



The effect of information sources ('messengers') on smoking behavior

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Information source and cigarettes: experimental evidence on the messenger effect (J. Maclean, J. Buckell, J. Marti)



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- Motivational Introduction
- Data
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The big picture

- Behavioral Theory:

Messenger \Rightarrow consumer choice between tobacco cigarettes & E-Cigarettes

- Neoclassical Theory:

Messenger \nRightarrow consumer choice between tobacco cigarettes & E-Cigarettes

- **Goal of the Study**: How important (if any) is the source of information (the 'messenger') on consumer choice in the context of cigarettes, electronics and tobacco?



The messenger effect

- Behavioral Economics has gained increasing importance in the last several decades, e.g. Prospect Theory of Kahnemann & Tversky (1979)
- A sub-area: Choice Theory
 - This study looks at the manner in which information is presented to consumers. They call this «**the messenger effect**».
- *Definition:* The same information received from different messengers can have different marginal effects on consumer beliefs & choices.
- Why is this important?
 - A vast majority of (new) information we get, are through some various kinds of messengers, e.g. media, television, stock market etc...
 - A wrong understanding of how information is communicated and perceived by people can have huge economic implications.



Previous Literature

- Most of the literature on studying the messenger effect is theoretical.
- This study is very first which try to find evidence for the messenger effect within economics empirically.
- The behavioral literature makes the following assumptions concerning the messenger effect:
 - The higher credibility (trustworthy-ness) of a messenger, the more likely he will influence choice behavior of the consumer (and vice versa)
 - If the consumer believes that companies or the government have hidden agendas, they are least likely to view them as credible messengers.



Implementation

- Use the tobacco cigarettes & E-cigarettes Market in the United States to identify the messenger effect (LHS of implication).
 - Why this market?
 - Approx. 15% of the US population smokes . Public health regarding cigarettes remains an issue.
 - Additionally, concerns among public-health advocates that the popular E-cigarettes may re-normalize smoking
 - Studying the messenger effect could represent an interesting alternative to implement more efficient health policies
 - What messengers?
 - 1) Government; 2) Physicians; 3) Private company

The different messengers (1)

Figure 1: FDA as the messenger



The different messengers (2)

Figure 2: The fictitious e-cigarette company (the Ave) as the messenger



The different messengers (3)

Figure 3: Physicians as the messenger



E-cigarettes are much **safer** than tobacco cigarettes

If you switch to e-cigarettes now, you are likely to **live 5 years longer**

The different messengers (4)

Figure 4: No messenger





Data

- Panel Data from 6.04.2017 to 26.05.2017
- Data was collected through online-surveys from a firm called Qualtrics
- 2'722 adult smokers of age 18 to 64
- After eliminating respondents who: 1) ..had difficulty viewing the image; 2) ..found the image extremely difficult to understand; 3) ..who failed the attention test; 4) ..who completed the survey too fast
 - The sample size reduces to 2'499 (92% of the full sample)
- Design of the study: experimental approach
- Check: «pilot-study» before launching experiment to avoid potential issues regarding the formulation of some questions or the difficulty in image viewing



Methodology

- Representative sample: The sample was constructed to match a sample of adult smokers in 2014 of large national health survey (BRFSS)
- Image-showing process was randomized. This implies:
 - 3 different treatment-groups: 1) FDA image; 2) fictional company image; 3) physicians image
 - 1 control group: «neutral» image
 - If the randomization is done correctly , we get comparable results across treatment- and control-group
- Important note: this experiments tries to mimic information-delivering through a real-world advertising campaign, like in a magazine.

Hypothesis

H₀: The messenger has no influence on choice behavior of the consumer

$$\Leftrightarrow \beta_i = 0, \text{ where } i = \{FDA, Ave, Physicians\}$$

H₁: Messengers like the FDA and physicians will have a greater effect on the consumer intention to use and risk perception than information provided with no source .

$$\Leftrightarrow \beta_i > \beta_{no\ source}, \text{ where } i = \{FDA, Physicians\}$$

H₂: Because consumers will view firms having an agenda (selling E – cig.), information from an E – cig. company will have no effect on intention to use and risk perceptions, relative to information provided with no source .

The empirical model (1)

$$C_{i,m} = \beta_0 + \beta_1 FDA_m + \beta_2 Physicians_m + \beta_3 Ave_m + X_{i,m}\beta_4 + \mu_{i,m}$$

$C_{i,m}$: different cigarette outcome (dummy) for respondent i assigned to messenger m

FDA_m : Dummy, taking value 1 if the image FDA was shown to person, 0 otherwise

$Physicians_m$: Dummy, taking value 1 if the image of physicians was shown to person, 0 otherwise

Ave_m : Dummy, taking value 1 if the image of company was shown to person, 0 otherwise

$X_{i,m}$: Vector of the smoker's demographic characteristics assigned to messenger m

→ We have a dummy-dummy model

Results (1)

Effect of messengers on E-cig. and tobacco cig. usage

Independent variables ↓	Use E-cig. in next 30 days (Y-var.)	Quit tobacco cig. in next 30 days (Y-var.)
No controls		
FDA	0.032	0.024
Ave	0.08***	0.038
Physicians	0.026	0.042
With controls		
FDA	0.032	0.018
Ave	0.065***	0.028
Physicians	0.033	0.038

*** : statistically different from zero at the 99% confidence-level.



Results (2)

- The researchers cannot reject their first hypothesis (H_1)
 - Potential explanations:
 - Survey was conducted at a time of general distrust towards science
 - Some misinterpretations from the respondents, which leads to diluted effects
 - People can lie!
- Only the fictitious company seem to be particularly important messengers. This goes against the researcher's second hypothesis (H_2).
- However, because of significant results regarding the company, the general Nullhypothesis can be rejected

Results (3)

Table A19: Characteristics of respondents who find the fictitious e-cigarette company somewhat or extremely trustworthy and respondents who do not

<i>Sample:</i>	Find the Ave trustworthy	Do not find the Ave trustworthy
18 to 34 years	0.37	0.37
35 to 49 years	0.33	0.28
50 to 64 years	0.30	0.34
Male	0.57	0.55
Female	0.43	0.45
No college	0.57	0.59
College	0.43	0.41
Mid Atlantic	0.14	0.11
Midwest	0.23	0.25
Mountain	0.046	0.075
New England	0.046	0.039
Pacific	0.11	0.12
South	0.42	0.40
White	0.79	0.83
African American	0.13	0.087
Other race	0.078	0.084
Hispanic	0.12	0.096
Family size	3.10	3.02
Democrat-leaning	0.55	0.53
Survey duration	9,716	16,998
Image difficulty	0.090	0.055
SAH	0.32	0.24
Daily smoker	0.85	0.84
Addicted smoker	0.32	0.30
Vaper	0.35	0.16
Observations	922	1,577





Results (4)

- The researcher cannot test why the fictitious company appears to be important for adult smokers.
- Possible reasons:
 - Congruence between messenger (E-Cig. company) and follow-up questions (intention to use E-Cig. In the future)
 - Tobacco cigarette companies have bad reputation in US. Substitution products like E-cigarette companies gain sympathy of consumer?
 - Maybe, the design of the logo of the fictitious company was appealing, credible etc...
- Findings are in line with other literature that there is no evidence that e-cigarette magazine advertising influences the quitting behavior of smokers (see column 2)

Robustness Check (1)

- Did randomization work?
- Yes, for most variables, it seems so, because we can only reject the H_0 of no differences in the mean rank for only 4 variables.

Table 1: Summary statistics

Sample;	Full sample	FDA	Ave	Physician	No source
18 to 34 years	0.37	0.38	0.38	0.33	0.40
35 to 49 years	0.30	0.27	0.29	0.34	0.30
50 to 64 years	0.33	0.34	0.33	0.33	0.30
Male	0.56	0.56	0.56	0.56	0.55
Female	0.44	0.44	0.44	0.44	0.45
No college	0.58	0.57	0.57	0.61	0.58
College	0.42	0.43	0.43	0.39	0.42
Mid Atlantic	0.12	0.13	0.11	0.13	0.12
Midwest	0.24	0.24	0.24	0.24	0.25
Mountain	0.064	0.057	0.056	0.064	0.080
New England	0.041	0.040	0.043	0.043	0.038
Pacific	0.12	0.15	0.098	0.14	0.096
South	0.41	0.39	0.46	0.38	0.42
White	0.82	0.79	0.81	0.82	0.83
African American	0.10	0.11	0.100	0.10	0.093
Other race	0.082	0.092	0.085	0.074	0.077
Hispanic	0.10	0.12	0.11	0.10	0.089
Family size	3.05	3.02	3.04	3.02	3.12
Democrat	0.54	0.51	0.57	0.53	0.53
Survey duration	14,312	18,776	10,244	12,163	15,990
Image difficulty	0.068	0.073	0.064	0.077	0.056
SAH	0.27	0.29	0.26	0.28	0.26
Daily smoker	0.84	0.83	0.83	0.85	0.86
Addicted smoker	0.30	0.30	0.30	0.29	0.32
Vaper	0.23	0.23	0.25	0.22	0.22
Observations	2,499	630	621	622	626

Robustness Check (2)

- In general, across several robustness checks, the results are stable.
- When the regression function is re-estimated with an ordered logit, the researchers get similar results:

Table A13: Effect of messengers on intentions to use e-cigarettes using an ordered logit mode

<i>Outcome variable:</i>	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Sample proportion:	0.27	0.21	0.35	0.17
FDA	-0.025 (0.019)	-0.003 (0.003)	0.013 (0.010)	0.015 (0.011)
Ave	-0.038* (0.019)	-0.005* (0.003)	0.021* (0.011)	0.022* (0.011)
Physician	-0.015 (0.020)	-0.002 (0.003)	0.008 (0.011)	0.009 (0.011)
Observations	2,499	2,499	2,499	2,499

Notes: The Ave is the fictitious e-cigarette company created by the authors for the purposes of this study. Outcome 1 = Not likely at all. Outcome 2 = Not very likely. Outcome 3 = Somewhat likely. Outcome 4 = Extremely likely. All models estimated with an ordered logit model. Average marginal effects reported. Controls include personal characteristics listed in Table 1. Reference category is no source. Heteroskedasticity robust standard errors are reported in parentheses. ***, **, * = statistically different from zero at the 1%, 5%, 10% level.



Conclusion

- All in all, the whole structure of the study make sense for me.
- The implementations like an attention test in the survey, the pilot study or the randomization test make me think that the researchers really thought the study through.
- How about the internal validity?
 - I believe in the causal relationship that a certain type of messenger can influence the choice behavior of consumers.
 - However, I see a major problem in the data-gathering process: the survey is very long and people tend to lie, even though everything.
- Another issue might lie in selection bias (positive), since people could choose to participate in the survey.