

Has the so called "3+2" university reform shortened the degrees time?

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The outline of this presentation

1. Goals of the university reform
2. Econometric strategy
3. Descriptive analysis
4. Results
5. Conclusions

Issues and solutions

There are too small enrollments

There are many drop-outs

Too long times to degree

There is great mismatch

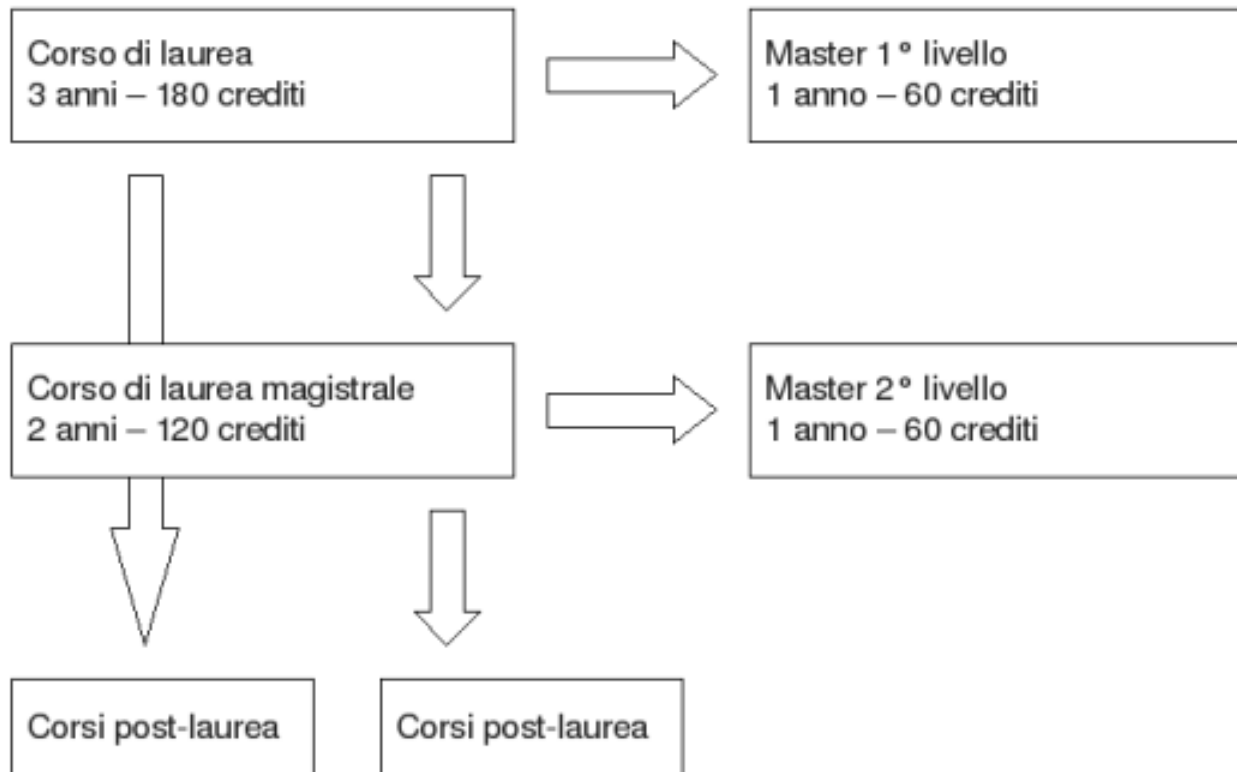
More courses

Short programmes

Short degree

More displaces

Decreto Ministeriale 509 3 /11/1999



The econometrics of program evaluation

There is a harsh theoretical confrontation between different “schools” (e.g. Imbens and Wooldridge, JEL 2010 vs. Heckman, NBER WP 2010). For the applied economist, the adoption of one strategy or another is also connected to data and to the availability of credible instruments

Let us consider the reduced-form approach and focus on a few interconnected aspects typical of any matching procedure:

- ✓ matching reduces bias due to observed covariates
- ✓ to make the selection on observables more credible, use a large number of covariates
- ✓ choices to be made when dealing with small samples, for which literature does not provide univocal guidance: metrics, number of matches (bias/variance trade-off)
- ✓ what is known is that combining matching and regression adjustment techniques reduces bias and leads to more robust inferences

The contribution of this paper (1)

- ✓ we contribute to a first wave (Bini, Chiandotto 2003; Bondonio 2007) of ex-post impact evaluations of the Italian University Reform (the so called 3+2), with respect to times and rate of degrees.
- ✓ we consider the impact for three Italian Universities
- ✓ the outcome indicator are the graduates within a given time
- ✓ we opt for a matching approach, using all the available informations in our database as pre-treatment variables, so as to capture, directly or not, a vast array of characteristics

The contribution of this paper (2)

More specifically...

- ✓ we choose to work on the estimated propensity score and its specification (Rosenbaum and Rubin, 1983)
- ✓ check for balancing property and common support
- ✓ use the difference in means and variances after matching to guide the choice of the number of matches
- ✓ use the bias-adjusted matching estimator of Abadie and Imbens (2011), with the propensity score as a distance metrics, regression adjustment for all the pre-treatment variables and an exact matching for faculty and university.

What do we evaluate? (1)

University	freshmen	treated	controls
Firenze	8,635	3,872	4,763
Pisa	6,938	3,961	2,977
Siena	3,109	1,790	1,319
all	18,682	9,623	9,059

We consider only those freshmen that enrolled during the year 2000/01 when the students themselves decided to enrol at “nuovo ordinamento”

Data have been collected from the register office of the three Tuscany universities – Florence, Pisa and Siena-, and collect all the individual data of all the students

What do we evaluate? (2)

the shift rate is very different among the faculties

Faculty	freshmen	shift rate	CL	DU	L1LV	L2LV	LSCU
AGRARIA	510	62.75	142	48	204	116	0
ARCHITETTURA	780	23.97	593	0	140	15	32
ECONOMIA	2,374	53.29	826	282	802	464	0
FARMACIA	467	61.67	175	4	33	0	255
GIURISPRUDENZA	1,870	27.75	1,351	0	341	160	18
INGEGNERIA	2,341	68.99	638	85	713	882	23
INTERFACOLTÀ	404	88.86	21	20	243	120	0
LETTERE E FILOSOFIA	2,709	49.83	1,294	58	972	385	0
LINGUE E LETTERATURE STRANIERE	277	50.54	137	0	128	12	0
MEDICINA E CHIRURGIA	1,948	79.26	182	223	989	38	516
MEDICINA VETERINARIA	115	59.13	47	0	15	3	50
PSICOLOGIA	948	25.63	710	0	171	67	0
SCIENZE DELLA FORMAZIONE	936	24.57	713	0	182	41	0
SCIENZE MFN	1,676	52.45	611	183	544	338	0
SCIENZE POLITICHE	1,228	43.16	651	45	379	153	0

Prior to reform : CL : 4 yrs - DU : 3 yrs

Post reform : L1LV : 3 yrs – L2LV : +2 yrs - LSCU : 5 yrs

How do we do it?

Preliminary descriptive analysis...

based on archive data, in order to identify possible differences between treated and control students

Estimation and analysis of p-score and its balancing properties

based on all available variables. It is at this stage that we decide how many controls guarantee the most similar distribution, for each variable, between treated and controls

Bias-corrected matching estimator (Abadie and Imbens, 2011)...

using a well-specified p-score (balancing score) as a distance. We also use a regression-based bias-correction (doubly-robust procedure)

Some descriptive outcomes

Degree rates coorte 2002/03

	L1LV within 4 years	Laurea magistrale within 6 years	
		all	only most talented
Firenze	29%	9%	35%
Pisa	27%	12%	43%
Siena	40%	11%	48%
All	30%	10%	40%

Degree rates within six years from enrollment

Laurea Magistrale (coorte 2002/03)

	CL (coorte 2000/01)	Laurea Magistrale (coorte 2002/03)	
		ALL	Excluded who stops at L1LV
FI	22%	9%	12%
PI	15%	12%	15%
SI	29%	11%	16%
All	21%	10%	14%

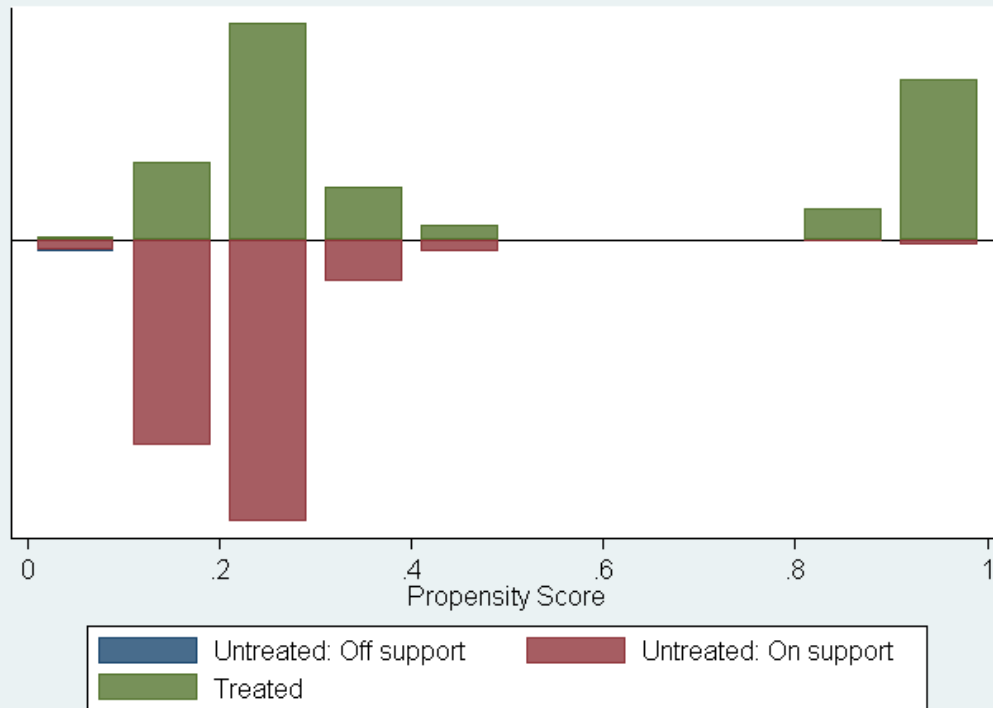
Some differences before matching

Let's have a look at the differences between the avg values of relevant variables (matching and outcomes variables)

variable	treated	controls
male	47.3%	44.9%
female	52.7%	55.1%
avg high school final mark (out of 100)	79.88	78.17
attended vocational school	3.3%	4.4%
attended technical school	28.3%	31.9%
attended high school specializing in education	5.4%	7.7%
attended other school	5.6%	7.5%
attended high school in humanities/sciences	57.3%	48.5%
lived in the city before enrolling	33.0%	27.9%
commuter	45.2%	43.0%
moved to the city after enrolling	21.7%	29.2%
lagged enrollment	2.28	2.49
attend courses with enrollment restriction	24.9%	1.2%
graduated before 2008	51.4%	33.2%

L1LV vs CL: Do we have a common support?

Shift	Freq.	Percent	Cum.
0	6,648	67.12	67.12
1	3,256	32.88	100



Estimated propensity score

	Controls	Treated
Smallest	0.070	0.094
1%	0.107	0.136
5%	0.150	0.172
10%	0.168	0.195
25%	0.201	0.259
50%	0.257	0.305
Mean	0.256	0.490
75%	0.296	0.915
90%	0.324	0.940
95%	0.338	0.946
99%	0.887	0.953
Largest	0.948	0.955

L1LV vs CL: Did the shift have an effect? (1)

variables	std avg diff	variance ratio	std avg diff	variance ratio	std avg diff	variance ratio	std avg diff	variance ratio
gender	-0.04	0.99	-0.03	1.00	-0.06	1.00	-0.07	1.00
high school mark	-0.17	0.89	0.04	0.94	0.01	0.90	0.01	0.90
lagged enrollment	0.02	1.01	0.07	1.15	0.06	1.12	0.02	1.01
commuter	0.09	1.02	0.03	1.00	0.02	1.00	0.02	1.00
moved to the city after enrolling	-0.23	0.75	-0.03	0.96	-0.03	0.96	-0.03	0.95
attend courses with enrollment restriction	0.94	16.42						
attended vocational school	0.05	1.23	0.03	1.16	0.01	1.03	-0.02	0.93
attended technical institute	0.07	1.05	0.02	1.01	0.01	1.01	-0.01	1.00
attended high school specializing in education	-0.01	0.95	0.10	1.50	0.07	1.37	0.10	1.52
attended other institute	-0.05	0.83	0.01	1.03	0.01	1.03	-0.05	0.82
SATT			0.958*** (0.0171)		0.0901*** (0.0151)		0.0874*** (0.0138)	

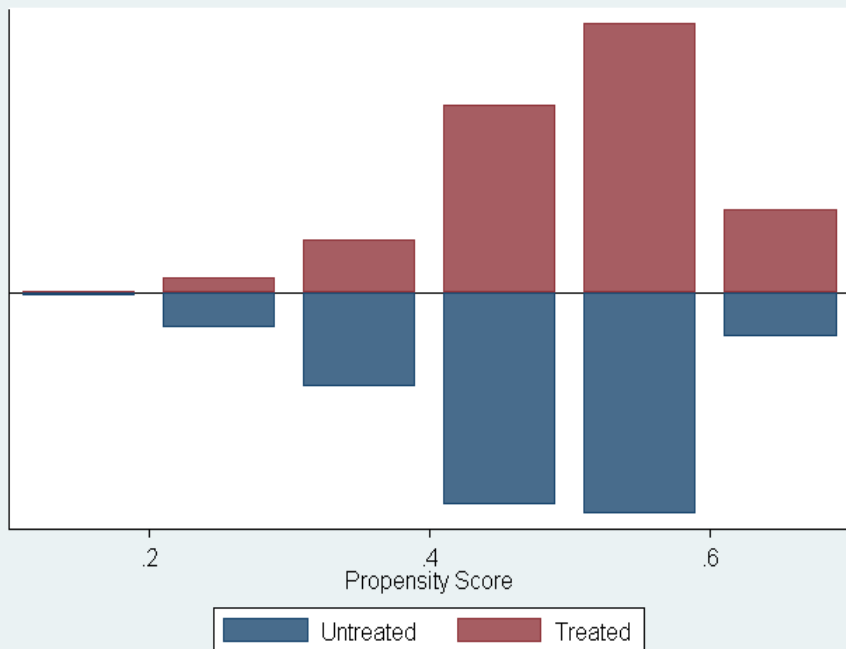
L1LV vs CL: Did the shift have an effect? (2)

Effect in each University

University	Treated	Controls	shift rate	M(1)	M(2)	M(5)
Firenze	1,512	3,314	31.3%	0.0674** (0.0307)	0.0681* (0.039)	0.0471* (0.025)
Pisa	968	2,242	30.2%	0.0921*** (0.026)	0.0798*** (0.023)	0.078*** (0.021)
Siena	776	1,092	41.5%	0.225*** (0.037)	0.235*** (0.034)	0.210*** (0.03)

L2LV vs CL: Do we have a common support?

Shift	Freq.	Percent	Cum.
0	7,542	51.71	51.71
1	7,042	48.29	100



Estimated propensity score		
	Controls	Treated
Smallest	0.150	0.144
1%	0.217	0.250
5%	0.289	0.338
10%	0.332	0.386
25%	0.412	0.447
50%	0.482	0.513
Mean	0.466	0.501
75%	0.528	0.562
90%	0.587	0.609
95%	0.611	0.621
99%	0.629	0.632
Largest	0.635	0.675

L2LV vs CL: Did the shift have an effect? (1)

variables	balancing before matching		balancing after (1)		balancing after (2)		balancing after (5)	
	std avg diff	variance ratio	std avg diff	variance ratio	std avg diff	variance ratio	std avg diff	variance ratio
gender	0.1	1.0	-0.1	1.0	-0.1	1.0	0.0	1.0
high school mark	0.1	1.0	0.0	0.9	0.0	0.9	0.0	0.9
lagged enrollment	-0.2	0.7	0.0	0.9	0.0	0.9	0.0	1.0
commuter	0.1	1.0	0.0	1.0	0.0	1.0	0.0	1.0
moved to the city after enrolling	-0.2	0.8	0.0	0.9	-0.1	0.9	0.0	1.0
attend courses with enrollment restriction	0.7	14.8						
attended vocational school	0.0	0.9	0.0	0.9	0.0	0.9	0.0	1.0
attended technical institute	0.0	1.0	-0.1	0.9	-0.1	0.9	-0.1	0.9
school high school specializing in education	-0.1	0.7	0.1	1.3	0.1	1.4	0.1	1.5
attended other institute	-0.1	0.8	0.0	1.0	0.0	1.1	0.0	1.1
SATT			-0.0799*** (0.010)		-0.0723*** (0.0121)		-0.0738*** (0.0111)	

L2LV vs CL: Did the shift have an effect? (2)

Effect in each University

University	Treated	Controls	shift rate	M(1)	M(2)	M(5)
Firenze	3,992	2,577	39.2%	-0.1978*** (0.0185)	-0.208*** (0.0168)	-0.214* (0.0154)
Pisa	2,590	3,961	60.5%	0.0296 (0.0185)	0.0298 (0.0174)	0.022*** (0.0168)
Siena	1,224	1,788	59.4%	-0.043 (0.0321)	-0.051* (0.0276)	-0.057** (0.024)

Concluding remarks

Leaving aside the issue of the *external validity* of these results...

we have found here that:

- In general, reform have proved to be more effective for the short degrees (L1LV)
- As for the long degrees, both timing that rates are disappointing

This might be due also to the too short, and early, observation period...

A more comprehensive evaluation might be required, that accounts for additional cohorts and analyses whetether the impact improves in the following years.