

COVID-19 VACCINE LOTTERY FIELD EXPERIMENT

Cassandra Pengelly

Behavioural Economics 871 Essay

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1. Introduction

2. Experiment Design

Have 1 control group: no messages, no lotto Have 4 treatment groups: • Send messages • 1 lottery where you are entered if you got at least 1 vaccination • 1 lottery where a friend has to refer you • 1 regret lottery: everyone is entered into the lotto (receive sms) and can only win if vaccinated Can randomize across municipalities or provinces

Research question: could a vaccine lottery improve vaccination rates in South Africa? Many South Africans are hesitant to get the COVID vaccine. As STATSA shows, amount of people have received the vaccine so far. Critical to reach herd immunity is improving vaccination rates. In order to improve the take-up of vaccinations, a field experiment designed around a vaccination lottery is proposed. While some governments have considered and experimented with lump-sum payments, behavioural economics could provide a more cost-effective solution. Individuals have a tendency to overweight small probabilities and this overestimate their chances of winning a lottery. In South Africa, Lit Review Theory: overweight small probabilities, gambling, social preferences, regret avoidance Empirical: vaccine field designs, lottery incentives, regret lottery incentives Several authors have experimented with lotteries as an incentive for vaccinations, although there have been no studies as of yet on the South African population. Problems with vaccine studies: too few participants. A larger study could fill this gap in the literature.

3. Treatment and Data

4. Partner Institutions and Funding

5. Pre-analysis plan

Students must submit an essay in which they design a field experiment that could answer an interesting behavioural economic question. The essay must contain the following:

- a clear statement of the research question and motivation for why this is interesting and important;
- a brief review of the relevant literature (both theoretical and empirical) which highlights the research gap your experiment will address;
- a clear description of the experimental design and the theory of change;
- an explanation of how the treatments will be administered and data gathered (including proposed partner institutions);
- a pre-analysis plan of the empirical analysis that will be performed on the data.

Overview In this field experiment, a person who refers his/her friend to receive a vaccine would be entered into a lucky draw, with a monetary prize, created by the government. The purpose behind this nudge is to encourage people who would otherwise not have got a Covid vaccine, to do so. The hypothesis is that there should be an increase in the total number of people receiving a Covid vaccine after the nudge is implemented. Increasing the number of vaccinations is important as medical research shows that vaccines decrease the probability of contracting Covid-19 and are also effective at reducing the severity of the symptoms of the virus for those who do contract it.

The Nudge The nudge addresses behaviour by creating an environment where there is social pressure to get a vaccine (if I wanted to enter the lucky draw, I would pressure my friend into getting the vaccine). It is also likely that if a person asks her friend to get the vaccine so she can enter the lucky draw, she will reciprocate and get the vaccine as well so that her friend may enter the draw, which will also increase the number of people getting vaccinated. For the vaccines that require two doses (e.g. Pfizer), a person's name could be withdrawn, if the second shot is not given within a certain amount of time. This makes use of loss aversion, where people who already have their names in the draw feel the pain of having their names withdrawn more intensely than the pleasure of having their names added a second time to the draw for getting their second shot.

Target Group The lucky draw is anticipated to attract people who are risk-on (they enjoy gambling, and are less worried about getting vaccinated), and poorer individuals for whom winning money is more attractive. These target groups are desirable as they are less likely to get the vaccine, and the government would like to maximise the number of vaccinated people. Additionally, if there are individuals who want to be vaccinated but procrastinate getting the vaccine (e.g. naïve hyperbolic discounters), setting a deadline for the lucky draw could increase the utility of getting the vaccine earlier enough to overcome the procrastination problem. There is no downside or extra cost for having people enter the lucky draw who would otherwise still have got the vaccine.

Proposed Partner Institutions This field experiment would be in collaboration with the South African government and facilities that conduct vaccinations (e.g. Clicks). The government would be where the data is centralized and the administrators of vaccines would all be data collection nodes. After a person has received a vaccine, the administrator would ask if the person received a referral for the shot, and then note the ID number of the friend in addition to the individual's details.

Data Collection There is a data collection system already set up at the vaccination sites so this extra data point would not be difficult to collect within the current tracking system. Depending on costs, the referral friend could be sent an sms thanking her for caring about others and getting them vaccinated, and letting her know that she has been entered into the draw. This is a positive reinforcement technique and shows people that the government is following up on their promise. This acknowledgement and transparency is expected to encourage more referrals. Once the lucky draw has been concluded, the data can be analysed, the purpose of which is to uncover whether the nudge increased vaccinations.

References are to be made as follows: [Fama & French \(1997: 33\)](#) and [Grinold & Kahn \(2000\)](#) Such

authors could also be referenced in brackets ([Grinold & Kahn, 2000](#)) and together [Grinold & Kahn \(2000\)](#). Source the reference code from scholar.google.com by clicking on “cite” below article name. Then select BibTeX at the bottom of the Cite window, and proceed to copy and paste this code into your ref.bib file, located in the directory’s Tex folder. Open this file in Rstudio for ease of management, else open it in your preferred Tex environment. Add and manage your article details here for simplicity - once saved, it will self-adjust in your paper.

I suggest renaming the top line after @article, as done in the template ref.bib file, to something more intuitive for you to remember. Do not change the rest of the code. Also, be mindful of the fact that bib references from google scholar may at times be incorrect. Reference Latex forums for correct bibtex notation.

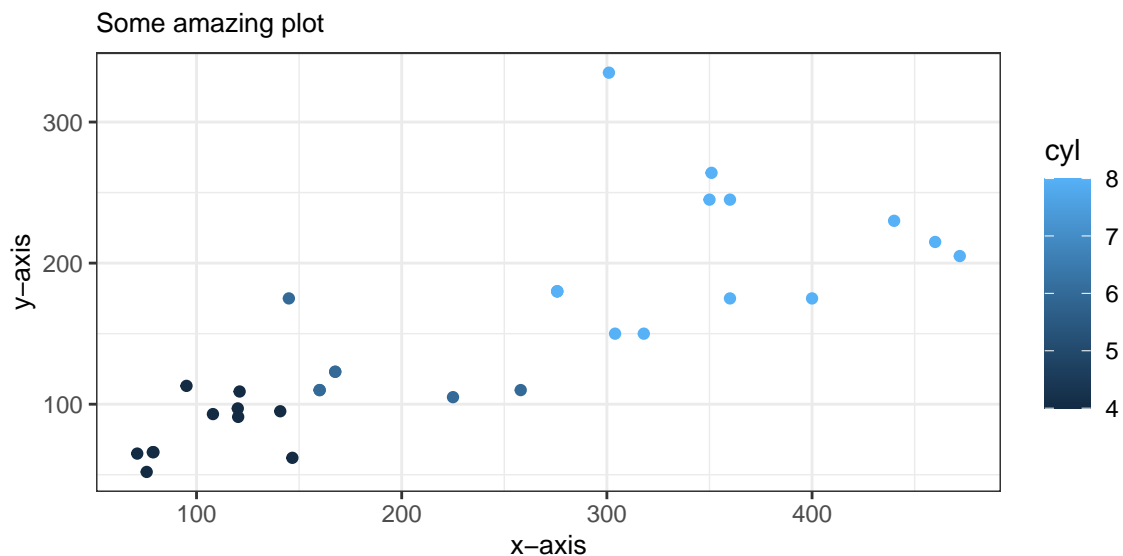


Figure 5.1: Caption Here

According to [Health \(2021\)](#), 34% of South Africans are vaccinated, while only 25% are fully vaccinated.

Province	Total Adults Vaccinated	Adult Population	Percentage Vaccinated
Eastern Cape	1 603 045	4 099 543	39%
Free State	735 696	1 914 521	38%
Gauteng	3 523 373	11 311 326	31%
KwaZulu-Natal	2 170 526	7 219 795	30%
Limpopo	1 437 846	3 695 801	39%
Mpumalanga	831 759	3 039 520	27%
North West	835 206	2 693 247	31%
Northern Cape	290 962	847 545	34%
Western Cape	2 141 933	4 976 903	43%
Total	13 570 346	39 798 201	34%

Table 5.1: Vaccination Statistics

To reference calculations **in text**, *do this*: From table 5.1 we see the average value of mpg is 20.98.

Including tables that span across pages, use the following (note that I add below the table: “continue on the next page’’). This is a neat way of splitting your table across a page.

Use the following default settings to build your own possibly long tables. Note that the following will fit on one page if it can, but cleanly spreads over multiple pages:

Table 5.2: Long Table Example

mpg	cyl	displacement	hp	drat	wt	qsec	vs	am	gear	carb
21.00	6.00	160.00	110.00	3.90	2.62	16.46	0.00	1.00	4.00	4.00
21.00	6.00	160.00	110.00	3.90	2.88	17.02	0.00	1.00	4.00	4.00
22.80	4.00	108.00	93.00	3.85	2.32	18.61	1.00	1.00	4.00	1.00
21.40	6.00	258.00	110.00	3.08	3.21	19.44	1.00	0.00	3.00	1.00
18.70	8.00	360.00	175.00	3.15	3.44	17.02	0.00	0.00	3.00	2.00
18.10	6.00	225.00	105.00	2.76	3.46	20.22	1.00	0.00	3.00	1.00
14.30	8.00	360.00	245.00	3.21	3.57	15.84	0.00	0.00	3.00	4.00
24.40	4.00	146.70	62.00	3.69	3.19	20.00	1.00	0.00	4.00	2.00
22.80	4.00	140.80	95.00	3.92	3.15	22.90	1.00	0.00	4.00	2.00
19.20	6.00	167.60	123.00	3.92	3.44	18.30	1.00	0.00	4.00	4.00
17.80	6.00	167.60	123.00	3.92	3.44	18.90	1.00	0.00	4.00	4.00
16.40	8.00	275.80	180.00	3.07	4.07	17.40	0.00	0.00	3.00	3.00
17.30	8.00	275.80	180.00	3.07	3.73	17.60	0.00	0.00	3.00	3.00
15.20	8.00	275.80	180.00	3.07	3.78	18.00	0.00	0.00	3.00	3.00

Continued on next page

Table 5.2: Long Table Example

mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
10.40	8.00	472.00	205.00	2.93	5.25	17.98	0.00	0.00	3.00	4.00
10.40	8.00	460.00	215.00	3.00	5.42	17.82	0.00	0.00	3.00	4.00
14.70	8.00	440.00	230.00	3.23	5.34	17.42	0.00	0.00	3.00	4.00
32.40	4.00	78.70	66.00	4.08	2.20	19.47	1.00	1.00	4.00	1.00
30.40	4.00	75.70	52.00	4.93	1.61	18.52	1.00	1.00	4.00	2.00
33.90	4.00	71.10	65.00	4.22	1.83	19.90	1.00	1.00	4.00	1.00
21.50	4.00	120.10	97.00	3.70	2.46	20.01	1.00	0.00	3.00	1.00
15.50	8.00	318.00	150.00	2.76	3.52	16.87	0.00	0.00	3.00	2.00
15.20	8.00	304.00	150.00	3.15	3.44	17.30	0.00	0.00	3.00	2.00
13.30	8.00	350.00	245.00	3.73	3.84	15.41	0.00	0.00	3.00	4.00
19.20	8.00	400.00	175.00	3.08	3.85	17.05	0.00	0.00	3.00	2.00
27.30	4.00	79.00	66.00	4.08	1.94	18.90	1.00	1.00	4.00	1.00
26.00	4.00	120.30	91.00	4.43	2.14	16.70	0.00	1.00	5.00	2.00
30.40	4.00	95.10	113.00	3.77	1.51	16.90	1.00	1.00	5.00	2.00
15.80	8.00	351.00	264.00	4.22	3.17	14.50	0.00	1.00	5.00	4.00
19.70	6.00	145.00	175.00	3.62	2.77	15.50	0.00	1.00	5.00	6.00
15.00	8.00	301.00	335.00	3.54	3.57	14.60	0.00	1.00	5.00	8.00
21.40	4.00	121.00	109.00	4.11	2.78	18.60	1.00	1.00	4.00	2.00

5.1. Huxtable

Huxtable is a very nice package for making working with tables between Rmarkdown and Tex easier.

This cost some adjustment to the Tex templates to make it work, but it now works nicely.

See documentation for this package [here](#). A particularly nice addition of this package is for making the printing of regression results a joy (see [here](#)). Here follows an example:

If you are eager to use huxtable, comment out the Huxtable table in the Rmd template, and uncomment the colortbl package in your Rmd's root.

Note that I do not include this in the ordinary template, as some latex users have complained it breaks when they build their Rmds (especially those using tidytex - I don't have this problem as I have the full Miktex installed on mine). Up to you, but I strongly recommend installing the package manually and using huxtable. To make this work, uncomment the *Adding additional latex packages* part in yaml

at the top of the Rmd file. Then comment out the huxtable example in the template below this line. Reknit, and enjoy.

Table 5.3: Regression Output

	Reg1	Reg2	Reg3
(Intercept)	-2256.361 *** (13.055)	5763.668 *** (740.556)	4045.333 *** (286.205)
carat	7756.426 *** (14.067)		7765.141 *** (14.009)
depth		-29.650 * (11.990)	-102.165 *** (4.635)
N	53940	53940	53940
R2	0.849	0.000	0.851

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

FYI - R also recently introduced the gt package, which is worthwhile exploring too.

6. Lists

To add lists, simply using the following notation

- This is really simple
 - Just note the spaces here - writing in R you have to sometimes be pedantic about spaces...
- Note that Rmarkdown notation removes the pain of defining \LaTeX environments!

7. Conclusion

I hope you find this template useful. Remember, stackoverflow is your friend - use it to find answers to questions. Feel free to write me a mail if you have any questions regarding the use of this package. To cite this package, simply type citation("Texevier") in Rstudio to get the citation for [Katzke \(2017\)](#) (Note that uncited references in your bibtex file will not be included in References).

References

10 Fama, E.F. & French, K.R. 1997. Industry costs of equity. *Journal of financial economics*. 43(2):153–193.

Grinold, R.C. & Kahn, R.N. 2000. Active portfolio management.

Health, D. of. 2021. Latest vaccine statistics. [Online], Available: <https://sacoronavirus.co.za/latest-vaccine-statistics/>.

Katzke, N.F. 2017. *Texevier: Package to create elsevier templates for rmarkdown*. Stellenbosch, South Africa: Bureau for Economic Research.

Appendix

Appendix A

Some appendix information here

Appendix B