Estimating Anti-Immigrant Sentiment by item count technique

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Index

Introduction

Randomized response techniques

Item count technique

Estimating anti-immigrant sentiment

Survey: research method that is based on questioning a sample of individuals

↓ interest

Sensitive or confidential aspects

↓ problem

Social desirability bias: tendency of respondents to answer based on what is socially acceptable

↙ Refuse to participate in the survey

↓ False answers

↘ Conditioned answers

Altering the accuracy and reliability of the estimations in a major way

↙ **overreport** socially acceptable attitudes (healthy eating, doing voluntary work)

↘ **underreport** socially disapproved (abortion, sexual violence)

Although these errors **cannot** be totally **avoided**, they may be **mitigated** considering some key points:

- way in which the survey is administrated
- role/presence of the interviewer
- format of the questionnaire
- wording and placing of the sensitive items in the questionnaire
- presence of other people
- **privacy protection**

Survey statisticians and practitioners

↓ have developed

strategies

↙ ↓ ↘

to ensure interviewees' anonymity

to reduce the incidence of evasive answers

underreporting of social taboos

↘ ↓ ↙

when **direct questions** (DQ) are posed on sensitive issues

One possibility is to **limit the influence of the interviewers**

- self-administered questionnaires (SAQs)
- interactive voice response (IVR) technique
- computer-assisted telephone interviewing (CATI)
- audio computer-assisted self interviewing (ACASI)
- computer-assisted self interviewing (CASI)
- computer-assisted Web interviewing (CAWI)

Alternatively, since the 1960s different questioning methods have been designed

to ensure respondent anonymity ↙ ↘ cutting down false reporting

Indirect Questioning Techniques (IQTs)

- **randomized response technique** - RRT (Warner, 1965; Chaudhuri and Mukerjee, 1988; Chaudhuri, 2011)
- **item count technique** - ICT (Raghavarao and Federer, 1979; Miller, 1984; Droitcour et al., 1991)
- non-randomized response technique - NRRT (Tian and Tang, 2014)

Randomized Response (RR) Technique (RRT) (Warner, 1965)

↓ pioneering work on IQTs

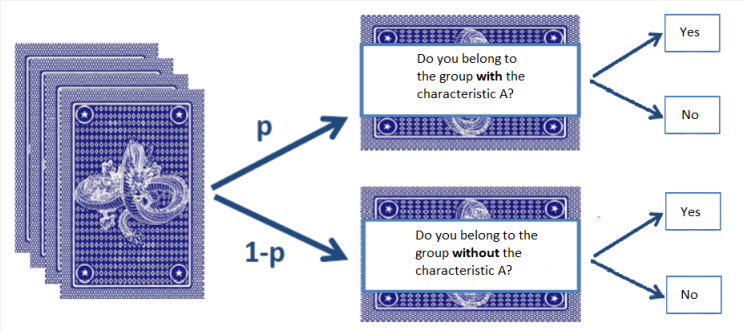
maintains a prominent position among IQTs

↓ objective

to protect
the anonymity
of the respondent

to reduce the risk of
escape or no response
to sensitive questions

The respondent selects one of two complementary questions by a **random mechanism** (deck of cards, dice, coins, coloured numbered balls, spinners,...)



Although the **individual information**

↓ cannot be used to discover

their true status regarding the sensitive issues

the information gathered for **all** the survey **participants**

↓ can be profitably employed

to draw **inferences** on certain parameters of interest for the study population

Alternative IQTs

↓

- the nominative technique (Miller, 1985)
- the three card method (Droitcour and Larson, 2002),
- the non-randomized response technique (Tian and Tang, 2014),
- the **item count technique**,
  the unmatched count technique,
  the block total response or
  the list experiment, (Raghavarao and Federer, 1979; Miller, 1984; Droitcour et al., 1991)

↓

surveys requiring a “yes” or “no” response to a sensitive question

Item count technique

We draw two independent samples from the target population

s_{sl} sample, receives a **short list** of items that only contains the G **innocuous questions**

s_{ll} sample, receives a **long list** of items containing $(G+1)$ questions

- G refer to **nonsensitive characteristics**
- 1 is related to the **sensitive characteristic** under study

All sensitive and nonsensitive items are **qualitative** in nature.

Respondents: to count and report the number of items that apply to them without answering each question individually.

Objective: population proportion $\bar{Y} = N^{-1} \sum_{i \in U}^{N} y_i$
Samples: s_{ll} and s_{sl}
Generic sampling designs: $p_{ll}(\cdot)$ and $p_{sl}(\cdot)$
First- and second-order inclusion probabilities:
$\pi_{i(ll)} = \sum_{s_{ll} \ni i} p_{ll}(s_{ll})$, $\pi_{i(sl)} = \sum_{s_{sl} \ni i} p_{sl}(s_{sl})$
$\pi_{ij(ll)} = \sum_{s_{ll} \ni i,j} p_{ll}(s_{ll})$, $\pi_{ij(sl)} = \sum_{s_{sl} \ni i,j} p_{sl}(s_{sl})$
Design-basic weights: $d_{i(ll)} = \pi_{i(ll)}^{-1}$, $d_{i(sl)} = \pi_{i(sl)}^{-1}$,
$d_{ij(ll)} = \pi_{ij(ll)}^{-1}$, $d_{ij(sl)} = \pi_{ij(sl)}^{-1}$

$\mathcal{T}$: **total score** applicable to the G **non-sensitive** questions,
$\mathcal{Z} = \mathcal{Y} + \mathcal{T}$: **total score** applicable to the **non-sensitive** questions and the **sensitive** question.
Answer given by the ith respondent will be

$$z_i = \begin{cases} y_i + t_i & \text{if } i \in s_{ll} \\ t_i & \text{if } i \in s_{sl} \end{cases}$$

Under the sampling designs $p_{ll}(\cdot)$, $p_{sl}(\cdot)$ let:

$$\hat{\bar{Z}}_{HT} = \frac{1}{N}\sum_{i\in s_{ll}} d_{i(ll)} z_i \qquad \hat{\bar{T}}_{HT} = \frac{1}{N}\sum_{i\in s_{sl}} d_{i(sl)} t_i$$

unbiased HT estimator of $\bar{Z} = N^{-1}\sum_{i\in U}(y_i + t_i)$

unbiased HT estimator of $\bar{T} = N^{-1}\sum_{i\in U} t_i$

HT-type estimator of $\bar{Y}$ under the ICT

$$\hat{\bar{Y}}_{HT} = \hat{\bar{Z}}_{HT} - \hat{\bar{T}}_{HT}$$

From the unbiasedness of $\hat{\bar{Z}}_{HT}$ and $\hat{\bar{T}}_{HT} \rightarrow \hat{\bar{Y}}_{HT}$ is unbiased for $\bar{Y}$.
Samples are independent, so the **variance** of $\hat{\bar{Y}}_{HT}$ is

$$V(\hat{\bar{Y}}_{HT}) = V(\hat{\bar{Z}}_{HT}) + V(\hat{\bar{T}}_{HT})$$

Some applications are:

- **drug use** (Miller et al., 1986),
- **prevalence of AIDS** (Droitcour et al., 1991),
- **racial prejudice** (Kuklinski et al., 1997, Gilens et al., 1998),
- **robberies perpetrated by employees** (Wimbush and Dalton, 1997),
- **sexual behavior** (LaBrie and Earleywine, 2000),
- **bullying** (Rayburn et al., 2003),
- **robberies in stores** (Tsuchiya et al., 2007),

Sensitive variable: Anti-Immigrant Sentiment

↓

social desirability bias

HT-type estimator of $\bar{Y}$ under the ICT

$$\hat{\bar{Y}}_{ICT} = \hat{\bar{Z}}_{HT} - \hat{\bar{T}}_{HT}$$

Social desirability bias

$$\hat{\bar{Y}}_{SDB} = \hat{\bar{Y}}_{ICT} - \hat{\bar{Y}}_{DQ}$$

The true population parameters are unknown

↓ according to the **"more is better"** assumption

(Lensvelt-Mulders et al., 2005)

the data-collection method that provided higher estimates of the sensitive characteristics was considered to be the more valid one

Few authors have carried out studies on the subject taking into account the social desirability bias.

- Janus 2010
- Krumpal 2012
- Knoll 2013
- An 2015
- Creighton and Jamal 2015
- Creighton et al. 2015

Estimating anti-immigrant sentiment

To reduce or eliminate social desirability bias

↙ self-administered interview mode
CATI vs CAWI

↘ unobtrusive question format
ICT vs DQ

This review originates five research hypotheses, namely:

- H1: ICT originates higher AIS estimates than DQ.
- H2: There is no discernible SDB in ICT-based AIS measurement.
- H3: DQ originates higher AIS estimates in CAWI than CATI.
- H4: Predictors of ICT-based and DQ-based AIS estimates do not coincide
- H5: AIS-related SDB is associated with better education (H5.1), leftist ideology (H5.2), and perhaps additional features (H5.3).

Data: Attitudes toward immigration and immigrants survey
This survey was carried out by Spanish Research Council's Institute for Advanced Social Studies (IESA-CSIC) in 2016 in the framework of PACIS, a probability-based mixed-modes panel.
PACIS comprises people aged 16 or more residing in private households in Andalusia

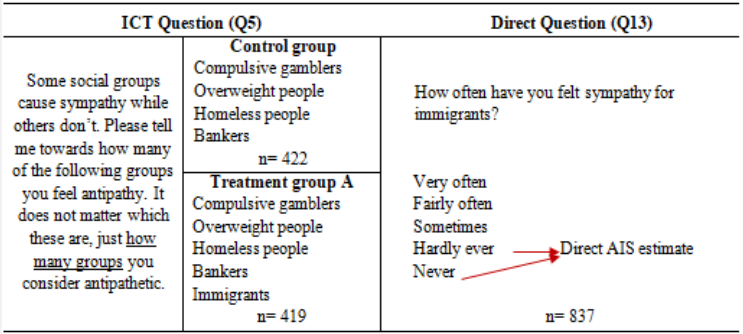
Location of the sensitive question in the questionnaire

- DQ: final part of the questionnaire
- ICT: beginning of the questionnaire,
  To assign respondents to a control group and treatment groups

↓

simple randomization

Figure A1. Question wording of obtrusive and unobtrusive AIS gauges



Note: In DQ, asking about antipathy generates racial connations, so we will use the word antonym, sympathy.
The two most unfavorable responses are "never" and "hardly ever"

We compute multivariate regression models (ML estimators)

- to infer the association between AIS and survey mode (H3),
- between specific respondent characteristics and either AIS gauge (H4)
- the scope of SDB (H5).

To model obtrusively measured AIS

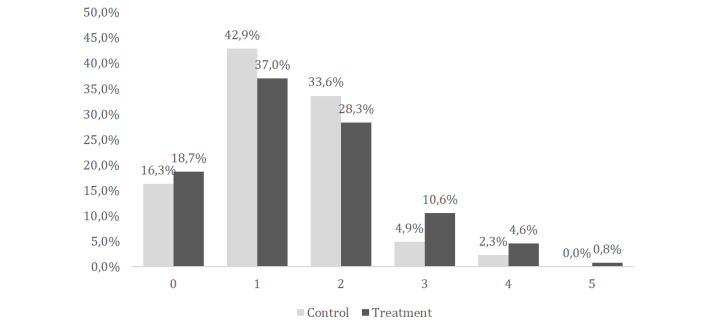
- DQ: standard logistic regression,
- ICT: logistic regression implemented in R-list package (Blair et al. 2016).

The validity of the ICT-ML model relies on two additional assumptions.

- control item counts must not differ depending on whether or not respondents are exposed to the sensitive item.
  Bonferroni-corrected (R-list package) p-value=0.62 -> no such design effect
- ICT get truthful answers about the sensitive item;
  "no liars" assumption may not be met when respondents perceive the anonymity of the experiment to be compromised.
  - **ceiling effects**: participants preferring all of the items
  - **floor effects**: participants preferring none of the items

Estimating anti-immigrant sentiment

Figure 1. Observed data (weighted)



Responses are normally distributed

↓

skewed to the left

↓

floor effects

To fit different regression models adjusting for the possible existence of ceiling and/or floor effects

↓

Akaike Information Criterion (AIC):
measure of the relative quality of a statistical model

↓

regression without ceiling or floor effects

H1: ICT originates higher AIS estimates than DQ

Estimates of anti-immigrant sentiment (difference-in-means method)

	Control mean	Treatment mean	Difference in means	Direct question
Weighted mean	1.340 (.043)	1.477 (.054)	0.137*	0.084 (0.01)

*p<.05

- ICT (13.7%) > DQ (8.4%), statistically significant
- On account of the "more is better" approach, we deduce that ICT reduces SDB substantially

H2: There is no discernible SDB in ICT-based AIS measurement

ICT scores and DiM estimates for specific DQ categories

DQ categories	%	Control mean	Treatment mean	Difference in means	95% Conf. interval
Very often	33.3%	1.32 (0.08)	1.10 (0.07)	-0.22* (0.10)	(-0.423; -0.018)
Fairly often	27.4%	1.27 (0.08)	1.42 (0.10)	0.15 (0.13)	(-0.107; 0.409)
Sometimes	30.8%	1.44 (0.08)	1.82 (0.10)	0.38* (0.13)	(0.133; 0.637)
Hardly ever or never[1]	8.5%	1.31 (0.14)	1.99 (0.24)	0.68* (0.28)	(0.135; 1.225)

*p<.05; [1] Response options merged due to low case numbers

prevalence ↓ as sympathy ↑
treatment means > control means
↓ "very often" (sympathy)
treatment means < control means
↓
some people mark artificially low ICT scores
to preclude even the remotest possibility
of being associated with AIS

⇓
DQ, bias uncertain
ICT, scores are
demonstrably biased,
thus distorting our
overall AIS estimate
↓
reject H2

H3: DQ originates higher AIS estimates in CAWI than CATI

Regression results regarding obtrusive and unobtrusive measures of anti-immigrant sentiment (weighted)

	ICT				Direct Question	
	Sensitive Item		Control items			
AIC: 2034.87	Est.	S.E.	Est.	S.E.	Est.	S.E.
(Intercept)	-1.91	3.24	-0.19	0.21	-2.79	0.70***
Sex Male	1.11	1.24	0.07	0.09	0.36	0.30
Age 18to34	-2.36	1.61	-0.13	0.12	0.54	0.39
Age 35to49	-2.02	1.33	-0.04	0.12	0.44	0.40
Education Low/Medium	-1.41	1.04	0.07	0.09	0.18	0.30
Labor status Unemployed	0.47	1.66	0.27	0.12*	0.09	0.41
Labor status Inactive	2.49	1.50+	-0.15	0.11	0.70	0.37+
Social Class Upper/Upper-Middle	2.14	1.37	-0.17	0.20	0.71	0.46
Social Class Low/Lower-Middle	-1.09	1.23	0.14	0.09	-0.03	0.33
Ideology Center	5.15	2.13**	-0.12	0.10	0.72	0.35*
Ideology Right	3.84	2.00*	0.02	0.11	0.69	0.39+
Survey Mode CAWI	1.62	1.32	-0.30	0.10**	-0.13	0.32
At risk of losing job Yes	2.27	1.43	-0.04	0.11	0.11	0.35
Social Trust (scale)	-1.10	0.41**	-0.07	0.02**	-0.22	0.07**

+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

H3: DQ originates higher AIS estimates in CAWI than CATI

Logistic regression model including survey mode as predictor

↙

↓

DQ

↓

CAWI $\simeq$ CATI

⇓

H3 is rejected

↘

ICT

↓

CAWI $>$ CATI

⇓

ICT works especially well in CAWI

H4: Predictors of ICT-based and DQ-based AIS estimates do not coincide

Predictors coincide

↙ DQ

↘ ICT

AIS varies

↙ lower levels of social trust

↓ centrist or right-wing political ideology

↘ inactive labor-market status

sex, age, educational attainment, survey mode, social class, perceived unemployment threat -> not significant impact.

⇓

H4 is rejected

H5: SDB is associated with higher educational attainment (H5.1), leftist ideology (H5.2), and perhaps additional features (H5.3)

Obtrusive and unobtrusive AIS estimates and SDB (weighted)

Group	DQ Estimate	ICT (ML)	SDB	Group	DQ Estimate	ICT (ML)	SDB
Total	7.2	19.9	12.6**	*Labor status*			
Sex				Employed	5.9	12.9	7.0
Male	8.0	21.7	13.6*	Unemployed	6.6	17.4	10.8+
Female	6.3	17.8	11.5*	Economically inactive	9.3	29.9	20.6**
Age				*Social Class*			
18-34	8.6	13.6	5.1	Upper/Upper-middle	13.7	44.9	31.2*
35-49	6.7	14.3	7.3	Middle	6.7	21.6	14.9*
50+	6.6	28.0	21.4**	Low/Lower-middle	6.6	12.5	5.9
Education				*Left-right*			
Up to secondary	7.7	15.8	8.1+	**Left (0-4)**	4.8	4.3	- 0.5
Tertiary	6.9	22.7	15.8*	Center (5)	8.8	34.2	25.4***
At risk of losing job				Right (6-10)	8.8	22.4	13.7+
Yes	7.2	21.5	14.3**	*Survey mode*			
No	7.3	18.1	10.8+	Web	6.9	21.6	14.7**
				CATI	7.8	17.0	9.2+
				Social Trust[1]			

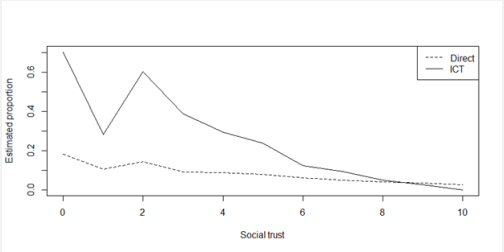
+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [1]Estimates plotted in figure 2.

H5: SDB is associated with higher educational attainment (H5.1), leftist ideology (H5.2), and perhaps additional features (H5.3)

- In categorical variables, we observe statistically significant magnitudes of SDB in a vast array of respondent categories

H5.1: higher educational attainment and
H5.3: additional features $->$ confirmed
H5.2: leftist ideology $->$ rejected

- In continuous variable (social trust), we use plotted estimates: higher levels of social trust are associated with lower levels of both AIS and SDB.



- The IQTs provide **more valid estimates** than the DQ to estimate sensitive behaviours
- the study might encourage survey methodologists to explore the combination of **CAWI** and **ICT** more thoroughly with regard to various sensitive items.
- ICT and DQ regression models are associated with the same predictors
- most predictor categories considered in our models, we discern statistically significant gaps between the magnitude of AIS

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