

# DESIRABLE AND UNDESIRABLE EFFECTS OF RESEARCH EVALUATION: EMPIRICAL EVIDENCE FROM BIBLIOMETRIC ANALYSIS

*Ciriaco Andrea D'Angelo*

University of Rome "Tor Vergata", Dipartimento di Ingegneria dell'Impresa  
*Laboratory for Studies in Research Evaluation*



**TOR VERGATA**  
UNIVERSITÀ DEGLI STUDI DI ROMA

Universitas  
Mercatorum

Università telematica delle  
Camere di Commercio Italiane

**RESEARCH  
EVALUATION:  
STATE OF THE  
ART AND FUTURE  
SCENARIOS**

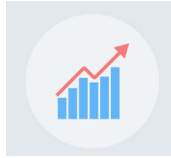


# Outline



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# Background and objectives



## Evaluation goals:

- Increase the research productivity of individuals and organizations
- Increase internationalization of research activities
- Improve the effectiveness of recruitment
- ...



## Research questions:

- Have they been achieved?
- Are “unintended” effects (due to inadequate criteria) in play?
- Are opportunistic behaviors detected?
- Are any other noteworthy system-level effects detected?





# Methodological issues

- Unit of observation: research staff of Italian universities in “bibliometric” fields
- Data source: Web of Science *Core Collection* of Clarivate Analytics
- Use of bibliometric indicators
- Analysis at the “micro” (individuals) or “meso” (institutions) or “macro” (whole country) level
- Counterfactual approach (before-after, interrupted time series, panel data, etc.)

## Key issues:

- Attribution of observed effects (presence of covariates and spurious effects)
- Time lag in cause-effects link
- Limitations of the bibliometric approach



# Methodological issues

## Field of observation

Area	SDSs	2009-2012		2013-2016	
		Universities	Researchers	Universities	Researchers
01 - Mathematics and Computer Science	10	71	3136	74	2946
02 - Physics	8	65	2191	66	2097
03 - Chemistry	12	61	2856	63	2742
04 - Earth Sciences	12	49	1049	51	987
05 - Biology	19	69	4730	72	4535
06 - Medicine	50	65	9843	67	8906
07 - Agricultural and veterinary sciences	30	57	2968	56	2867
08 - Civil Engineering	10	53	1550	60	1508
09 - Industrial and Information Engineering	42	74	5045	72	5095
11 - Psychology	10	68	1328	69	1347
13 - Economics and Statistics	12	84	2788	86	2751
Total	215	92	37484	94	35781

# Results – The overall productivity\*

2009-2012 vs 2013-2016

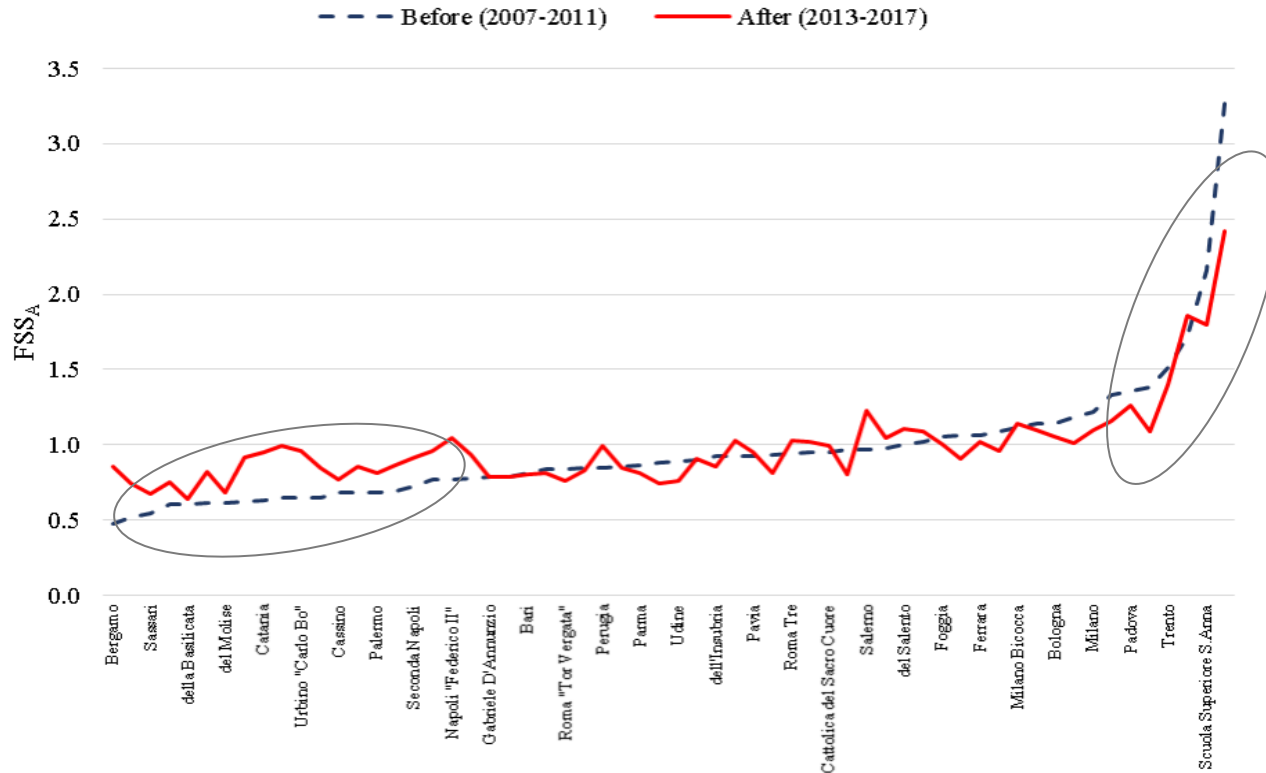
Area	No. of SDSs	With decreasing productivity	Weighted avg. decrease	With increasing productivity	Weighted avg. increase	Weighted avg. variation
1-Math	10	2	-6.4%	8	+35.0%	+30.5%
2-Phys	8	2	-3.4%	6	+17.9%	+12.7%
3-Chem	12	2	-3.5%	10	+8.7%	+8.2%
4-Earth	12	4	-7.5%	8	+44.6%	+26.9%
5-Biol	19	2	-13.2%	17	+16.3%	+14.1%
6-Med	50	14	-7.0%	36	+20.8%	+13.7%
7-Agr+Vet	30	4	-11.9%	26	+52.0%	+44.7%
8-Civ Eng	10	0	n.a.	10	+63.1%	+63.1%
9-Ind+Inf Eng	42	4	-20.0%	38	+45.3%	+44.6%
11-Psych	10	2	-6.9%	8	+80.4%	+66.6%
13. Econ+stat	12	1	-14.4%	11	+40.3%	+39.0%
<b>Total</b>	<b>215</b>	<b>37</b>	<b>-7.6%</b>	<b>178</b>	<b>+33.3%</b>	<b>+28.2%</b>



Productivity: +28%  
 - Output (No. of pub.): +20%  
 - Avg impact: +8%

\* As measured by the Fractional Scientific Strength at the “macro” aggregate level

# Results – Research productivity of universities



2013-2017 (VQR2) vs 2004-2010 (VQR1)  
 Performance changes

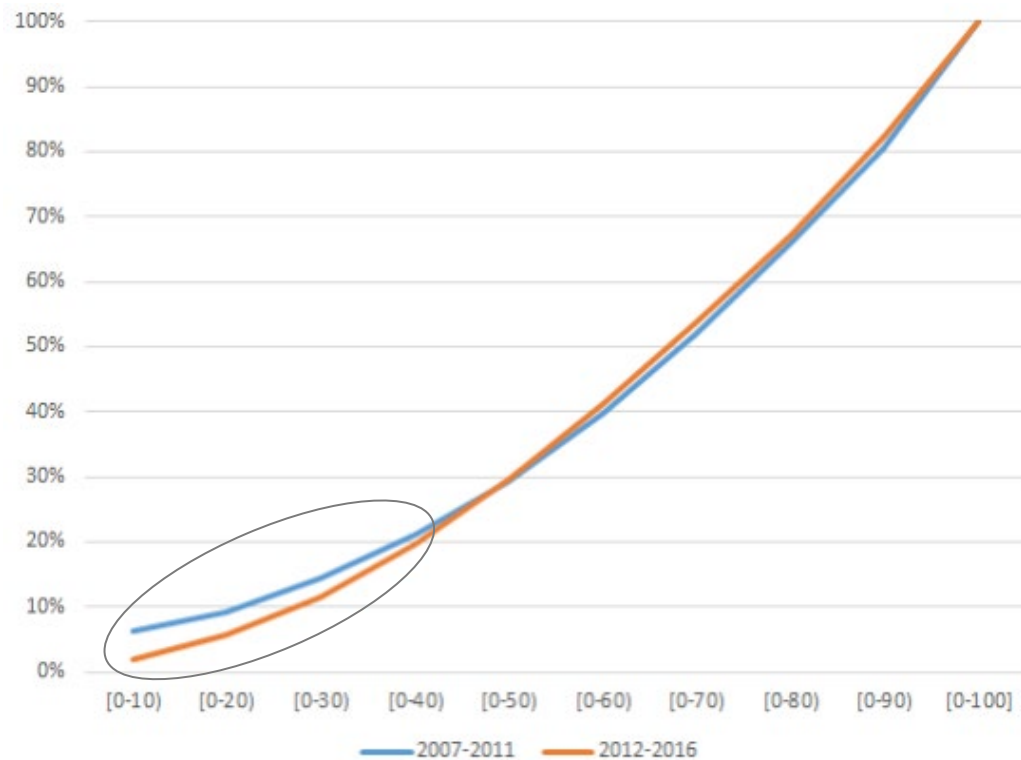
	No. of universities	Of which improving	Of which worsening	Avg. rank change
North	24	5 (21%)	15 (63%)	-14%
Center	14	8 (57%)	6 (43%)	-2%
South	22	14 (64%)	8 (36%)	4%

Data reveal the "convergence" of comparative performance, notably emphasizing the productivity gains of Southern universities.



# Results – The academic recruitment

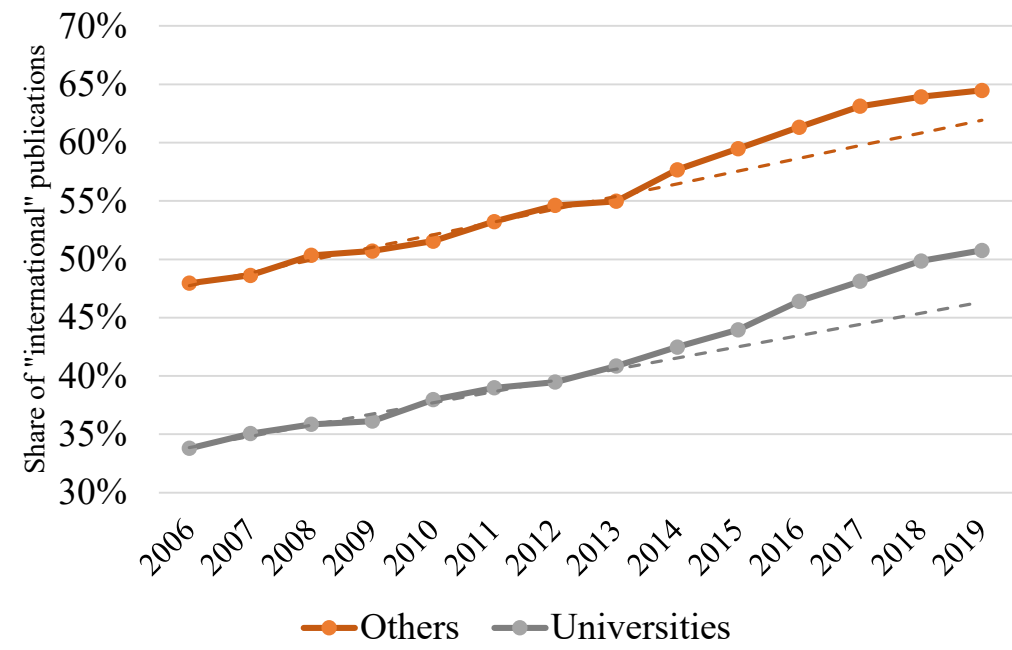
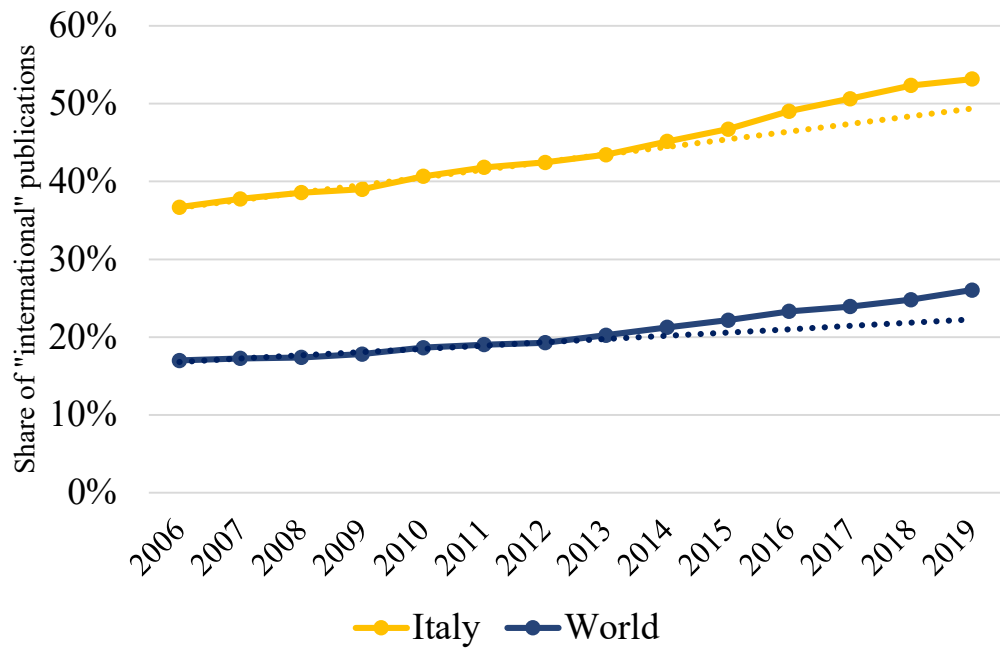
Cumulative performance distribution (FSS percentile)



- ✓ The share of un-productives decreased. The share recruited above the national median is unchanged.
- ✓ “Cuts” in ordinary university funding has boosted internal promotions, at the expense of new recruits and mobility.
- ✓ There is no evidence of any improvement in the recruiting capacity of universities.

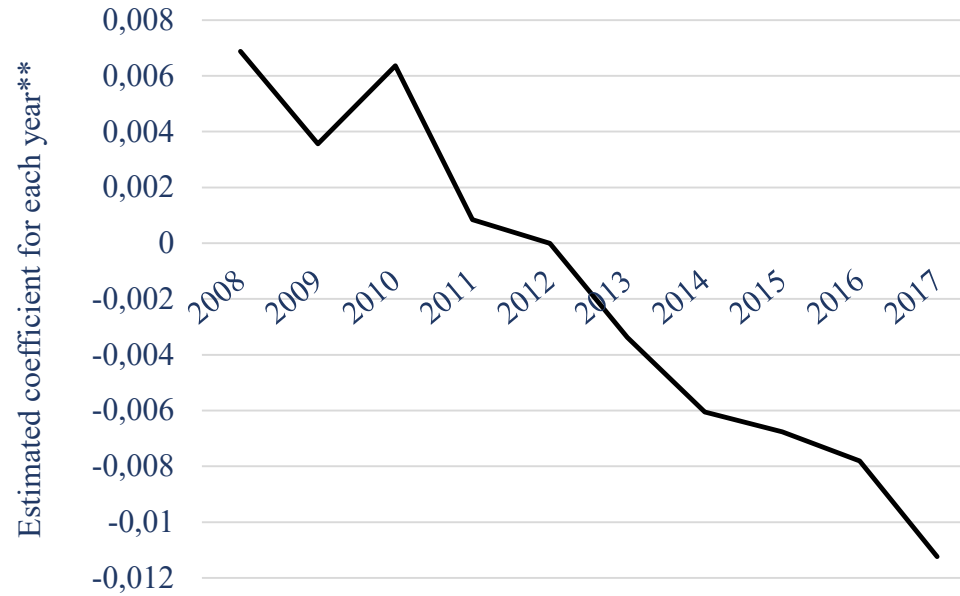


# Results – International collaborations



- The growth in the share of Italian publications resulting from international collaboration (from 37% to 53%) occurs within a broader context of global increase.
- 2013 shows a break, also apparent for the rest of the world.
- University publications show a lower internationalization rate but with a more pronounced break after 2013.

# Results – Specialization vs diversification



\*\* 2012 as a benchmark, controlling for area and personal features fixed effects

Data reveal a significant decrease in research agenda specialization of scholars' after the introduction of the ASN, reinforcing a trend that was nonetheless apparent before.

# Results – Opportunistic behaviors: Self-citations

With the introduction of the ASN, researchers and associate professors in bibliometric fields increase their self-citation rates in order to obtain “habilitation”.

Self-citations per publication

	2008-2012	2013-2017
Total (15k obs.)	<b>1.74</b>	<b>2.00 (+15%)</b>
Min: Chemistry	2.80	3.06 (+9%)
Max: Civil Engineering	1.07	1.61 (+50%)

Inference with controls

	ASN Effect
Assistant and associate not habilitated	+15.0%
Full professors	+9.9%
Habilitated assistant professors	+4.2%
Habilitated associate professors	+3.3%
Overall	+9.5%

Full and habilitated professors increase self-citations to a lesser extent.

Of the 15,000 observed scholars, 41% show an unchanged self-citation rate. The remaining 59% show high variability, but with very few outliers: only 22 subjects “abnormally” increase their self-citations.

The estimated effect (+9.5%) is “concentrated” and so small to be neglected.

# Results – Opportunistic behaviors: «Gift authorship»

VQR1 (2004-2010) included penalties for “missing products.” After VQR1, universities with high rates of un-productives may have incentivized “gift authorships”. This practice could be signaled by an increase of “intramural” collaborations/co-authorship of such individuals' publications.

	“New productives”	Reference random sample
Observations	676	990
Avg publications per professor	4.1	13.9
Of which in international collab. (%)	15.3	30.6
Intramural only (%)	32.8	25.7
With one single author (%)	2.6	1.5
Number of co-authors	5.9	6.6

Data seemingly support the hypothesis (32.8% vs. 25.7%), but other figures (international collaborations, single-author publications, etc.) seem to reject it.

Among universities most effective in “converting” un-productives, only one shows an anomalous share of intramural publications authored by the newly productive.

# Conclusions

- The research productivity of the Italian academic system shows a very positive trend, especially in terms of number of publications, but also in terms of average impact.
- The VQR has certainly triggered a process of convergence in research productivity of universities: those in the South have grown more than those in the North, despite the penalty in terms of funding resulting from VQR1.
- As for recruitment, the ASN has introduced a barrier for unproductive or poorly productive scholars, but it has not raised the overall average research quality of recruited. Universities do not appear to have improved recruitment: budget constraints have incentivized “internal” promotions.

# Conclusions

- Internationalization of Italian research shows a decidedly positive trend, but in line with what is happening globally. The first VQR does not seem to have had an impact in this regard (subsequent ones removed this incentive).
- The ASN induced a significant reduction in the average level of specialization of scholars' research agenda, reinforcing a trend that was already taking place.
- The introduction of indicators and citation thresholds in the ASN, for bibliometric fields, has resulted in a very limited and concentrated increase in self-citations.
- The presence of penalties for universities with many “unproductive” in the first VQR, does not seem to have induced them to adopt opportunistic behavior in terms of “gift-authorship.”

# Conclusions



There is much talk about reforming research evaluation systems. The outcomes of our empirical analyses revealed that the exercises introduced in Italy have produced several important positive effects and some limited side effects.

Hopefully, this should be taken into account in the debate about the future of evaluation in Italy and the world.



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# Thanks for your attention!

Ciriaco Andrea D'Angelo

University of Rome "Tor Vergata", Dipartimento di Ingegneria dell'Impresa  
*Laboratory for Studies in Research Evaluation*

[dangelo@dii.uniroma2.it](mailto:dangelo@dii.uniroma2.it)



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