027)	0.065 (0.043)
Observations	142,991	142,991
R ²	0.121	0.153
Student controls	✓	✓
School FE	✓	
Teacher FE		✓

Students of treated teachers
report lower teacher effort in
2015

Back