

Evaluating Mode Effects in Mixed-Mode Surveys using Back-door, Front-Door, and Instrumental Variables

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Theory

Example

Conclusions

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Theory

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Data

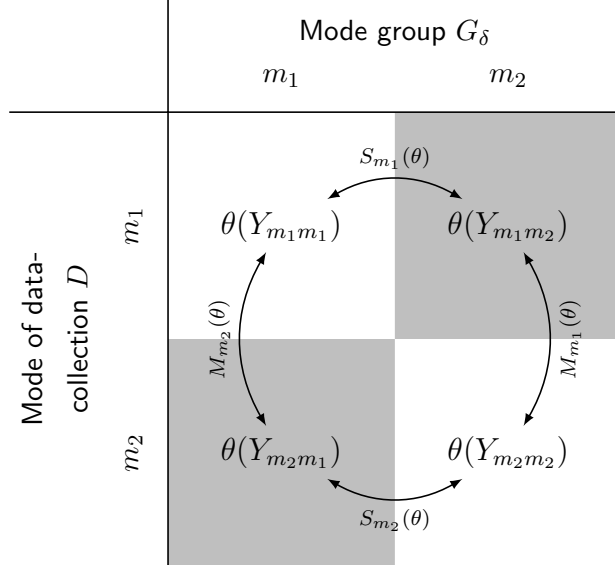
ID	G_δ	D	Y
1	m_1	m_1	y_{1,m_1}
1	m_1	m_2	$y_{1,m_2} = \text{counterfactual}$
2	m_1	m_1	y_{2,m_1}
2	m_1	m_2	$y_{2,m_2} = \text{counterfactual}$
3	m_2	m_1	$y_{3,m_1} = \text{counterfactual}$
3	m_2	m_2	y_{3,m_2}
4	m_2	m_1	$y_{4,m_1} = \text{counterfactual}$
4	m_2	m_2	y_{4,m_2}
...

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- ID = respondent identification number
- Y = target variable
- G_δ = the mode to which a respondent is allocated within design δ (mode m_1 or m_2) We expect differences in measurement error between the modes \Rightarrow respondents would respond differently with different modes \Rightarrow each respondent can be represented by two data lines instead of one, each referring to measurement by one particular modes $\rightarrow D$ denotes mode of measurement.
- only data lines where $G_{delta} = D$ are observed, data lines where $G_{delta} \neq D$ are counterfactual

note 1 of slide 4

Mode effects

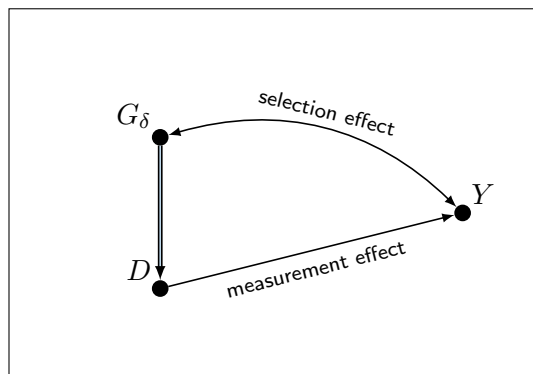


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- θ is target statistic defined on target variable Y
- four θ 's can be defined conditional on G_δ and D , two of them counterfactual
- if m_1 is benchmark mode (assumed no measurement error), interest is in $Y_{m_1m_1}$ and $Y_{m_1m_2}$, i.e. the outcomes of all respondents measured by mode m_1
- $S_{m_1}(\theta)$ preferably non-zero because otherwise mixed-mode survey useless
- $M_{m_1}(\theta)$ preferably zero because otherwise mixed-mode survey outcomes biased
- but $S_{m_1}(\theta)$ and $M_{m_1}(\theta)$ not directly estimable because $\theta(Y_{m_1m_2})$ counterfactual

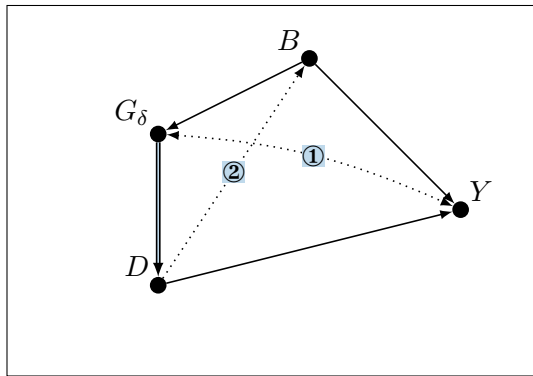
note 1 of slide 5

Causal inference



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METHOD 1: Back-door Method



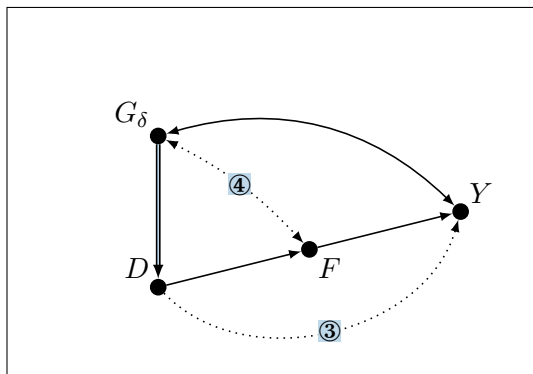
- ASMP 1: ignorable mode allocation (①)
- ASMP 2: mode-insensitivity (②)

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- back-door variables B = variables completely explaining mode allocation/mode selection of respondents, e.g. questions about mode preferences.

note 1 of slide 7

METHOD 2: Front-door method



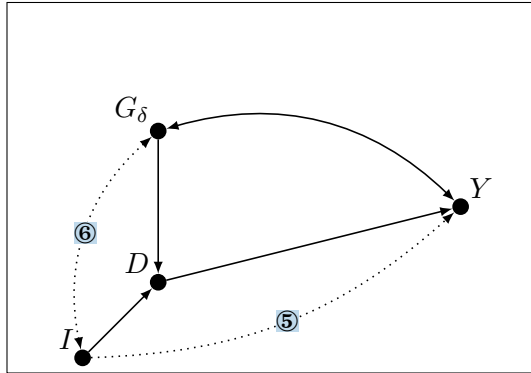
- ASMP 1: exhaustiveness (③)
- ASMP 2: isolation (④)

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- front-door variables F = variables completely explaining measurement error differences between the modes, e.g. questions about response burden, social desirability, acquiescence, . . .

note 1 of slide 8

METHOD 3: Instrumental variable



- ASMP 1: measurement equivalence (⑤)
- ASMP 2: representativity (⑥)
- Disadvantage: conditional effects

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- instrumental variables I = variable allocating respondent to two different samples, e.g. a mixed-mode sample versus a single-mode sample.

note 1 of slide 9

Example

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Survey on surveys

- 2004 in Flanders
- Mixed-mode sample
 - ◆ Mail questionnaire
 - ◆ FTF follow-up
 - ◆ RR=66.6%
- Comparative sample
 - ◆ FTF
 - ◆ RR=69.5%

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Variables

Y	I do not like participating in surveys (Interest in mean $\theta(Y) = \mu(Y)$)
B_1	age \times gender
B_2	educational level
B_3	ownership of a personal email-address
B_4	activity status
B_5	number of adults in the household
B_6	number of adolescents in the household
B_7	number of children in the household
F	answering questions (un)pleasant task
I	dataset (mixed-mode or comparative)

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Results

effect(p)	S_{ff}		M_{ff}	
BD	-0.048(0.714)		0.319(0.001)	
FD	-0.599(<.001)		-0.232(<.001)	
IV	-0.820(<.001)		-0.454(0.001)	
	S_{mail}		M_{mail}	
BD	-0.040(0.570)		-0.407(<.001)	
FD	0.455(<.001)		0.088(0.157)	
IV	n.a.		n.a.	

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- BD = back-door method, FD = front-door method, IV = instrumental variable method
- S_{ff} negative means mail questionnaire respondents more positive about surveys than the face-to-face respondents in the follow-up phase,
- S_{mail} positive idem interpretation
- M_{ff} negative means respondents say they are more positive about surveys in face-to-face interview compared to mail questionnaire
- M_{mail} positive idem interpretation
- FD & IV in line with expectations, BD not
- !reason = bad covariates, not the methods themselves are bad

note 1 of slide 13

Discussion

- Weaknesses
 - ◆ IV: requires additional data, conditional estimates, >2 modes = trouble
- Strengths
 - ◆ All: Validity assumptions?
 - ◆ BD: procedures readily available
- Threats
 - ◆ All: Validity assumptions?
 - ◆ BD: Popularity
- Opportunities
 - ◆ BD: other selection vars (e.g. paradata)?
 - ◆ FD: other measurement vars?
 - ◆ IV: adaptation survey design to validate/control?
 - ◆ All: Combination models

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Correspondence

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Correspondence

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