High School Teens and Museum Attendance
A field experiment

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The ideas behind this experiment

Why don't many young people visit art galleries?

- ❑ feeling of exclusion (Mason & McCarthy, 2006)
- ❑ cultural participation is lower in vulnerable social groups
- ❑ teens often visit museums with their school teachers and classmates, but…
- ❑ when it's up to them to choose how to allocate their free time, museums rarely are among the top preferences (Gray, 1998), despite favorable pricing and the 'open doors' policy followed by many museums and their attempts to portray an image of educational and entertaining institutions

How their voluntary museum attendance can be encouraged can be an interesting issue in cultural economics (e.g. changes in individual preferences, museum policies to attract visitors), but also in education policy, since it is also at school that the provision of appropriate incentives can occur

Motivation and novelty

The aim of the experiment is to encourage individual museum attendance during the high school years, and to identify best practices to transform this behavior into a long run cultural consumption

Field experiments have been increasingly popular in economic analyses (e.g. surveyed in Levitt & List, 2009)

However, their application to this area of research is novel. Recently published contributions in the field of cultural economics by Suárez-Vázquez (2011), Barkshi &Thorsby (2014), Berlin et al. (2015) report results from laboratory or field experiments, but none focuses on museum attendance and means to increase its practice

Experimental design (1)

We conduct a field experiment to study incentives offered to high-school teens to motivate them to visit art museums

In the experiment, three different levels of encouragement *W* are provided:

- *W = flier* : students receive a flier containing basic information and opening hours
- *W = presentation* : in addition to the previous, students are visited by an art expert for a presentation about the exhibit
- *W = reward* : in addition to the previous two, students are told that visit will receive extra-credit points towards their school grade

Assignment to the three levels of encouragement was randomized and occurred at the level of classes, which configures our experiment as a clustered randomized trial (Murray, 1998; Arcenaux, 2005; Frangakis et al., 2002; Duflo et al., 2007; Raudenbush et al., 2007)

The experiment was conducted in Florence, Italy from spring 2014

The encouraged visit

Palazzo Vecchio has been the symbol of the civic power of Florence for over seven centuries. Built between the end of the 13th century and the beginning of the 14th to house the city's supreme governing body, over time it has been subject to a series of extensions and transformations.
Its current appearance is mainly due to the restoration work and interior decoration carried out in the mid-16th century to adapt the building to its new function as ducal palace as ordered by Cosimo I de' Medici. After the transfer of the Medici court to Palazzo Pitti, it continued to host the various governmental offices, until it became the seat of the Florence City Council in 1871.

Palazzo Vecchio Museum practices an open-doors policy: it is open every day 9AM-Midnight (9AM-2PM on Thursdays)

The entrance is free to individuals 18 and younger. For students over 18 years old, a free ticket was provided, to guarantee an equal treatment

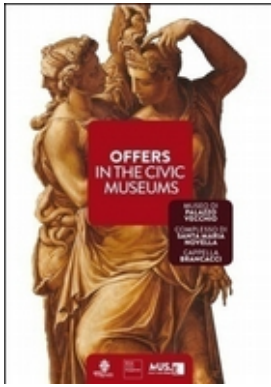
More details about the presentation

The presentation, a form of motivational encouragement, consisted in a talk by an art expert from Palazzo Vecchio, specialized in communicating to a juvenile audience.

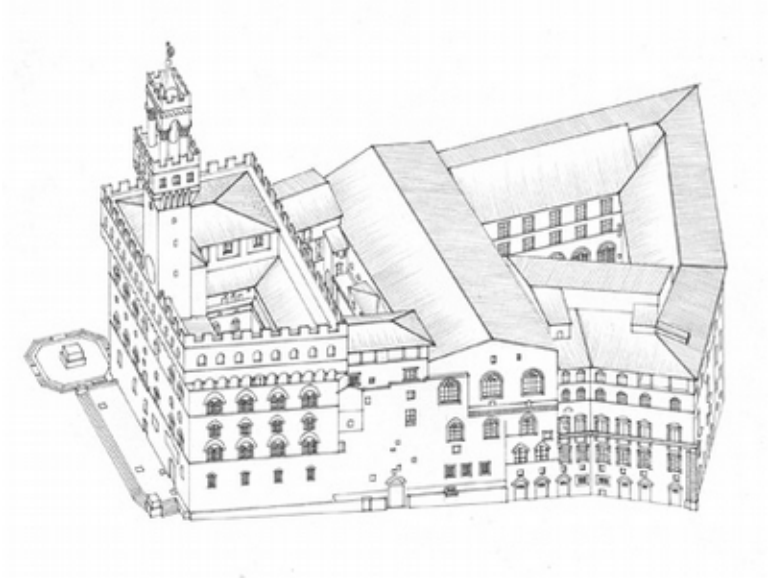
The presentation followed a strict protocol, with moments of interaction scheduled and used the support of materials and illustrations.

Its contents included:

Here is the FLIER→



- a place of art, a place of history
- creating bridges between 16th century and today culture in imagery and language
- with the support of images, discussion on how irony is present in 16th century arts, so that students can envision an entertaining visit
- discussion on Palazzo Vecchio as location of contemporary fiction, movies and videogames that students are likely to have heard of
- students are introduced to the many approaches they can take to the museum: individual visits, guided tours, meeting with historical characters, etc.



Timeline of the experiment

WHEN	FLIER	PRESENTATION	REWARD
First visit, late March/ early April 2014	Students are informed that they will be involved in a study about cultural consumption. Students complete a questionnaire about their background characteristics, cultural consumption habits		
	A flier of Palazzo Vecchio with opening hours is distributed		
	nothing	Talk by an art expert	
	nothing	nothing	Reward promise
Second visit, after two months	Collect entry tickets	Collect entry tickets	Collect entry tickets
Third visit, after six months	Students complete a final questionnaire about the number of individual visits to museums done in town and out of town in the last six months		

Experimental design (2)

About 300 students from 15 different classes involved – they were not informed that they were part of an experiment with different forms of encouragement

	N. of classes	N. of students
FLIER	5	93
FLIER & PRESENTATION	5	97
FLIER & PRESENTATION & REWARD	5	104
Total	15	297

Students attended the 4th year of high school and were aged 17-18

All high schools…

- ❑ are located in Florence
- ❑ offer a same program of studies involving a mix of humanities, mathematics and scientific subjects

Descriptive statistics about students

	Overall	Flier	Presentation	Reward
N. of museum visits last year (Mean)	*3.87*	*3.27*	*4.74*	*3.59*
% visiting the recommended museum	*18.71*	*3.23*	*10.31*	*40.38*
N. of visits in subsequent 6 months (Mean)	*2.95*	*1.49*	*4.39*	*3.00*
Male (1/0)	0.35	0.21	0.30	0.53
Born abroad (1/0)	0.06	0.02	0.09	0.07
Suburban resident(1/0)	0.42	0.39	0.32	0.55
Older than cohort (1/0)	0.06	0.07	0.06	0.04
Current GPA (out of 10)	6.82	6.72	6.79	6.93
Interested only in humanities (1/0)	0.26	0.23	0.39	0.17
Leisure & Cultural habits				
Interested in politics (1/0)	0.23	0.21	0.21	0.26
Volunteer (1/0)	0.17	0.20	0.14	0.15
Visited Palazzo Vecchio previously (1/0)	0.72	0.68	0.76	0.72
Parents' education and working status				
At least one parent unemployed (1/0)	0.16	0.15	0.17	0.14
Both high school degree (1/0)	0.33	0.38	0.25	0.36
At least one has college degree (1/0)	0.24	0.26	0.26	0.21
Parents are regular museum goers (1/0)	0.20	0.18	0.25	0.16

Descriptive statistics at the class level

	Mean	Std Dev	Min	Max
FLIER (5 Obs)				
a) share of students undertaking the encouraged visit	0.033	0.075	0.000	0.167
b) N. of voluntary museum visits 6 months later	1.756	2.013	0.000	4.875
c) N. of voluntary museum visits in previous 12 months	3.286	0.677	2.760	4.444
Difference (b - c)	-1.530	1.541	-3.222	0.431
PRESENTATION (5 Obs)				
a) share of students undertaking the encouraged visit	0.118	0.263	0.000	0.588
b) N. of voluntary museum visits 6 months later	4.303	2.346	2.500	8.368
c) N. of voluntary museum visits in previous 12 months	4.749	1.237	3.760	6.857
Difference (b - c)	-0.446	1.303	-2.147	1.511
REWARD (5 Obs)				
a) share of students undertaking the encouraged visit	0.402	0.180	0.222	0.650
b) N. of voluntary museum visits 6 months later	2.980	0.622	2.190	3.909
c) N. of voluntary museum visits in previous 12 months	3.543	1.058	2.667	5.000
Difference (b - c)	-0.564	0.679	-1.409	0.111

Classes randomly assigned to the presentation encouragement had higher previous museum attendance than the classes under the other two encouragement groups.
This difference constitutes an example of unbalances in that persist in the background variables, despite randomization. It is due to chance!

We are interested in…

Estimating and testing the differential effects of alternative encouragements on …

- ❑ the share of students undertaking the encouraged visit
- ❑ the class average number of subsequent visits to any museum (with the encouraged visit excluded from this count)

The fundamental problem of causal inference

For each class, three potential outcomes can be defined for each outcome variable of interest, however, only one outcome is observed associated with the encouragement level actually received

Example of the potential outcomes of the kth class receiving PRESENTATION

	Share of students…	Av. subsequent visits
FLIER	?	?
PRESENTATION	20%	3
REWARD	?	?

For the *k*th class…

- ❑ the effect of receiving PRESENTATION instead of FLIER is [20% - ?]
- ❑ the effect of receiving REWARD instead of FLIER is [? - ?], and so on

Randomized assignment helps…

… in finding a credible approximation of missing potential outcomes

- exogeneity is ensured, as assignments are independent of the unit's characteristics

If it is credible to assume that
- units do not (significantly) interfer with one another (SUTVA), and that
- potential outcomes respond only to the encouragement and not to other features of the experiment (excludability),

then, missing potential outcomes for the *k*th class can be approximated with no systematic bias by the outcomes that are observed in other classes receiving an alternative level of encouragement

Note that random assignment creates groups of observations that are, at least with regard to *a priori* expectations, identical, but

- with small samples, some unbalances in pre-treatment variables can persist, which need to be adjusted for in order to obtain more reliable estimates

Average treatment effect (ATE)

Based on this, we can define the ATE of a particular form of encouragement over another as the average of all unit-level effects.
If comparing, for instance, *p* to *f*

$$ATE_{pf,DIM} = E[[Y_k(r) - E[Y_k(f)]] = E[Y_k(r) - E[Y_k(f)]$$ diff-in-means estimator

In order to control for residual unbalances in pre-treatment variables, we can rescale the outcome by subtracting from the observed dependent variable its lagged value prior to (and thus independent of) the experiment, based on the motivation that this previous museum attendance is very likely to be the best predictor subsequent museum attendance:

$$ATE_{pf,DID} = E[Y_k(p) - Y_{k,prior}(p)] - E[Y_k(f) - Y_{k,prior}(f)]$$ diff-in-diff estimator

These ATEs can be easily calculated. How can they be tested?
Let each of them be a test statistic in the non-parametric testing strategy known as randomization inference

Hypothesis testing

H0: *The encouragement effect is zero for all classes, whatever encouragement they receive, i.e.* $Y_k(f)=Y_k(p)=Y_k(r)$ *for all k.*

Note that, under this special case, we observe three potential outcomes for each class

Example of the potential outcomes under H0 of the kth class receiving PRESENTATION

	Share of students…	Av. subsequent visits
FLIER	? = 20%	? = 3
PRESENTATION	20%	3
REWARD	? = 20%	? = 3

while alternative, one-tailed hypotheses state that

H1$_{p.f}$: *There exists at least one class k for which* $Y_k(p) - Y_k(f) > 0$, or

H1$_{r.f}$: *There exists at least one class k for which* $Y_k(r) - Y_k(f) > 0$, or also

H1$_{r.p}$: *There exists at least one class k for which* $Y_k(r) - Y_k(p) > 0$.

Randomization inference

There were [15! /(5! 5! 5!)] = 756,756 alternative possible assignments of encouragements, only one of these actually occurred

We may therefore:

- take the complete schedule of potential outcomes reconstructed under HO and simulate all possible randomizations of encouragements that could have occurred

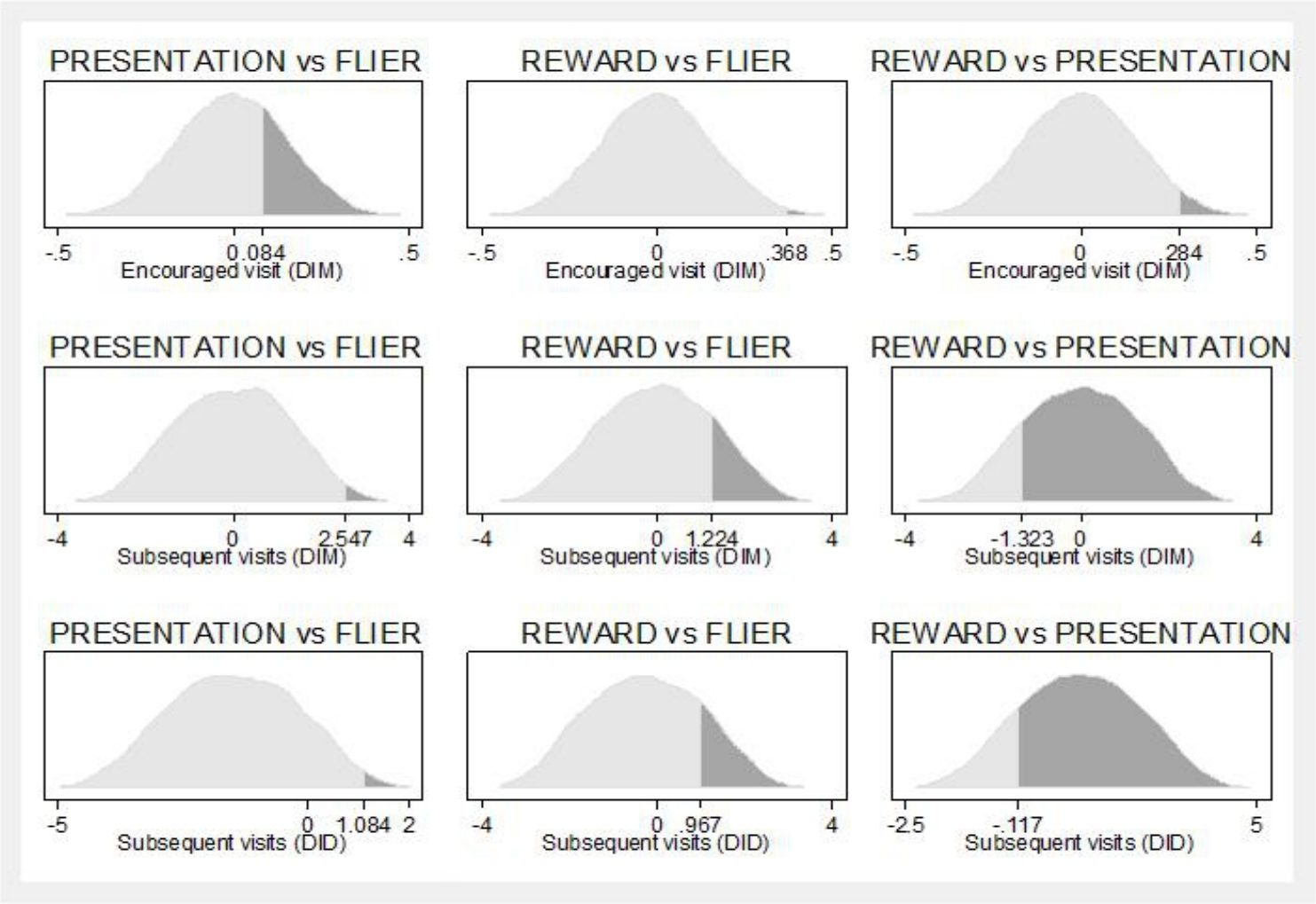
- for each of these 756,756 simulated randomized assignments, calculate the test statistics (ATEs) of interest, obtaining an exact sampling distribution of the differential effects under H0 (the randomization distribution)

- calculate the probability of obtaining – under *H0* – a fictional ATE that is at least as large as the one obtained from the actual experiment. This probability is equivalent to an exact *p*-value (Fisher, 1925) and is a measure of extremeness

A small value of the *p*-value suggests that the observed value of the test statistic is very unlikely in the randomization distribution of the test statistic and constitutes evidence against *H0* and in favor of *H1*.

Randomization distributions and *p*-values

Kernel probability density functions of the randomization distributions



p-value corresponds to the dark grey area in the randomization distribution

Observed encouragement effects and *p*-values (1)

Effect on the share of students undertaking the encouraged visit (DIM)

	ATE	ATE 95% C.I. *		*p*-value (right tail)
PRESENTATION vs FLIER	0.084	-0.023	0.208	0.293
REWARD vs FLIER	0.368	0.261	0.497	0.005
REWARD vs PRESENTATION	0.284	0.176	0.412	0.030

The average share under REWARD is

- 36.8 points higher than under FLIER
- 28.4 points higher than under PRESENTATION

with p-values strongly against the sharp null hypothesis of no effect

Therefore, the reward encouragement is the most effective way to promote the one-time visit to the proposed museum, while the presentation does not work much better than the flier (8.4 points higher but weaker evidence against HO)

* 95% CI calculated through the test-inversion procedure suggested by Rosenbaum (2002)

Observed encouragement effects and *p*-values (2)

	ATE	ATE 95% C.I. *		*p*-value (right tail)
Effect on subsequent voluntary museum visits (DIM)				
PRESENTATION vs FLIER	2.547	1.494	3.810	0.016
REWARD vs FLIER	1.224	0.173	2.494	0.187
REWARD vs PRESENTATION	-1.323	-2.379	-0.053	0.836
Effect on subsequent voluntary museum visits (DID)				
PRESENTATION vs FLIER	1.084	0.031	2.347	0.015
REWARD vs FLIER	0.967	-0.084	2.236	0.189
REWARD vs PRESENTATION	-0.117	-1.173	1.152	0.840

The average number of museum visits under PRESENTATION

- ❑ is 2.5 points higher than under FLIER (*p*-value against HO)
- ❑ has a variation that is 1.1 points higher than under FLIER (*p*-value against HO)

So, the presentation works. There is some weaker evidence that REWARD works more than FLIER but nothing supports the idea that REWARD is better than PRESENTATION in the long run.

Concluding remarks

Provision of extra-credit rewards that configure immediate utility beyond the cultural sphere is not the most effective way to increase teens' attendance to museums over time and affect their long run behavior,

unless it is thought as an enduring, "pay-per-visit" policy!

An appropriate curiosity-enhancing policy may instead suffice in providing unambiguous motivations and help teens in finding their "way to do it" in the future

Upcoming and future developments

- ❑ robustness analysis using different test statistics (e.g. difference in quantiles and in rank sums) and alternative adjustment strategies of unbalances

- ❑ this is another paper: analysis of individual attendance decisions in the presence of encouragements and peer pressure