Warner Compariso to Greenberg

ncorporation of Untruthful Response

Miyod Modele

Function?

Warner Solution to Untruthful Responding and Mixed Models How I Spent My Weekend

Maxwell Lovig

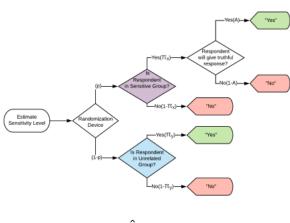
Greenberg's Model

Introduction

to Greenberg

ncorporation of

Truthfulne



$$\hat{\pi}_g^* = \frac{\hat{P}_y^* - (1-p)\pi_y}{p}$$

Warner's Model

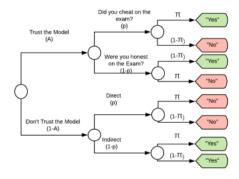
Introduction

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ncorporation of

Mixed Models?

Frutntuine



$$\hat{\pi}_w^* = \frac{\hat{P}_y^* - (1 - p)\pi_y}{2p - 1}$$

Comparison of Variance

Introduction

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Mixed Models

Both Models under untruthful responding have the same bias of $\pi(A-1)$

$$Var(\hat{\pi}_g^*) = rac{\hat{P}_y^*(1-\hat{P}_y^*)}{p^2(n-1)}$$

$$Var(\hat{\pi}_w^*) = rac{\hat{P}_y^*(1-\hat{P}_y^*)}{(2p-1)^2(n-1)}$$

Comparision between simular values

Introduction

Warner Comparison to Greenberg

Incorporation of Untruthful Responses Mixed Models?

Comparison of Variances Under the Two Models with Untruthful Responding				
р	Α	$Var(\hat{\pi}_{x}^{*})$	$Var(\hat{\pi}_{w}^{*})$	$Bias = \pi(A - 1)$
0.2	0.90	0.011873948	0.00128566	-0.03
0.2	0.80	0.011940681	0.001256201	-0.06
0.3	0.90	0.005454442	0.003025251	-0.03
0.3	0.80	0.005481096	0.002995792	-0.06

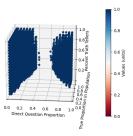
$$n = 500$$
, $\pi = 0.3$, $\pi_v = 0.7$

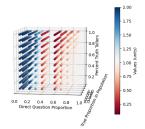
Though Simulation we can extend this to more numbers!

Warner Comparison to Greenberg

Incorporation of Untruthful Respo Mixed Models?

Turns out Warner is more effective in alot of cases.





$$n = 100, \pi_x = .3, \pi_y = .7, A = .8$$

Incorporation of Untruthfulness

Introduction

Warner Comparison

Incorporation of Untruthful Responses

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Truthfulness Function?

For Greenberg's Model

$$\hat{\pi}_g^* = \frac{P(y) - (1-p)\pi_y}{Ap}$$

For Warner's Model

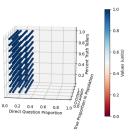
$$\hat{\pi}_w^* = \frac{P(y) - (1 - p)}{A(2p - 1)}$$

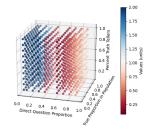
Warner Comparison

Incorporation of Untruthful Responses

Truthfulnes

Turns out Warner still is more effective in alot of cases.





$$n = 100, \pi_x = .3, \pi_y = .7, A = .8$$

Mixed Model?

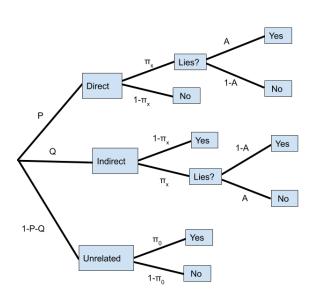
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Warner Compariso

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Without Incorporating Lies:

$$\hat{\pi}_M^* = \frac{P(y) - q - \pi_y(1 - p - q)}{p - q}$$
 With Incorporating Lies:

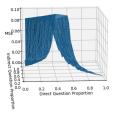
$$\hat{\pi}_M L^* = \frac{P(y) - qA - A\pi_y(1 - p - q) - (1 - A)(q + \pi_y(1 - q - p))}{A(p - q)}$$

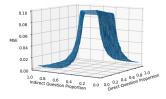
Warner Compa to Greenberg

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$$n = 100, \pi_x = .3, \pi_y = .7, A = .8, p = 0.02, q = 0.74, MSE = .0043$$

What If Lying Is A Function of the Direct Question

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Could it be the case that people do not lie based if the question is sensitive but how well scrambled there response is.

For example would it be the case that the same amount of people would lie when p=.9 versus p=.5 for Greenberg or Warners model

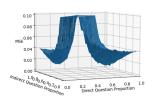
For example

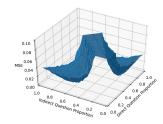
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Truthfulness Function?

Without Incorporating Lies





$$A=\frac{pq(1-p-q)}{(1/3)^3}$$

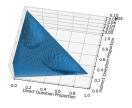
$$n = 100, \pi_x = .2, \pi_y = .7, p = 0.16, q = 0.62, MSE = 0.0156$$

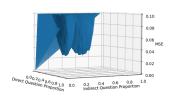
For example

Varner Comparison o Greenberg

Truthfulness Function?

With Incorporating Lies





$$A = \frac{pq(1 - p - q)}{(1/3)^3}$$

$$n = 100, \pi_x = .2, \pi_y = .7, p = 0.12, q = 0.64, MSE = .024$$