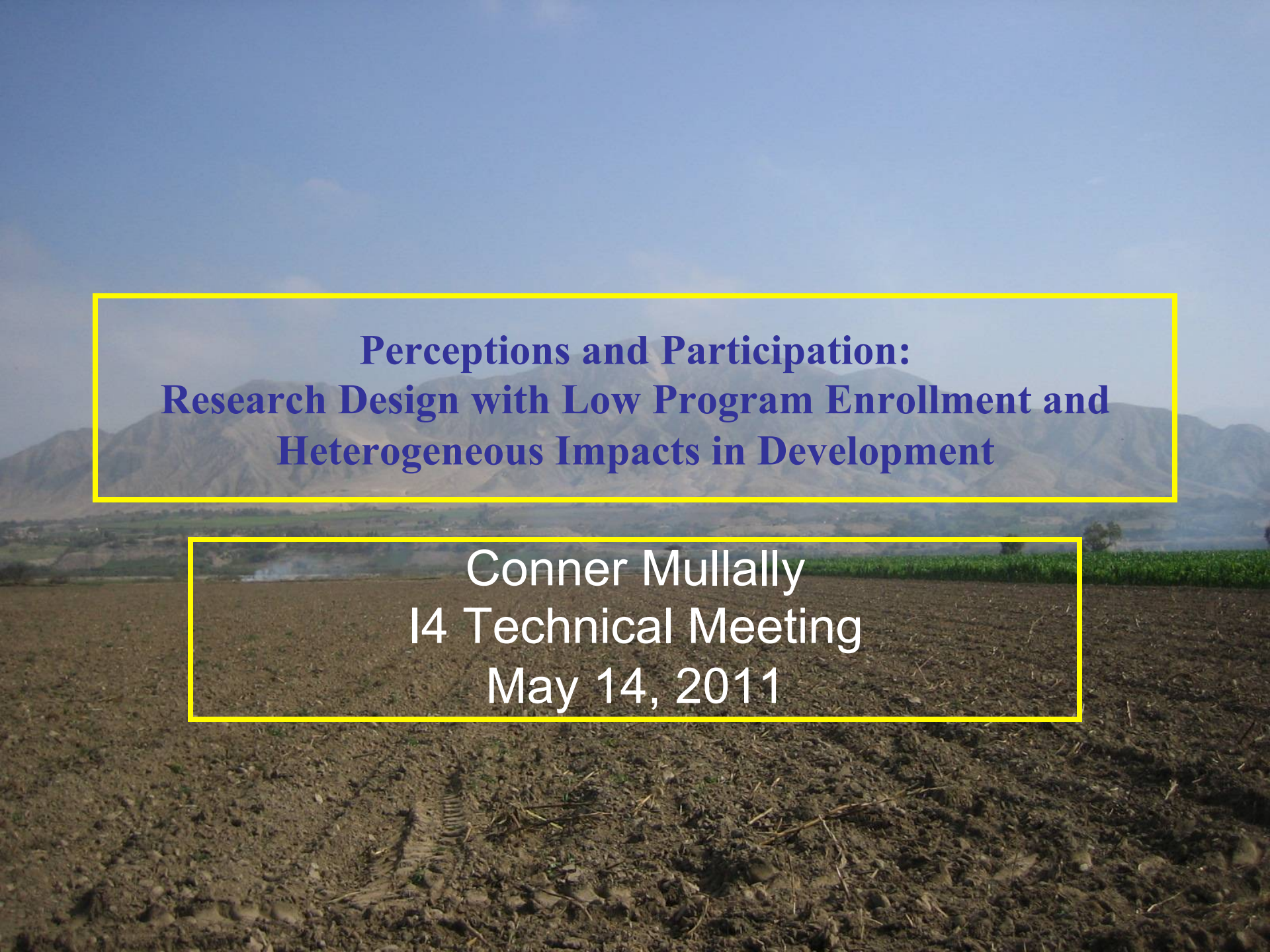

Perceptions and Participation: Research Design with Low Program Enrollment and Heterogeneous Impacts in Development

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Introduction

- Evaluating interventions in financial markets in developing countries
  - Voluntary participation
  - Low enrollment rates (McKenzie, 2009).
- Not clear that low enrollment is due to fully informed optimizing households choosing not to participate
- In this context, which research design should we choose?

Hypotheses

- Randomized eligibility: preferred if all that matters is unbiasedness.
- Randomized encouragement design: biased but may be closer to the truth on average when participation is low (i.e., lower MSE).
- Contrary to intuition, greater unobserved heterogeneity will not necessarily drive the latter further from the truth.
- Research designs compared using the example of index insurance.

Index insurance vs. Traditional insurance

- Traditional:
  - Covers individual risk
  - Subject to information problems
  - High ratio of payouts to premiums

- Index
  - Payouts based on an index (rainfall, temperature, average yields)
  - Should avoid moral hazard problems, but covers less risk
  - More affordable and sustainable for poor countries

Participation so far

- Participation is usually low (Giné, Townsend, Vickery 2007; Cole et al. 2010; Boucher and Mullally 2010).
- Some of these same studies have had success raising participation by altering incentives.
  - Marketing scheme (Cai et al. 2009), information (Cole et al.)
- Experience and trust in institutions seem to be important determinants of uptake (Giné, Townsend, Vickery; Cai et al.)

The Model: Demand for Index Insurance in the Absence of Trust

- Farmers choosing between a risky activity ("cotton farming") and subsistence farming.
- Introduce index insurance (area-yield insurance)
- Farmers believe the insurer exaggerated area-yields by some fixed amount.
- Impact evaluation of index insurance in this context.

The Model

- Farmers with MV preferences:

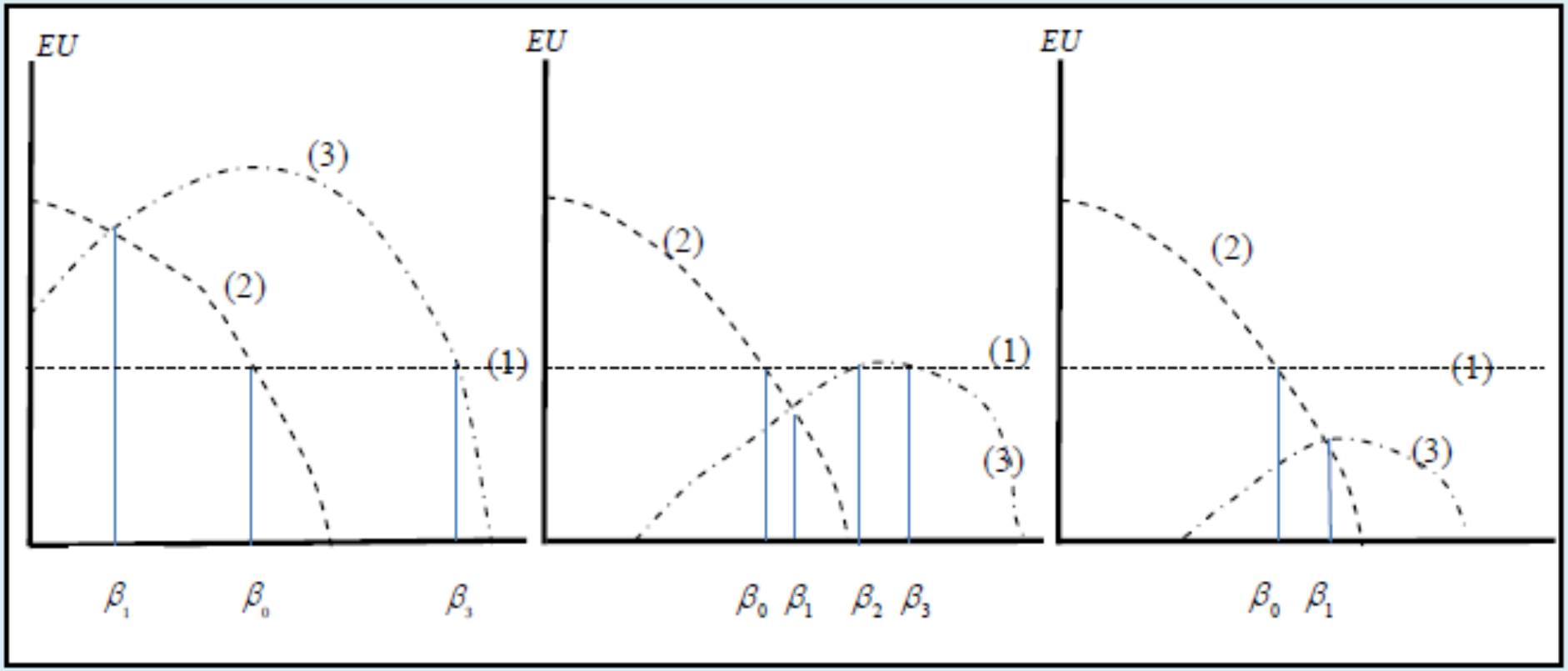
$$EU = \left(\text{Mean}\right)^2 - \gamma \text{Variance}$$

- Safe activity: $w = \text{return in every period}$
- Cotton: $q_{it} = \mu_i - \beta_i\left(\mu - \bar{q}_t\right) - \varepsilon_t^s = \mu_i - \beta_i \varepsilon_t^c - \varepsilon_t^s$
  - Common shock: $\varepsilon_t^c = \mu - \bar{q}_t$
  - Household specific shock: ε_t^s
  - Sensitivity to common shock: $\beta_i > 0$
  - Assume $\mu_i = \mu$ for all $i, \mu > w$
  - Variance of yield: $\beta_i^2 \sigma_c^2 + \sigma_s^2$

Area-yield Insurance

- Indemnity: $I_t = \max\left[0, \mu - \bar{q}_t\right] = \max\left[0, \varepsilon_t^c\right]$
- Premium: $\tau = E\left[I\right] + L = r + L$
- Expected insured yield: $\mu - L$
- Variance of insured yield: $\beta_i^2\sigma_c^2 + \sigma_s^2 + \sigma_I^2 + 2\beta_i\sigma_{c,I}$
- AYI can induce some farmers to switch to cotton.
- Activity choice will depend on value of β_i

Figure 1: Expected Utility of Subsistence Farming, Cotton, and AYI

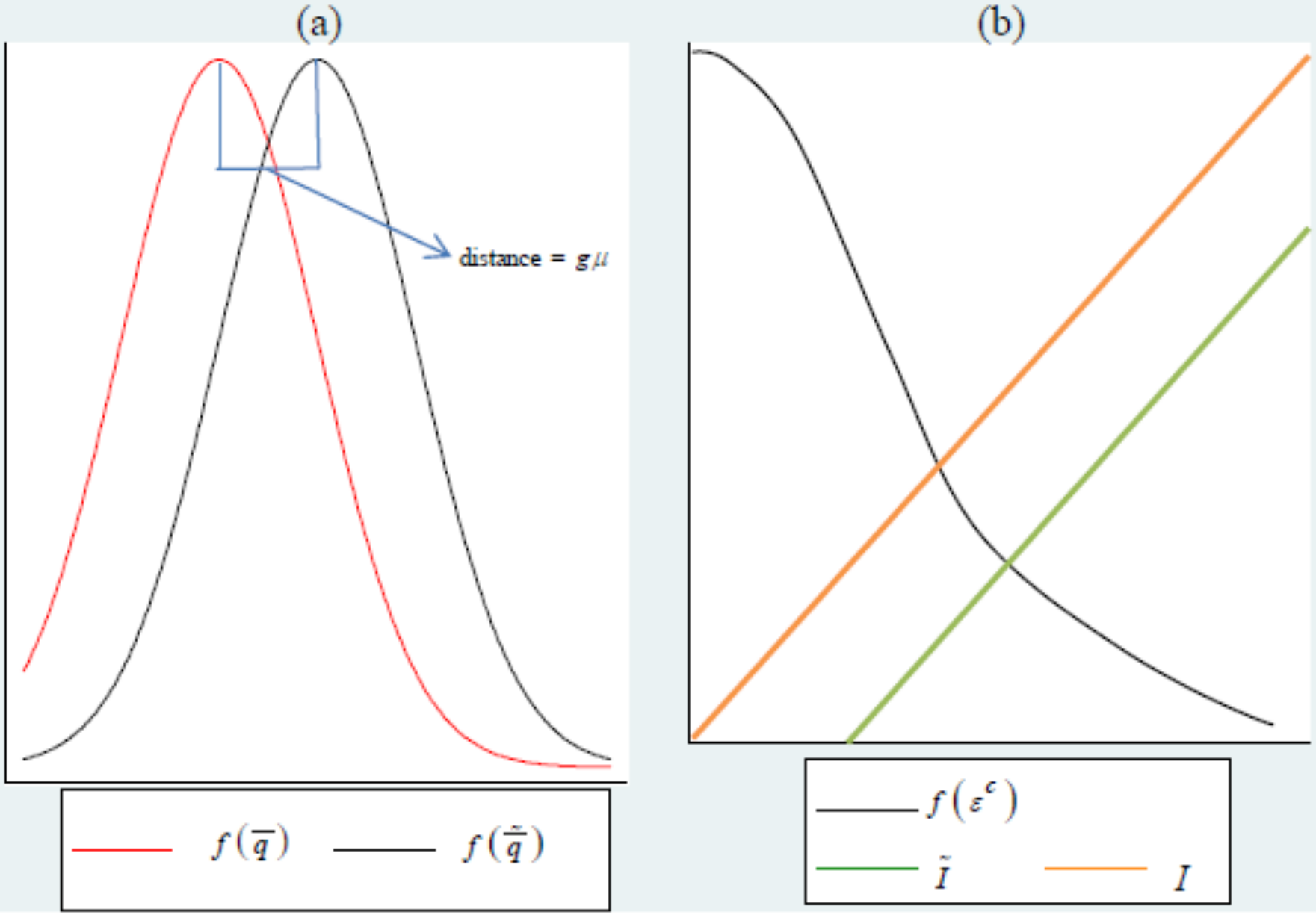


(1) = $EU_{plant=0}$ (2) = $EU_{plant=1,AYI=0}$ (3) = $EU_{plant=1,AYI=1}$

Lack of trust

- Assume farmers think the insurer will exaggerate measured area-yields by a fixed amount $g\mu$, where g is a proportion.
- How does this affect demand?

Figure 3: Perception of Cheating, Area-yields, and the Indemnity



Econometric Evaluation

- Impact evaluation in the context of the above model.
- Cannot observe β_i.
- We would like to introduce random variation in demand that does not affect outcomes. How should we do this?

Econometric Evaluation

- Randomized eligibility
  - Identifies average impact on participants (the “Policy Relevant Treatment Effect”, or PRTE), identification becomes weak if participation is very low.
- Randomized encouragement:
  - Identifies average effect on individuals who participate when “encouraged, ” or a Local Average Treatment Effect (LATE).
  - If the encouragement is strong enough, should overcome weak identification problem.
- Both are instrumental variable strategies.

Simulation of Impact Evaluation

Table 1: Parameter Values for Economic Model.		
$\mu = 1,876$ kg	$\gamma = 3.5$	$\sigma_\beta^2 = 0.25$
$\sigma_c^2 = 147,516$ kg^2	$\sigma_I^2 = 50,276$ kg^2	$r = 153$ kg
$\sigma_s^2 = 147,516$ kg^2	$\sigma_{c,I} = 73,576$ kg^2	$L = 23$ kg
$w = 1,565$ kg		

- Use these values to compare Mean Square Error of estimators based on randomized eligibility and a randomized encouragement (coupons for a lower premium).

Figure 5: Magnitude and Precision of the PRTE with g

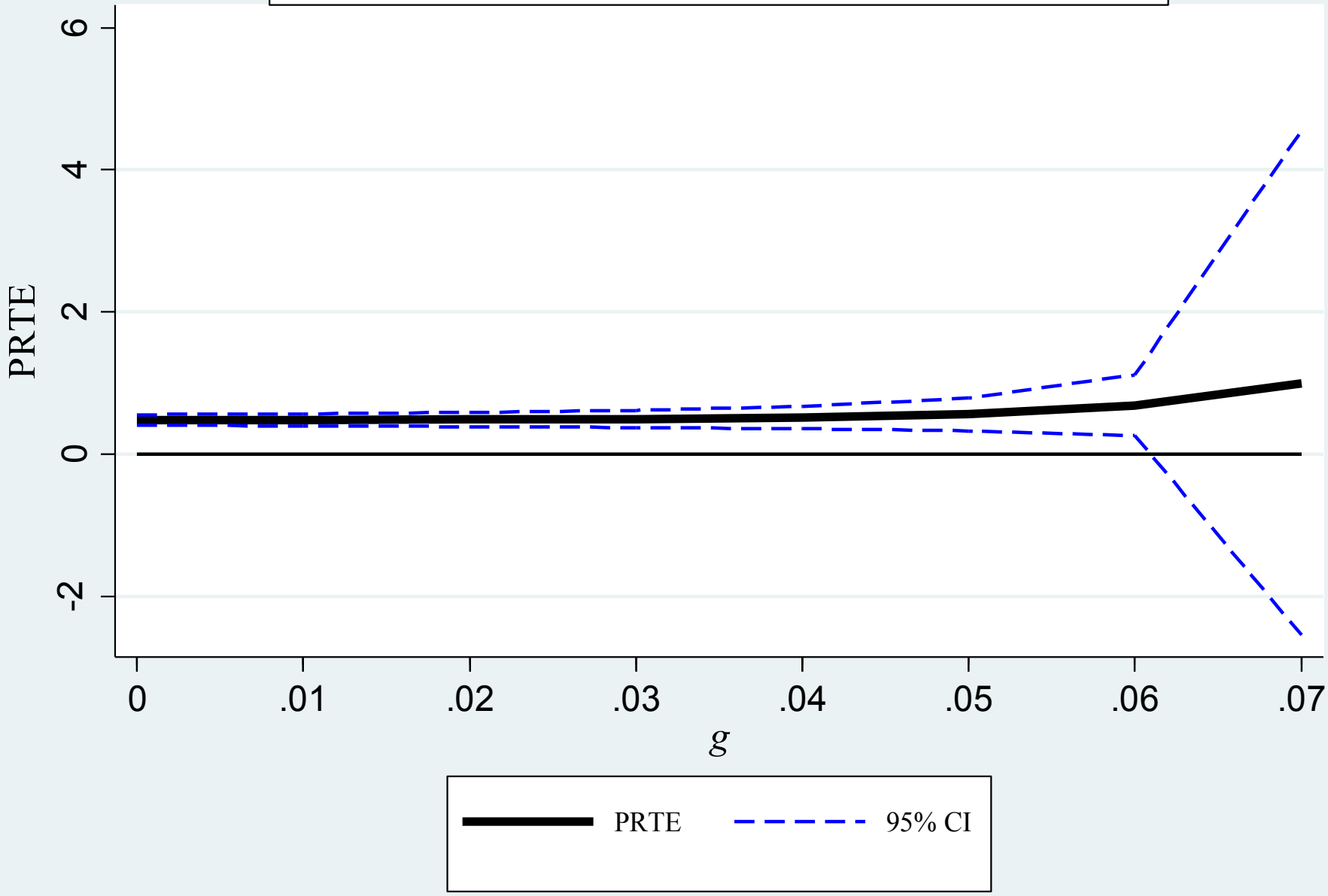
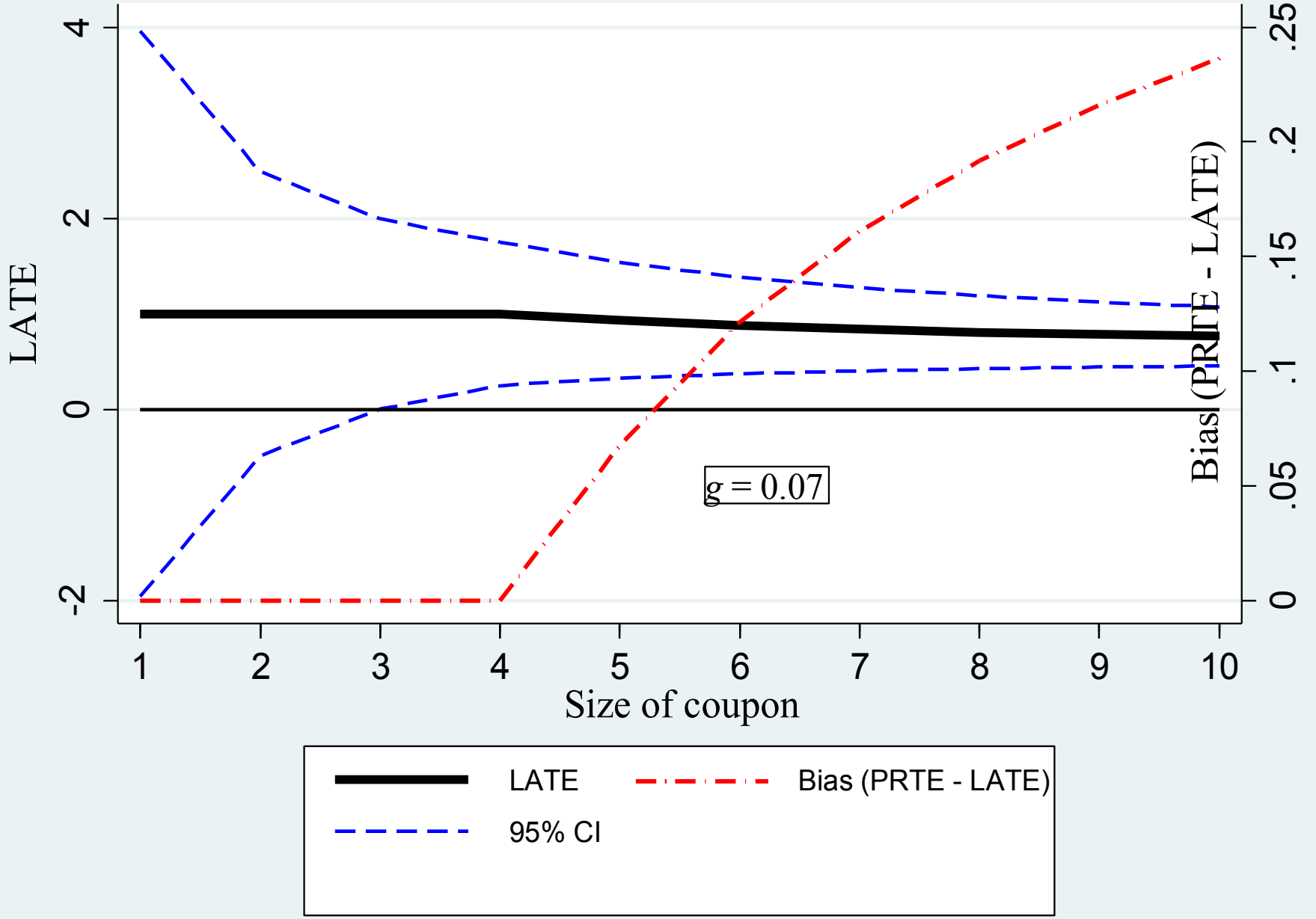
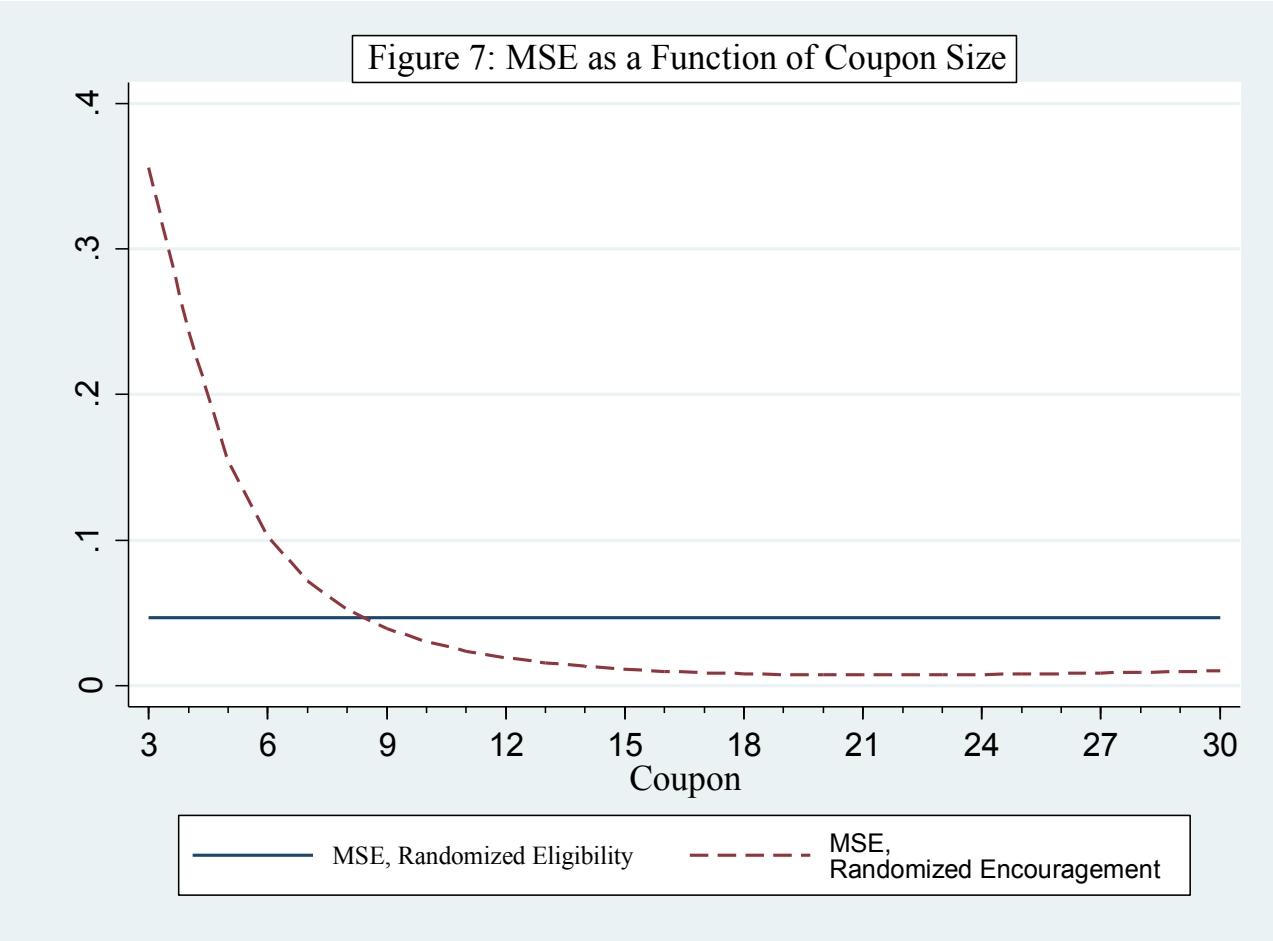


Figure 6: Precision and Bias of the LATE



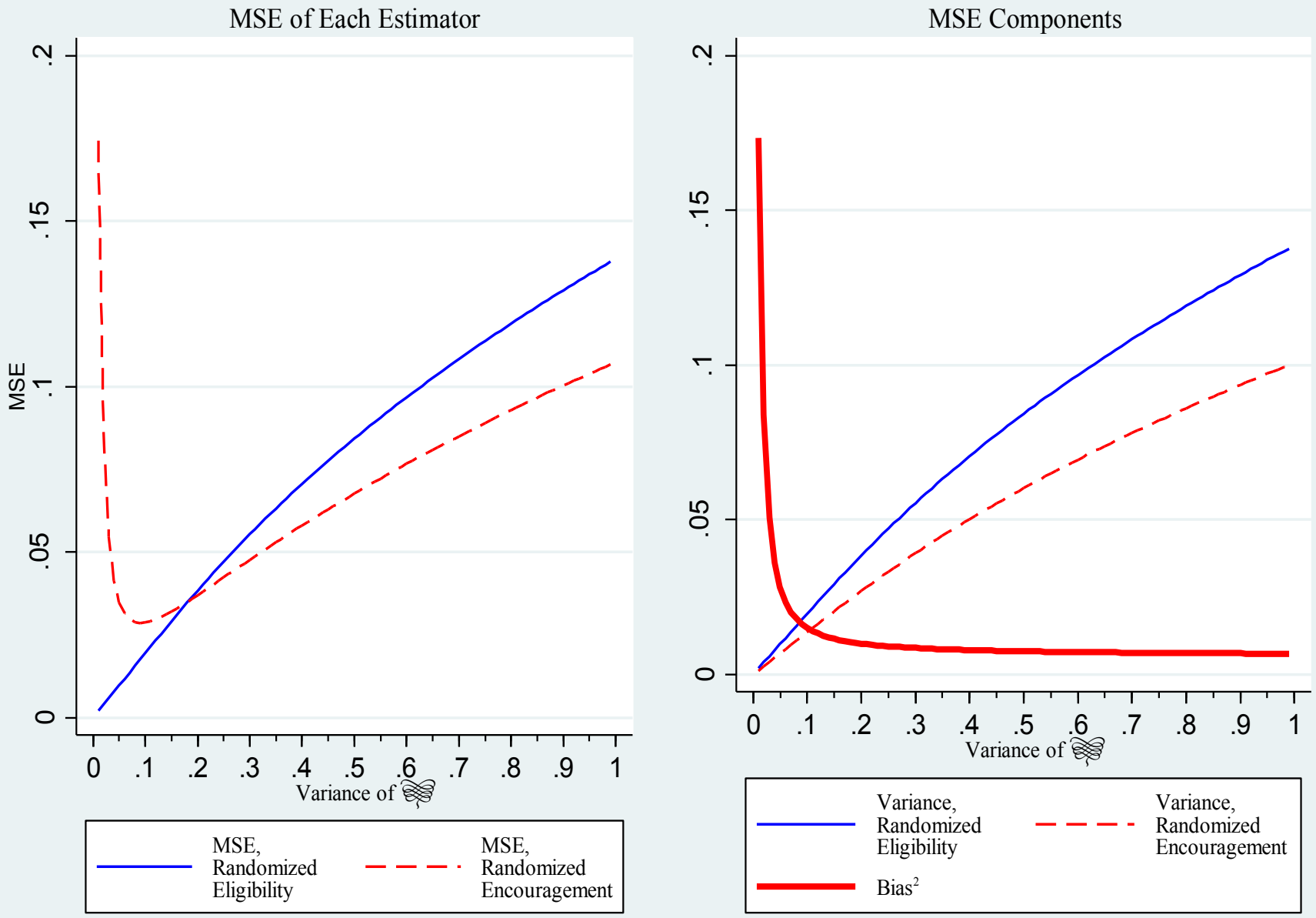
- Bias of encouragement estimator grows with the coupon, but it may actually get closer to the truth on average due to greater precision.
- Recall MSE = Bias^2 + Variance

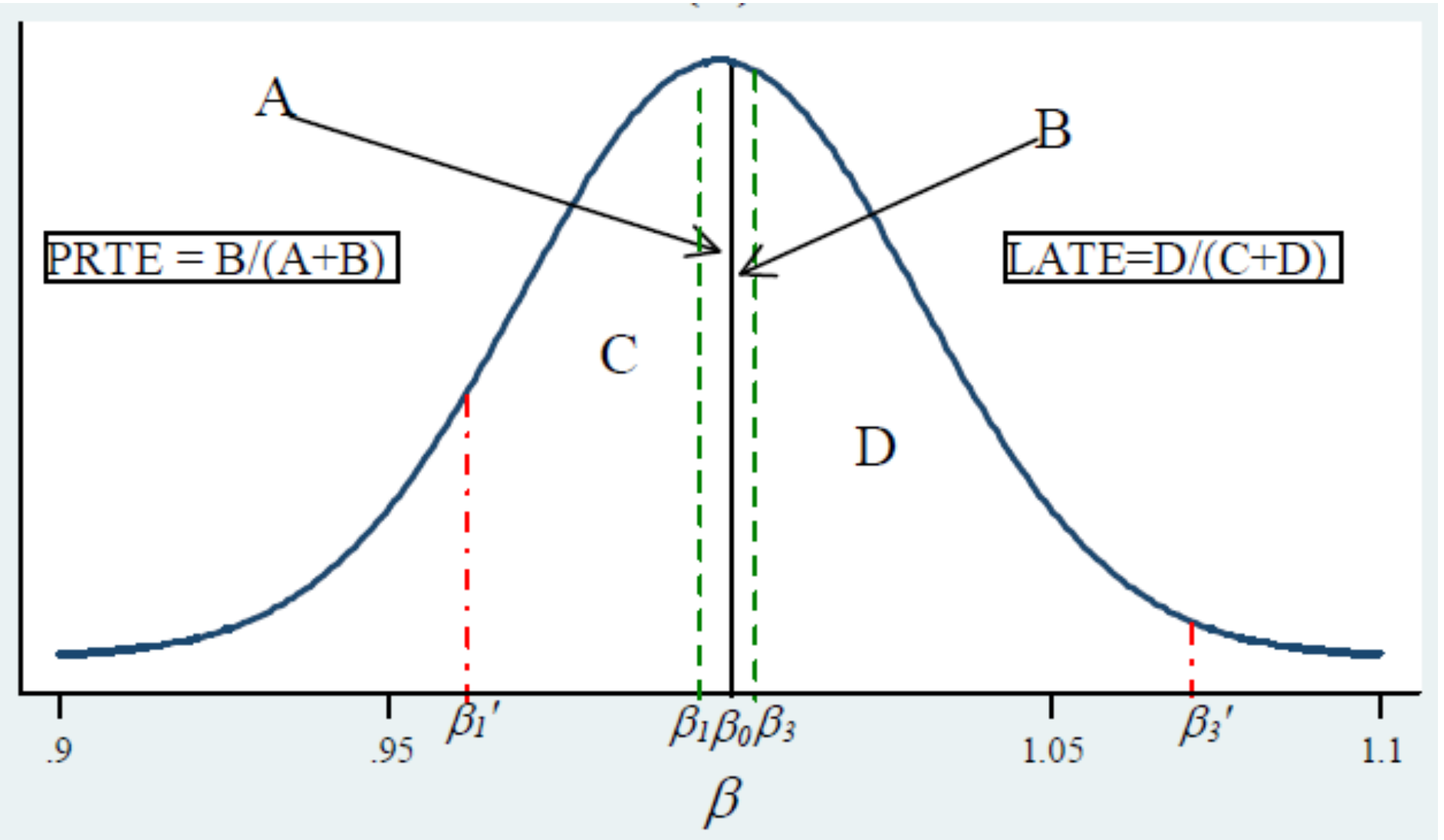


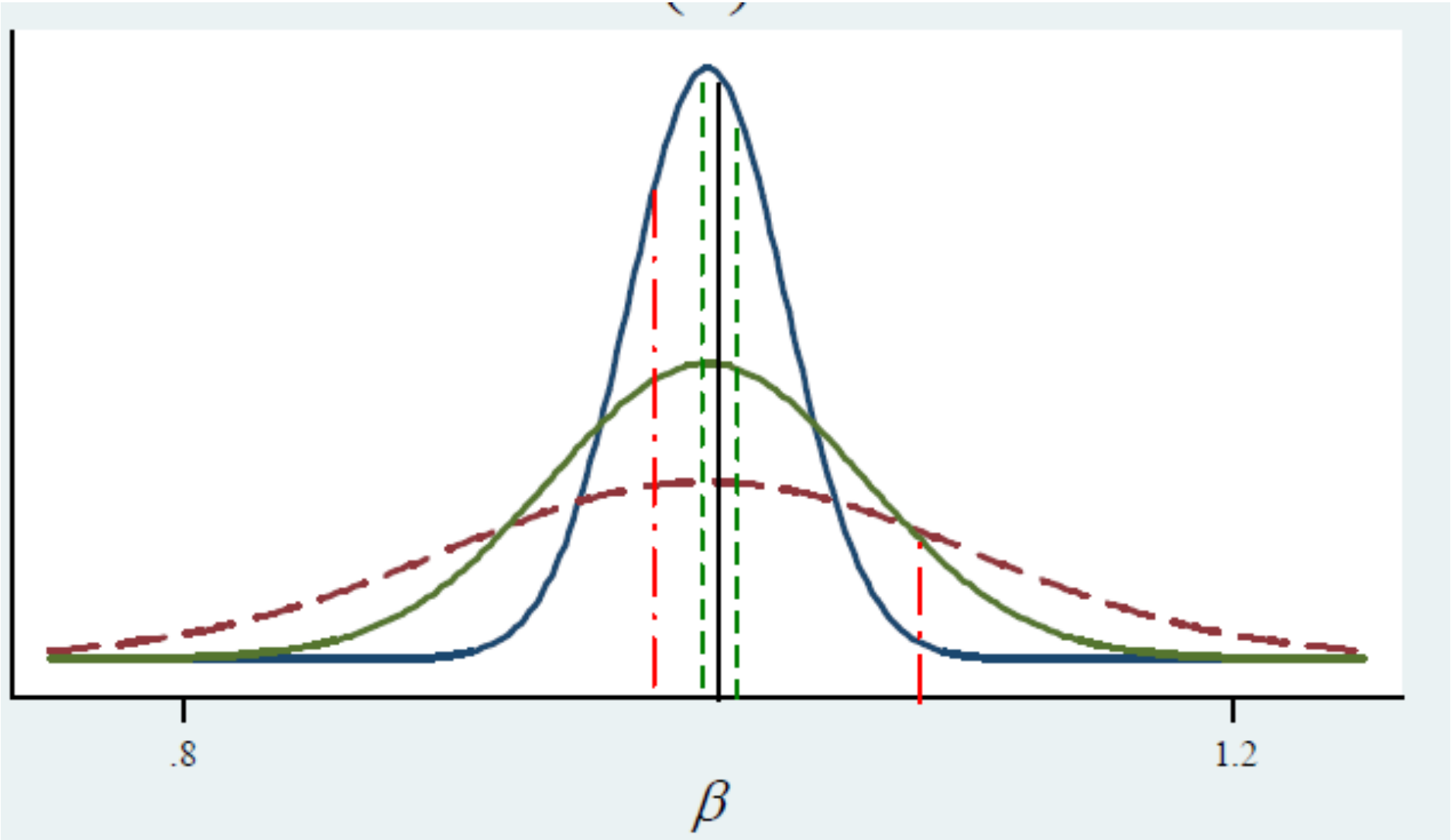
Greater Heterogeneity and MSE

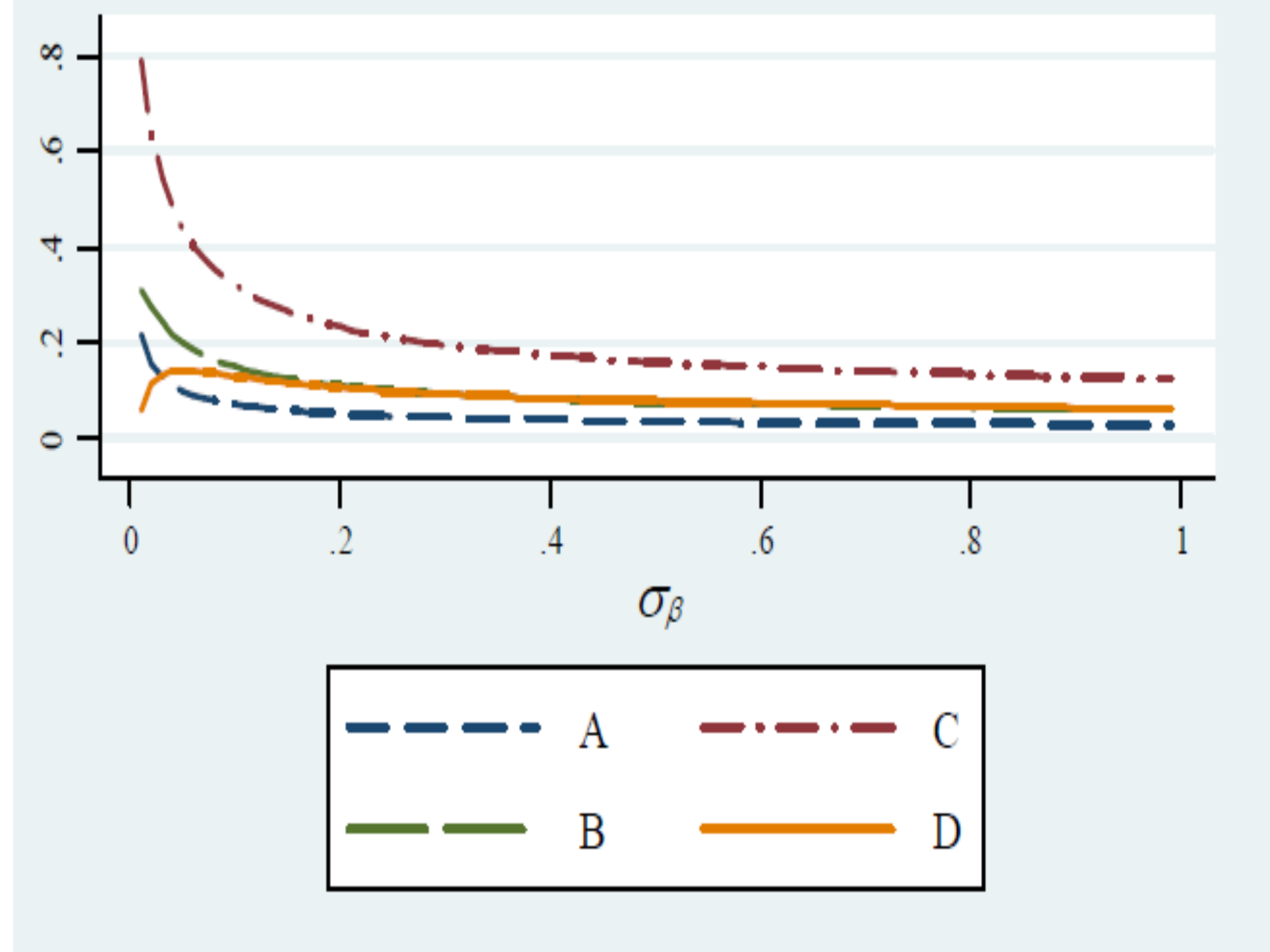
- What happens when we increase σ_β^2?
- Might expect this to increase MSE of encouragement estimator more than eligibility estimator.
- Encouragement changes pool of insurance purchasers, and by increasing σ_β^2 we have made population more heterogeneous.

Figure 8: MSE and its Components as Functions of Spread of




A
B
PRTE = B/(A+B)
LATE=D/(C+D)
C
D
.9
.95
β_1'
β_1 β_0 β_3
1.05
β_3'
1.1
β


.8
1.2
β


0
.2
.4
.6
.8
0
.2
.4
.6
.8
1
σ_β
A
B
C
D

Conclusion

- Do not abandon effort to measure impacts just because of low participation.
- Randomized encouragements can replace or complement other designs when multiple treatment arms are used.
- Paper shows strong enough incentives can bring the effect estimated by an encouragement design closer to the truth, and that this will not necessarily be undermined by greater unobserved heterogeneity.