The Effectiveness of Promotion Incentives for Public Employees: Evidence from Italian Academia

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Motivation

- Public workers account for a large % of total employment in most countries
  - ▷ About 1 in 5 workers in OECD countries (OECD, 2017)
- ... and provide **essential goods** and **services**
- Yet, public managers have **limited tools** to motivate public workers
  - ▷ Public organizations have **rigid compensation schemes** (Finan et al., 2017)
  - ▷ Although effective (Muralidharan and Sundararaman, 2011; Duflo et al., 2012), pay-for-performance schemes are hard to implement

⇒ **Career-based incentives** as the main motivational lever

- ▷ Evidence on their effectiveness is still limited (Karachiwalla and Park, 2017; Bertrand et al., 2020; Checchi et al., 2021; Deserranno et al., 2021)

This paper

- We study how a large sample of high-skilled public employees, *i.e.*, academics, respond to quasi-random **variation in promotion incentives**
- To this end, we exploit a peculiar feature of the Italian **National Scientific Qualification**:
  - Success in the NSQ depends on past research productivity, measured by three indicators that are required to be above certain well-defined thresholds
- This **multi-cutoff rule** provides two key advantages:
  1. It provides scholars with clear and observable **promotion thresholds**
  2. For marginal scholars, it entails quasi-random **variation in career prospects**

The main idea

- The outcome of the NSQ affects candidates' career trajectories, providing them with different **promotion incentives**
  - For assistant professors who qualify for the associate professorship, the goal becomes meeting the (higher) requirements for the full professorship
  - For non-qualified assistant professors, the goal remains meeting the associate professor thresholds
- In a **fuzzy RDD**, we thus compare the post-NSQ research productivity of **barely qualified** and **barely non-qualified** assistant professors to estimate the effect of an increase in expected future promotion bars

Preview of the results

- Barely qualified scholars publish **6 more papers** than their (barely) non-qualified colleagues over the period 2013-2016, in journals of comparable quality
- No effect in the sample of researchers who work under different incentive schemes (full professors; non-university scholars)
- Effect is larger for scholars who are not too close nor too far from the expected full professor threshold
  - incentives are mostly effective when *'the promotion is possible, but neither too hard to achieve, nor too easy'* (Lazear and Gibbs, 2014; Hansen, 2012; Stepanov, 2020)

Outline

The National Scientific Qualification

- Introduced in 2010, the NSQ is a **centralized evaluation procedure** regulating the access to associate and full professorships in Italy
- By achieving the NSQ, scholars gain the **eligibility for career advancements**
- The NSQ is awarded by a committee of five, randomly selected, full professors
  - **Key criterion**: scholars' past productivity is measured by three bibliometrics indicators, which have to meet some clear and well-defined thresholds
  - Different rules and indicators depending on the academic field. Two macro areas: *bibliometric* and *non-bibliometric*

The cutoff rule

- To achieve the NSQ, candidates (in bibliometric sectors) must overcome the thresholds in at least **two out of the three** productivity indicators
  - indicators: i) **number of articles**, ii) **number of citations**, iii) **h-index**
  - thresholds tied to the median professor in the field (▷ Field heterogeneity)
- The **two-out-of-three** rule is (almost) a necessary condition, but not sufficient:
  - also other aspects of candidates' cv are taken into account (awards, teaching experience, etc.)
  - deviations from the rule allowed only in case of an extremely positive evaluation of candidates' cv (▷ Compliance)

Outline

Data sources

1. **List of applicants** to the 2012 round of the NSQ, together with their score in each of the three indicators and the sector-specific thresholds
2. **Professor census** covering all assistant, associate, and full professors in the Italian university system (2012-2016)
3. ***Scopus* database**: whole publication record of all candidates, both before and after the NSQ
   - for each paper, we query the *Scopus* archive to get cover type, author's affiliation, publication date, journal name, citations received, and coauthors

Summary Stats

Econometric specification

- A three-dimensional (fuzzy) regression discontinuity design:

$$Q_{is} = \alpha_0 + \alpha_1 D_{is} + f(x_{iks} - m_{ks}) + Z_s + \nu_{iks} \quad (1)$$

$$Y_{is} = \gamma_0 + \gamma_1 \hat{Q}_{is} + f(x_{iks} - m_{ks}) + Z_s + \eta_{iks} \quad (2)$$

where

- Q_{is} is the binary indicator for the success of candidate i in field s;
- D_{is} is the indicator for the compliance with the two-out-of-three rule (▷ Figure);
- $f(x_{iks} - m_{ks})$ is a flexible nonlinear function of the distances from the threshold(s);

In all specifications, we allow $f(\cdot)$ to vary across academic fields.

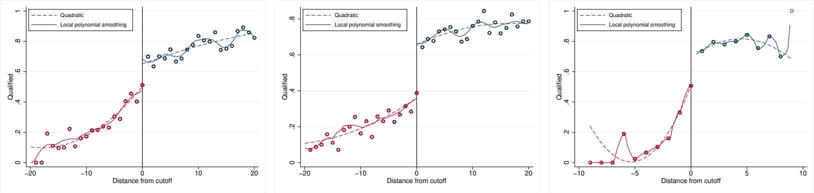
Validity of the RD design

1. **First stage**: the probability of achieving the qualification jumps discontinuously at the multidimensional cutoff
2. **No jumps** in the distribution of the running variables: no manipulation (unlikely) and no selection (▷ Density test; ▷ Covariate smoothness)
3. **Exclusion restriction**: no confounding factors or other policies exploiting same criteria (very unlikely)
4. **Monotonicity**: for each candidate, crossing the multidimensional frontier must (weakly) increase the probability of success

\+ Correct specification of the functional form

First stage

Figure: Discontinuity in the probability of success in the NSQ



(a) N. of articles **(b)** N. of citations **(c)** H index

First stage

Dependent variable: Qualified							
	Single RD (Articles)		Single RD (Citations)		Single RD (H-Index)		Triple RD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Quadratic	LLR	Quadratic	LLR	Quadratic	LLR	Quadratic
Above cutoff	0.131***	0.122***	0.210***	0.161***	0.153***	0.149*	
	(0.040)	(0.046)	(0.041)	(0.057)	(0.046)	(0.089)	
Above 2/3 cutoffs							0.306***
							(0.043)
Competition sector FE	Yes	No	Yes	No	Yes	No	Yes
Sector specific interactions	Yes	No	Yes	No	Yes	No	Yes
Mean dep. var.	0.577	0.569	0.577	0.536	0.577	0.563	0.577
Sd dep. var.	0.494	0.495	0.494	0.499	0.494	0.496	0.494
BW (MSE)		0.409		0.364		0.224	
N of clusters	82	89	82	89	82	89	82
Observations	4920	2868	4920	1798	4920	2383	4920

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

Outline

1. Introduction
2. Institutional Setting
3. Data & Empirical Strategy
4. Results
5. Conclusions

Quantity of publications

	Publications	Articles	Conf. Papers	Reviews
	(1)	(2)	(3)	(4)
ITT	2.003***	1.254**	0.540	0.198*
	(0.701)	(0.477)	(0.336)	(0.102)
LATE	6.557***	4.105***	1.769*	0.648**
	(2.159)	(1.485)	(0.956)	(0.290)
Mean dependent variable	17.006	12.747	2.313	0.916
Sd dependent variable	20.410	17.820	5.719	2.088
Number of clusters	82	82	82	82
Observations	4920	4920	4920	4920

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

Quantity of publications

Figure: Publication trend of the marginal applicants

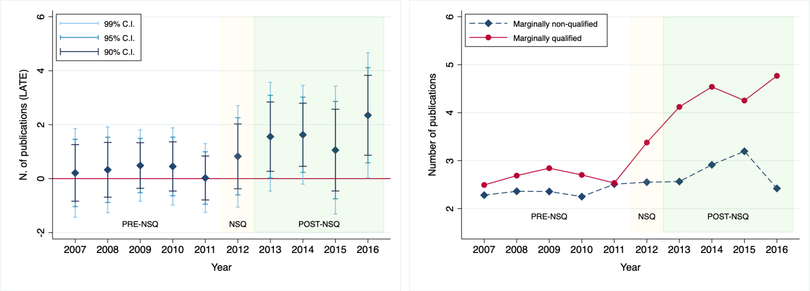


Figure: **a.** LATE **Figure:** **b.** Predicted publications

By publication type Dropout

Quality of publications

	Top 5% (1)	CiteScore (pct) (2)	CiteScore index (3)	Sjr index (4)	Snip index (5)	% Unlisted (6)
ITT	0.038	-0.110	0.063	0.052	0.040	0.000
	(0.030)	(1.087)	(0.069)	(0.059)	(0.032)	(0.011)
LATE	0.126	-0.360	0.206	0.170	0.130	0.001
	(0.083)	(3.065)	(0.192)	(0.168)	(0.086)	(0.029)
Mean dependent variable	0.655	72.403	2.509	1.336	1.239	0.126
Sd dependent variable	0.475	14.773	1.343	0.843	0.456	0.180
Number of clusters	82	82	82	82	82	82
Observations	4809	4809	4809	4808	4809	4838

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

Citations Coauthors

Heterogeneity of treatment effects and incentive intensity

Table: Heterogeneity in the distance from the full professor thresholds

Dependent variable: Number of publications 2013–2016						
	Average effect	By quintile of the distance				
	(1)	(2)	(3)	(4)	(5)	(6)
		Q1	Q2	Q3	Q4	Q5
Qualified	6.279***					
	(2.175)					
Qualified × Quintile		2.550	5.652	10.100***	7.245***	2.366
		(12.905)	(4.173)	(3.526)	(2.618)	(4.174)
Mean dep. var.	17.079	25.680	19.533	17.027	14.160	9.202
Sd dep. var.	20.452	35.700	16.372	13.253	11.493	10.102
Observations	4887	968	986	975	954	1004

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

Full professor NSQ by 2016 First stage Pre-NSQ publications

Applicants under different incentive schemes I

Table: The effect of achieving the full professor NSQ on publications

	Publications	Articles	Conf. Papers	Reviews
	(1)	(2)	(3)	(4)
ITT	-0.349	-0.251	0.195	-0.105
	(1.195)	(1.009)	(0.221)	(0.189)
LATE	-0.836	-0.601	0.468	-0.251
	(2.408)	(2.037)	(0.467)	(0.382)
Mean dependent variable	22.592	16.776	2.727	1.431
Sd dependent variable	24.987	21.383	6.982	2.758
Number of clusters	51	51	51	51
Observations	2746	2746	2746	2746

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

First stage

Applicants under different incentive schemes II

Table: The effect of achieving the NSQ among all applicants

Dependent variable: Number of publications 2013-2016						
	Average effect	By 2012 employment				
	(1)	(2) Tenured assistant p.	(3) Untenured assistant p.	(4) Others in Italian univ.	(5) Researchers in non-univ. inst.	(6) Researchers Abroad
Qualified	3.553*					
	(2.075)					
Qualified × 2012 Employment		4.592**	9.521**	2.324	1.198	-4.999
		(1.947)	(4.451)	(2.812)	(2.885)	(4.188)
Mean dep. var. (Group)	16.871	17.006	21.329	14.405	18.896	16.940
Sd dep. var. (Group)	18.516	20.410	19.255	13.672	17.558	16.295
Observations (Group)	9071	4920	295	1993	1433	430

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

First stage

Additional results

1. Heterogeneity
   - Disciplinary area, gender, and age
   - Competition at the decentralized stage
2. Robustness checks
   - Robustness to alternative sample restrictions
   - Multiple applications:
     - own sector
     - random application selection
   - Functional form:
     - 3D local linear RD
     - 2D non-parametric RD
   - Cutoff perturbation

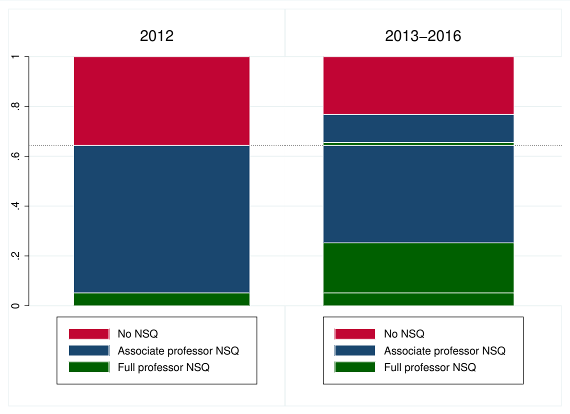
Outline

Conclusions

- Scholars do strongly respond to a quasi-random increase in promotion bars, especially if the bar is not too close nor too far
- **Policy implications:**
  1. Centralized evaluation criteria in public universities (such as those in France, Germany, Portugal, and Spain) can strongly enhance research productivity
  2. The same applies to public organizations with **internal labor markets**, especially when individual output is recognizable and measurable, and there is moral hazard: university professors, school teachers, judges, public managers
  3. To be effective, evaluation criteria should be transparent and output-based

Thank you!

NSQ trajectories 2012-2016



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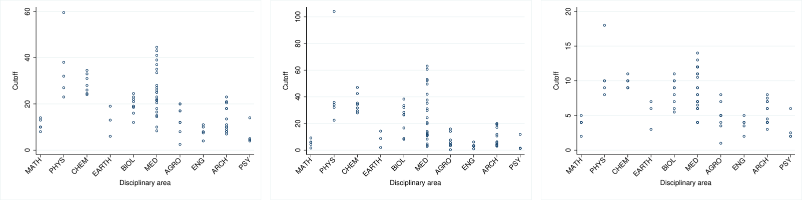
Academic field heterogeneit

Figure: Heterogeneity in field-specific cutoffs



(a) Number of articles **(b)** Number of citations **(c)** H-index

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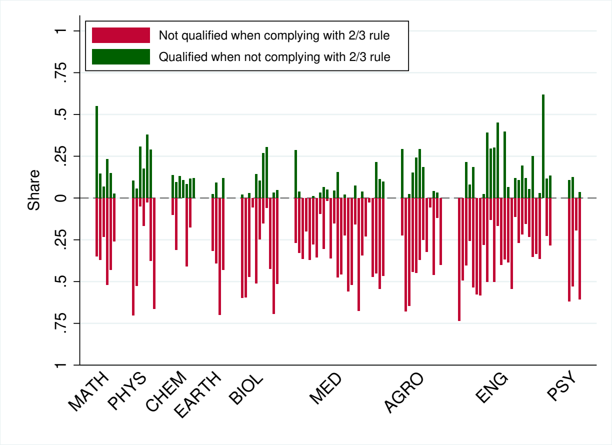
Rule compliance



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Summary statistics

Panel A: applicants' characteristics	Mean	Sd
Academic age	15.87	7.65
Female	0.42	0.49
Number of applications	1.26	0.65
Qualified	0.58	0.49
Above 2/3 cutoffs	0.66	0.47
Above cutoff 1 (number of articles)	0.62	0.49
Above cutoff 2 (number of citations)	0.68	0.47
Above cutoff 3 (h-index)	0.58	0.49
Distance from sector median 1 (n. of articles)	4.43	18.26
Distance from sector median 2 (n. of citations)	9.62	38.36
Distance from sector median 3 (h-index)	0.92	3.55

Panel B: research activity	2008-2011		2013-2016	
	Mean	Sd	Mean	Sd
Number of publications	11.66	9.60	17.01	20.41
Number of articles	8.16	6.80	12.75	17.82
Number of conference papers	2.23	5.19	2.31	5.72
Number of reviews	0.57	1.38	0.92	2.09
Number of scholars		4920		

Panel C: publication characteristics	2008-2011		2013-2016	
	Mean	Sd	Mean	Sd
Top 5% journal	0.16	0.37	0.18	0.39
CiteScore (percentile)	72.28	24.71	75.44	23.19
CiteScore	2.70	2.25	2.80	2.13
Sjr	1.49	1.65	1.52	1.58
Snip	1.27	0.95	1.31	0.91
Journal unlisted	0.15	0.35	0.13	0.34
Number of citations received	17.98	38.98	5.34	15.00
Single-authored	0.02	0.14	0.02	0.12
Number of authors	8.15	11.68	10.82	17.09
Number of publications	57358		83670	

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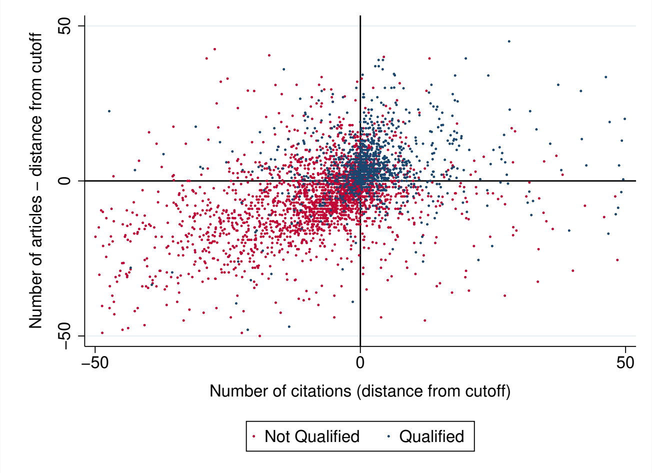
Compliance and outcome of the evaluation



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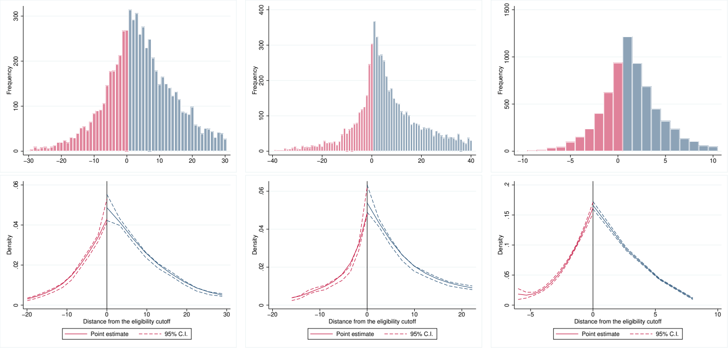
Manipulation and selection



(a) Number of articles **(b)** Number of citations **(c)** H-index

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Continuity test (2009-2011)

	(1) Publications	(2) Zero publ.	(3) % Unlisted	(4) Top 5%	(5) CiteScore (pct)	(6) Coauthors	(7) Single-author	(8) Network size
Above 2/3 cutoffs	0.392	-0.002	0.028	0.173	0.010	0.310	-0.013	1.372
	(0.467)	(0.007)	(0.034)	(1.143)	(0.010)	(0.315)	(0.025)	(3.608)
Mean dependent variable	11.658	0.026	0.580	70.999	0.122	6.860	0.143	41.859
Sd dependent variable	9.598	0.159	0.494	15.860	0.196	5.766	0.351	53.641
Number of clusters	82	82	82	82	82	82	82	82
Observations	4920	4920	4755	4755	4792	4763	4861	4785

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Dynamic effects I

Panel A - Dependent variable: Number of publications										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ITT	0.064	0.099	0.149	0.138	0.008	0.253	0.474**	0.496**	0.323	0.717***
	(0.194)	(0.184)	(0.154)	(0.167)	(0.153)	(0.222)	(0.236)	(0.211)	(0.273)	(0.254)
LATE	0.212	0.327	0.486	0.452	0.025	0.827	1.556**	1.626***	1.058	2.348***
	(0.551)	(0.534)	(0.446)	(0.482)	(0.430)	(0.634)	(0.679)	(0.618)	(0.801)	(0.783)
Mean Dep. Var.	2.706	2.825	2.940	2.962	3.146	3.533	3.820	4.159	4.518	4.574
Standard dev.	2.655	2.668	3.015	3.019	3.141	3.793	3.862	4.956	7.547	8.446
Observations	4743	4795	4827	4843	4855	4861	4869	4898	4914	4919

Panel B - Dependent variable: Number of articles										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ITT	0.112	0.122	0.056	0.097	0.079	0.169	0.231	0.342*	0.160	0.530***
	(0.124)	(0.115)	(0.120)	(0.117)	(0.114)	(0.165)	(0.161)	(0.174)	(0.204)	(0.186)
LATE	0.369	0.403	0.183	0.316	0.258	0.555	0.758	1.121**	0.526	1.735***
	(0.351)	(0.334)	(0.338)	(0.336)	(0.326)	(0.474)	(0.468)	(0.514)	(0.590)	(0.567)
Mean Dep. Var.	1.888	1.981	2.084	2.041	2.206	2.468	2.734	3.054	3.408	3.598
Standard dev.	1.903	1.928	2.339	2.229	2.327	2.979	2.849	4.183	6.854	7.807
Observations	4743	4795	4827	4843	4855	4861	4869	4898	4914	4919

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Dynamic effects II

Panel C - Dependent variable: Number of conference papers

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ITT	-0.024	0.005	0.113	0.077	-0.029	0.064	0.173*	0.098	0.114	0.147
	(0.140)	(0.109)	(0.077)	(0.084)	(0.068)	(0.100)	(0.100)	(0.090)	(0.111)	(0.109)
LATE	-0.081	0.017	0.368	0.251	-0.094	0.209	0.569**	0.322	0.373	0.483
	(0.393)	(0.308)	(0.229)	(0.243)	(0.192)	(0.277)	(0.283)	(0.256)	(0.321)	(0.304)
Mean Dep. Var.	0.565	0.551	0.562	0.589	0.575	0.596	0.605	0.610	0.617	0.490
Standard dev.	1.564	1.455	1.508	1.594	1.577	1.615	1.690	1.699	1.770	1.508
Observations	4743	4795	4827	4843	4855	4861	4869	4898	4914	4919

Panel D - Dependent variable: Number of reviews

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ITT	-0.024	-0.009	0.029	-0.009	-0.026	0.005	0.073*	0.021	0.041	0.064
	(0.033)	(0.031)	(0.032)	(0.033)	(0.031)	(0.038)	(0.037)	(0.036)	(0.047)	(0.054)
LATE	-0.080	-0.029	0.096	-0.029	-0.087	0.018	0.241**	0.070	0.134	0.210
	(0.093)	(0.086)	(0.090)	(0.094)	(0.085)	(0.107)	(0.107)	(0.100)	(0.129)	(0.157)
Mean Dep. Var.	0.128	0.134	0.126	0.158	0.167	0.236	0.222	0.238	0.209	0.251
Standard dev.	0.449	0.467	0.478	0.570	0.513	0.681	0.676	0.708	0.692	0.743
Observations	4743	4795	4827	4843	4855	4861	4869	4898	4914	4919

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Citations

	Total citations (1)	Citations per paper (2)	% papers with ≥ 50 citations (3)	% Papers with 0 citations (4)
ITT	13.526**	0.519*	0.002	0.012
	(6.372)	(0.273)	(0.002)	(0.012)
LATE	43.934**	1.687**	0.006	0.039
	(18.087)	(0.748)	(0.004)	(0.034)
Mean dependent variable	92.371	4.417	0.005	0.356
Sd dependent variable	200.847	4.184	0.028	0.211
Number of clusters	82	82	82	82
Observations	4838	4838	4838	4838

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Dropout from Academia

	Left academia	Zero publications
	(1)	(2)
ITT	-0.007	-0.006
	(0.015)	(0.007)
LATE	-0.024	-0.019
	(0.043)	(0.019)
Mean dependent variable	0.028	0.017
Sd dependent variable	0.166	0.128
Number of clusters	82	82
Observations	4920	4920

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Heterogeneity in the distance from full professorship II

Dependent variable: Probability of achieving the full professor NSQ by 2016						
	Average effect	By quintile of the distance				
	(1)	(2)	(3)	(4)	(5)	(6)
		Q1	Q2	Q3	Q4	Q5
Qualified	0.179**					
	(0.071)					
Qualified × Quintile		0.648*	0.195	0.309***	0.130*	0.027
		(0.336)	(0.123)	(0.120)	(0.073)	(0.079)
Mean dep. var.	0.177	0.309	0.259	0.190	0.108	0.022
Sd dep. var.	0.382	0.462	0.438	0.392	0.311	0.146
Observations	4887	968	986	975	954	1004

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Heterogeneity in the distance from full professorship III

Dependent variable: Probability of achieving the NSQ					
	(1)	(2)	(3)	(4)	(5)
	Q1	Q2	Q3	Q4	Q5
Above 2/3 cutoffs × Quintile	0.148	0.333***	0.283***	0.328***	0.343***
	(0.099)	(0.072)	(0.057)	(0.045)	(0.064)
Mean dep. var. (Quintile)	0.812	0.754	0.673	0.498	0.178
Sd dep. var. (Quintile)	0.391	0.431	0.469	0.500	0.383
Observations (Quintile)	968	986	975	954	1004

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Heterogeneity in the distance from full professorship IV

Dependent variable: Number of publications pre-NSQ (2008-2011)					
	(1)	(2)	(3)	(4)	(5)
	Q1	Q2	Q3	Q4	Q5
Above 2/3 cutoffs × Quintile	-0.342	-0.128	0.214	0.717	0.950
	(0.900)	(0.806)	(0.685)	(0.556)	(1.089)
Mean dep. var. (Quintile)	14.235	14.889	12.925	10.363	6.348
Sd dep. var. (Quintile)	10.611	9.838	8.674	7.089	8.686
Observations (Quintile)	968	986	975	954	1004

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Field heterogeneity

Dependent variable: Number of publications (std)										
	MATH	PHYS	CHEM	EARTH	BIOL	MED	AGRO	ENG	ARCH	PSY
Panel A: LATE										
Qualified × DA	0.121	0.883***	1.227*	1.015**	0.010	0.227	2.008	2.025*	1.262	-0.296
	(0.251)	(0.157)	(0.681)	(0.486)	(0.161)	(0.157)	(2.005)	(1.128)	(2.005)	(0.467)
Panel B: First Stage										
Above 2/3 cutoffs × DA	0.372***	0.143***	0.242***	0.507**	0.313***	0.394***	0.186*	0.252	0.114	0.532**
	(0.109)	(0.051)	(0.064)	(0.243)	(0.074)	(0.096)	(0.105)	(0.206)	(0.140)	(0.215)

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Gender heterogeneity

Dependent variable: Number of publications		
	First stage	LATE
Female	0.005	-1.148
	(0.020)	(0.875)
Above 2/3 cutoffs	0.329***	
	(0.046)	
Above 2/3 cutoffs × Female	-0.057*	
	(0.030)	
Qualified		6.742***
		(2.253)
Qualified × Female		-0.684
		(1.563)
Mean Dep. Var.	0.577	17.006
Standard dev.	0.494	20.410
N. of clusters	82	82
Observations	4920	4920

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Age heterogeneity

	Years of tenure		Academic age	
	(1) First stage	(2) Publications	(3) First stage	(4) Publications
Senior	-0.033	-1.113	-0.012	-2.218***
	(0.028)	(0.750)	(0.030)	(0.808)
Above 2/3 cutoffs	0.298***		0.316***	
	(0.045)		(0.048)	
Above 2/3 cutoffs × Senior	0.032		-0.025	
	(0.039)		(0.038)	
Qualified		6.820***		6.493***
		(2.139)		(2.243)
Qualified × Senior		-1.657		-1.028
		(1.190)		(1.356)
Mean Dep. Var.	0.577	17.006	0.577	17.006
Standard dev.	0.494	20.410	0.494	20.410
N. of clusters	82	82	82	82
Observations	4920	4920	4920	4920

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Heterogeneity in the degree of internal competition

Dependent variable: Number of publications					
	Q1	Q2	Q3	Q4	Q5
Qualified × Quintile	5.920**	6.237***	4.048	7.614***	8.062**
	(2.600)	(1.871)	(2.560)	(2.723)	(3.829)
Mean dep. var. (Quintile)	14.323	16.647	16.957	16.807	19.794
Sd dep. var. (Quintile)	12.883	18.816	15.053	22.199	28.099
Observations (Quintile)	827	1095	998	909	1057

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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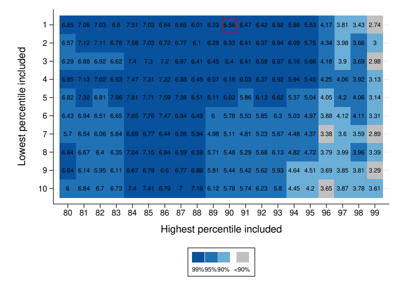
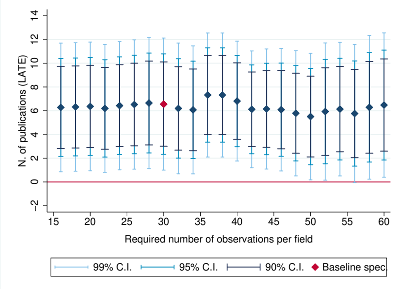
Robustness to sample restrictions



(a) Interpercentile range



(b) Sector size

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Candidates applying to their 2012-competition sector

	Publications	Articles	Conf. Papers	Reviews
	(1)	(2)	(3)	(4)
ITT	1.520**	1.230**	0.218	0.045
	(0.761)	(0.533)	(0.290)	(0.109)
LATE	4.238**	3.431**	0.609	0.127
	(1.951)	(1.376)	(0.709)	(0.263)
Mean dependent variable	15.374	11.285	2.216	0.895
Sd dependent variable	13.728	10.111	5.719	2.048
Number of clusters	83	83	83	83
Observations	5024	5024	5024	5024

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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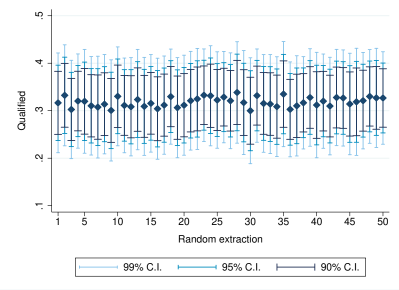
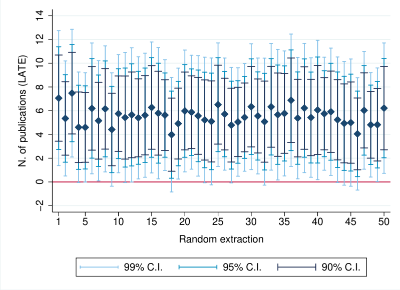
Robustness to random application selection



(a) First stage



(b) LATE

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Local linear specification

Dependent variable: Number of publications		
	(1) Full Parametric	(2) LLR
ITT	2.003***	1.399*
	(0.701)	(0.814)
LATE	6.557***	5.456*
	(2.159)	(3.298)
First Stage	0.306***	0.256***
	(0.043)	(0.052)
Competition sector FE	Yes	Yes
Sector specific interactions	Yes	No
Mean Dep. Var.	17.006	15.252
Standard dev.	20.410	11.910
BW (MSE) Ind 1		0.362
BW (MSE) Ind 2		0.462
BW (MSE) Ind 3		0.308
N. of clusters	82	86
Observations	4920	1110

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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Two-dimensional RDDs

	First Stage			N. of publications (LATE)		
	(1) Art.; Cit.	(2) Cit.; H-Index	(3) Art.; H-Index	(4) Art.; Cit.	(5) Cit.; H-Index	(6) Art.; H-Index
(0;0)	0.294***	0.246***	0.126***	0.596	10.592**	-0.368
	(0.037)	(0.030)	(0.040)	(3.753)	(4.809)	(7.601)
BW	19.113	13.714	10.026	13.790	7.696	9.750
Within-BW Observations	4108	4146	3937	3282	3033	3871
	Art.; Cit.	Cit.; H-Index	Art.; H-Index	Art.; Cit.	Cit.; H-Index	Art.; H-Index
(1;0)	0.233***	0.203***	0.120***	-0.661	11.557**	-8.766
	(0.040)	(0.028)	(0.042)	(3.115)	(4.856)	(9.548)
BW	15.183	13.109	8.306	18.309	8.847	7.616
Within-BW Observations	3575	4128	3606	4031	3357	3377
	Art.; Cit.	Cit.; H-Index	Art.; H-Index	Art.; Cit.	Cit.; H-Index	Art.; H-Index
(0;1)	0.269***	0.205***	0.176***	1.505	20.132***	3.455
	(0.037)	(0.031)	(0.039)	(4.259)	(6.011)	(7.216)
BW	17.988	11.801	10.045	13.672	7.328	7.316
Within-BW Observations	3991	3850	3953	3313	2931	3258
	Art.; Cit.	Cit.; H-Index	Art.; H-Index	Art.; Cit.	Cit.; H-Index	Art.; H-Index
(2;0)	0.170***	0.168***	0.107**	-2.287	5.020	2.928
	(0.043)	(0.028)	(0.044)	(3.437)	(7.852)	(9.013)
BW	12.504	12.435	7.587	19.034	7.411	7.621
Within-BW Observations	3100	4056	3351	4151	3087	3399
	Art.; Cit.	Cit.; H-Index	Art.; H-Index	Art.; Cit.	Cit.; H-Index	Art.; H-Index
(0;2)	0.246***	0.156***	0.086*	1.137	19.261***	34.257*
	(0.037)	(0.035)	(0.048)	(4.689)	(6.174)	(20.053)
BW	17.523	11.517	7.549	13.981	10.748	6.392
Within-BW Observations	3969	3790	3221	3378	3660	2818
Average effect		.187			6.557	

NOTES. Robust standard errors in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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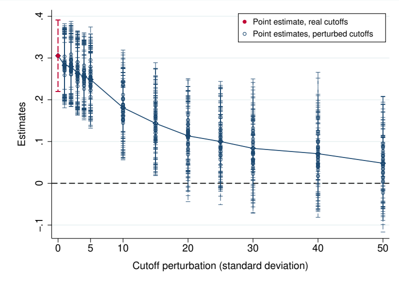
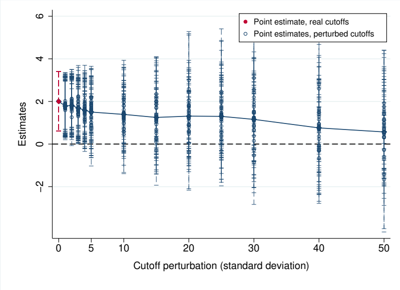
Placebo – cutoff perturbation



(a) First stage



(b) Number of publications 2013-2016 (ITT)

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First stage - full professor NSQ

Dependent variable: Qualified							
	Single RD (Articles)		Single RD (Citations)		Single RD (H-Index)		Triple RD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Quadratic	LLR	Quadratic	LLR	Quadratic	LLR	Quadratic
Above cutoff	0.141*	0.175***	0.242***	0.174**	0.265***	0.328***	
	(0.072)	(0.064)	(0.075)	(0.081)	(0.086)	(0.098)	
Above 2/3 cutoffs							0.420***
							(0.067)
Competition sector FE	Yes	No	Yes	No	Yes	No	Yes
Sector specific interactions	Yes	No	Yes	No	Yes	No	Yes
Mean dep. var.	0.566	0.580	0.566	0.546	0.566	0.543	0.566
Sd dep. var.	0.496	0.494	0.496	0.498	0.496	0.498	0.496
BW (MSE)		0.299		0.270		0.199	
N of clusters	47	89	47	89	47	89	47
Observations	2369	1040	2369	675	2369	909	2369

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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First stage — all applicants

Dependent variable: Probability of achieving the NSQ						
	Average effect	By 2012 employment				
	(1)	(2) Tenured assistant p.	(3) Untenured assistant p.	(4) Others in Italian univ.	(5) Researchers in non-univ. inst.	(6) Researchers Abroad
Above 2/3 cutoffs	0.278***					
	(0.033)					
Above 2/3 cutoffs × 2012 Employment		0.337***	0.198***	0.183***	0.245***	0.178***
		(0.034)	(0.070)	(0.040)	(0.040)	(0.059)
Mean dep. var. (Group)	0.497	0.577	0.614	0.346	0.426	0.444
Sd dep. var. (Group)	0.500	0.494	0.488	0.476	0.495	0.497
Observations (Group)	9071	4920	295	1993	1433	430

NOTES. Standard errors, clustered at the academic field level, in parentheses. *** p< 0.01, ** p<0.05, and *p<0.10.

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References i

Bertrand, M., Burgess, R., Chawla, A., and Xu, G. (2020). The Glittering Prizes: Career Incentives and Bureaucrat Performance. *The Review of Economic Studies*, 87(2):626–655.

Checchi, D., Fraja, G. D., and Verzillo, S. (2021). Incentives and careers in academia: Theory and empirical analysis. *The Review of Economics and Statistics*, 103(4):786–802.

Deserranno, E., Kastrau, P., and León-Ciliotta, G. (2021). Promotions and Productivity: The Role of Meritocracy and Pay Progression in the Public Sector. Working Papers 1239, Barcelona Graduate School of Economics.

Duflo, E., Hanna, R., and Ryan, S. (2012). Incentives Work: Getting Teachers to Come to School. *American Economic Review*, 102(4):1241–78.

Finan, F., Olken, B. A., and Pande, R. (2017). The Personnel Economics of the Developing State. *Handbook of Economic Field Experiments*, 2:467–514.

Hansen, S. E. (2012). Performance Feedback with Career Concerns. *The Journal of Law, Economics, and Organization*, 29(6):1279–1316.

References ii

Karachiwalla, N. and Park, A. (2017). Promotion Incentives in the Public Sector: Evidence from Chinese Schools. *Journal of Public Economics*, 146(C):109–128.

Lazear, E. P. and Gibbs, M. (2014). *Personnel Economics in Practice*. John Wiley & Sons.

Muralidharan, K. and Sundararaman, V. (2011). Teacher Performance Pay: Experimental Evidence from India. *Journal of Political Economy*, 119(1):39 – 77.

OECD (2017). *Government at a Glance 2017*. OECD Publishing.

Stepanov, S. (2020). Biased performance evaluation in a model of career concerns: incentives versus ex-post optimality. *Journal of Economic Behavior & Organization*, 179:589–607.