Savings: 2
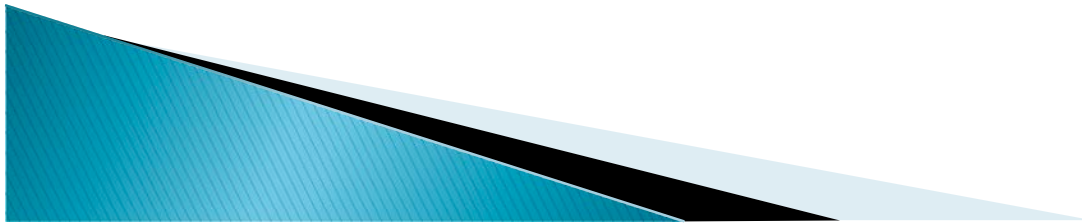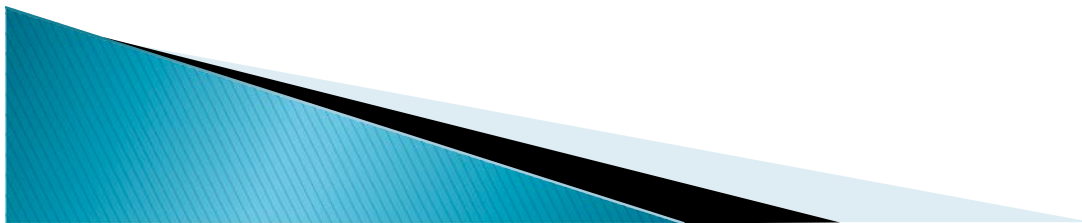
Abhijit Banerjee
Esther Duflo
14.73

Returns from Using Fertilizer

- Experiment in Busia, Keny
- Experiments on pilot plots on farmers' plot.
- Not taking into account labor costs:
  - Over 3.4 months: 27%
  - Annualized: 106%
- Taking into account extra labor cost
 - At the daily wage rate: 56%
  - At the opportunity cost: 102%

Why Don't Farmers Use Fertilizer?

- Knowledge?
  - Well-known technology, long history of use.
  - 98% on demonstration plot say that they want to use, 36.8% use it
- Credit constraints?
  - No technical non-convexities in fertilizer use.
  - Could gradually accumulate.
- Farmers say they want to use fertilizer, but do not have cash to purchase.
  - Take seriously?
  - Farmers have money at harvest, but not at planting
  - Why don't they save up?
 - Why don't they buy fertilizer when they have money?

Nobody purchases early

◦ A small survey of farmers to ask them about timing of purchase :

◦ in the last season, 2% of them (3.8% of those who used fertilizer at all) had purchased it early;

◦ in previous season, 2% of those who used fertilizer purchased it early.
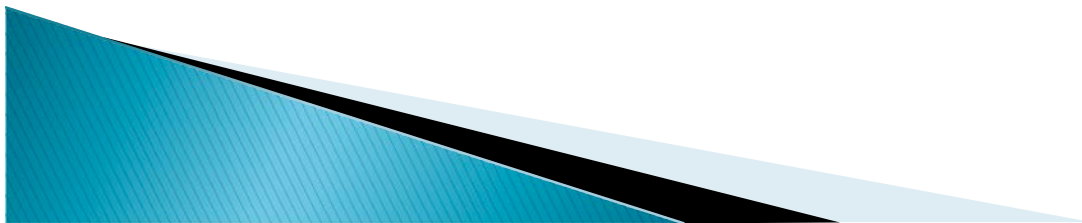
The SAFI Program

Savings and Fertilizer Initiative

- Randomized, stratified by earlier treatment
- Visit household at harvest time, offer to sell fertilizer
  - Saves a trip to market to buy fertilizer.
  - Requires immediate decision on fertilizer quantity + type.
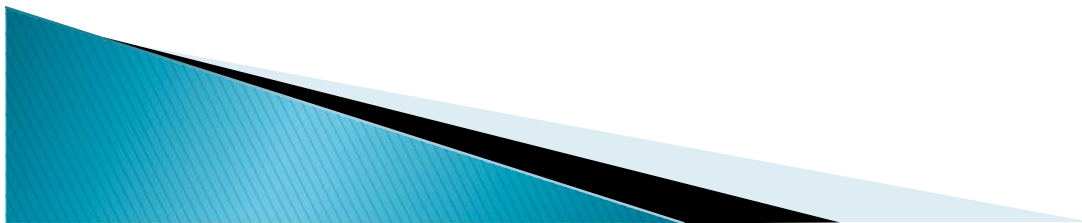
Second SAFI season

1) New group of basic SAFI farmers.
2) Choice of SAFI timing: early, when they have cash or later, when need fertilizer
3) Two other groups visited close to time when fertilizer needs to be applied
   1. Free delivery
   2. 50% discount
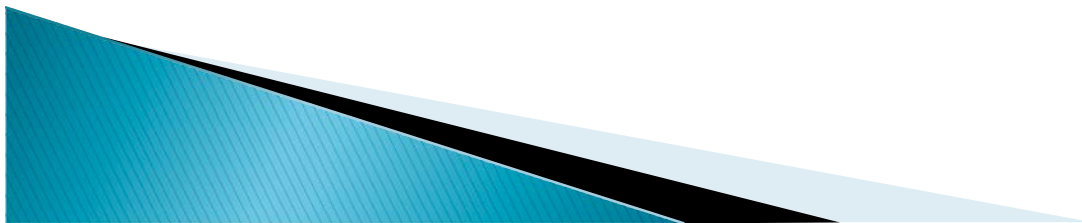
Results from SAFI 1

▸ 11.4 – 14.3 percentage point increase in adoption in season offered (46–63% over comparison group).

▸ No persistent impact on fertilizer use
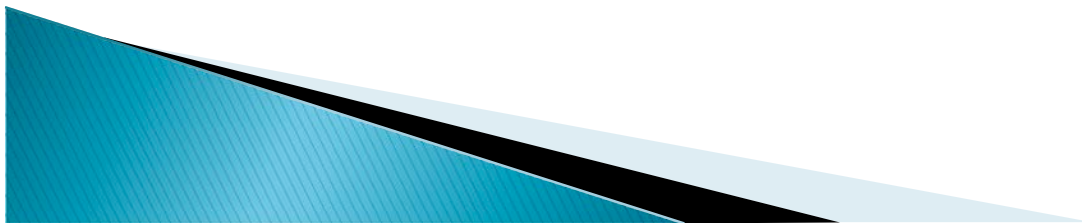
Results from SAFI 2

- SAFI increases fertilizer use 18 percentage points.
- Later visit – no significant impact on fertilizer use
- 50% discount – 13 percentage point increase
- Impact of the "SAFI with *ex ante* timing choice" on fertilizer use is slightly larger than the basic SAFI program
  - Why should this be the case
  - About half of people requested early visit
- No persistent effect
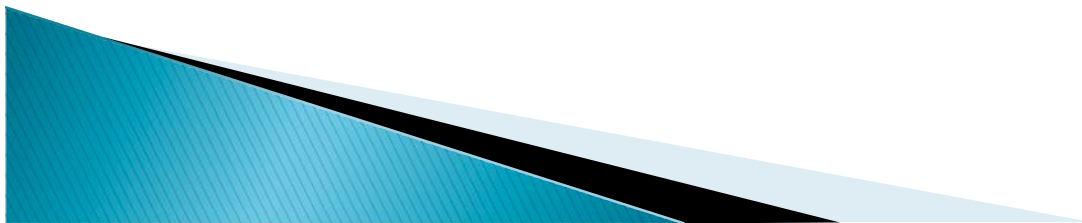
What could be going on?

- These people have money at harvest time
- And want fertilizer
- But spend it before planting
- Why?
- Because they want to buy fertilizer now
  - But want even more to consume a bit more now and cut back tomorrow to pay for the fertilizer
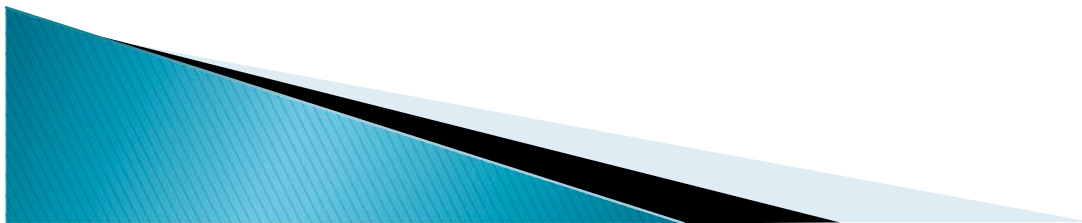
Time inconsistent preferences

▸ For example, people who maximize
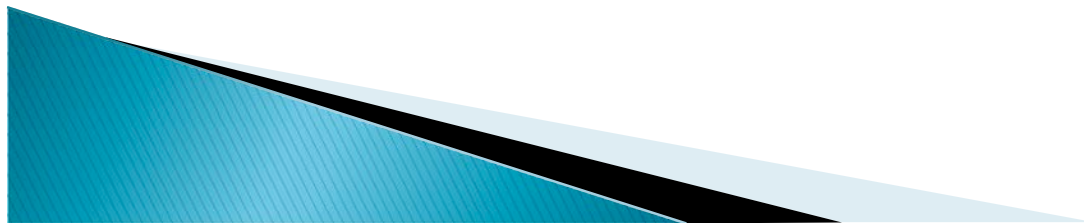
$$U(c_0) + \beta\delta U(c_1) + \beta\delta^2 U(c_2) + \beta\delta^3 U(c_3) + \ldots$$

▸ Starting from today…

▸ And do it all the time…

▸ How does this help us understand the Kenyan farmers?

Do people really have such preferences?

▸ Ashraf, Karlan and Yin asked 1700 subjects in the Philippines the following three questions

▸ Question #1: "Would you prefer 200 pesos now or 250 pesos in one month?"

▸ If the respondent preferred 200 pesos now over 250 pesos in one month, Question #2 was asked. "

▸ "Would you prefer 200 pesos now or 300 pesos in one month?"

▸ If the respondent preferred 200 pesos now over 300 pesos in one month, Question #3 was asked.

▸ Question #3: "How much would we have to give you in one month for you to choose to wait?"

▸ Then (after 15 mins) same questions but starting in 6 months
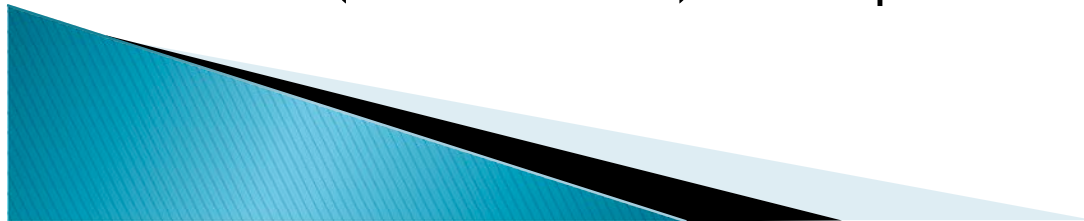
Tabulations of Responses to Hypothetical Time Preference Questions

			Indifferent between 200 pesos in 6 months and X in 7 months			
			Patient	Somewhat Impatient	Most Impatient	Total
			X<250	250<X<300	300<X	
Indifferent between 200 pesos now and X in one month	Patient	X<250	606 / 34.4%	126 / 7.2%	73 / 4.1%	805 / 45.7%
	Somewhat Impatient	250<X<300	206 / 11.7%	146 / 8.3%	59 / 3.3%	411 / 23.3%
	Most Impatient	300<X	154 / 8.7%	93 / 5.3%	299 / 17%	546 / 31%
	Total		966 / 54.8%	365 / 20.7%	431 / 24.5%	1,762 / 100%

"Hyperbolic": More patient over future tradeoffs than current tradeoffs

"Patient Now, Impatient Later": Less patient over future tradeoffs than current tradeoffs.

Time inconsistent (direction of inconsistency depends on answer to open-ended question).

Sophistication versus naivete

- Can this really explain the fertilizer puzzle?
- Don't they realize that this is what they are doing? This is called sophistication
- What if they were sophisticated?
  - Would they buy fertilizer when they have money?
  - Would they buy more if it was brought to them?
- On the other hand: suppose they were not sophisticated.
  - Would they want SAFI right after harvest?
- Some limited sophistication.
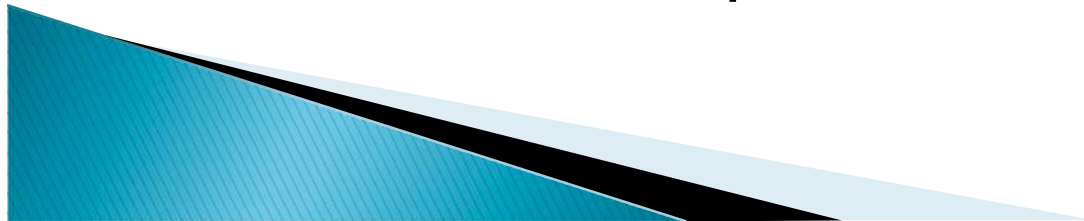
A test of sophistication

- Ashraf, Karlan, Yin offered their subjects a lock-box
- They could put money away in a lock-box until they either reached a particular amount or a particular date.
- Most people did not want it.
- But among those who did, being hyperbolic increases take up by 16%
- They know that they are hyperbolic.
- But effect only among women.

TABLE I
Clients' Specific Savings Goals

	Frequency	Percent
Christmas/Birthday/Celebration/Graduation	95	47.0%
Education	41	20.3%
House/Lot construction and purchase	20	9.9%
Capital for Business	20	9.9%
Purchase or Maintenance of Machine/Automobile/Appliance	8	4.0%
Did not report reason for saving	6	3.0%
Agricultural Financing/Investing/Maintenance	4	2.0%
Vacation/Travel	4	2.0%
Personal Needs/Future Expenses	3	1.5%
Medical	1	0.5%
Total	202	100.0%
Date-based goals	140	69.3%
Amount-based goals	62	30.7%
Total	202	100.0%
Bought Ganansiya Box	167	82.7%
Did not buy Ganansiya Box	35	17.3%
Total	202	100.0%

Experimental Context - Overview

- *Location* - Busia, Kenya: border town/commercial center in Western Province

- *Partner* - Family Bank of Kenya
    - A commercial bank with over 50 branches throughout Kenya
    - Approximately Ksh 7.9 billion (USD 100 million) in customer deposits at end of FY 2009
    - Actively targeting low to middle income earners with low fee banking products
        - *Mwananchi Account*: Current account with no monthly fees, operating balance of Ksh 100 ($1.25), no deposit fees. Withdrawal fees of Ksh 30/62 with/without ATM card. Fee for ATM card - Ksh 300 ($3.75)

- *Target Population* - Married couples interested in opening savings accounts and residing in areas near Family Bank's Busia branch (analysis sample: 0.2-7.7 miles away)

Courtesy of Simone G. Schaner. Used with permission.

Experimental Protocol - The Basic Idea

► Group meetings at primary schools; Offer married couples 3 different savings accounts (1 joint, 1 individual account for each spouse)

► Randomly vary "promotional" interest rates on these three accounts (6-month APY of 0, 2, 6, or 10%). All accounts funded with minimum balance of Ksh 100

► Measure rates of time preference for all participants

► Administrative data from bank: 6 months of account activity

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Experimental Protocol - Interest Rate Design

$R_J=2$	$R_M=0$	$R_M=2$	$R_M=6$	$R_M=10$		$R_J=6$	$R_M=0$	$R_M=2$	$R_M=6$	$R_M=10$		$R_J=10$	$R_M=0$	$R_M=2$	$R_M=6$	$R_M=10$
$R_F=0$	2, -2,-2	0, 0,-2	-4, 4,-6	-8, 8,-10		$R_F=0$	6, -6,-6	4, -4,-6	0, 0,-6	-4, 4,-10		$R_F=0$	10,-10, -10	8, -8,-10	4, -4,-10	0, 0,-10
$R_F=2$	0, -2,0	0, 0,0	-4, 4,-4	-8, 8,-8		$R_F=2$	4, -6,-4	4, -4,-4	0, 0,-4	-4, 4,-8		$R_F=2$	8, -10,-8	8, -8,-8	4, -4,-8	0, 0,-8
$R_F=6$	-4, -6,4	-4, -4,4	-4, 0,0	-8, 4,-4		$R_F=6$	0, -6,6	0, -4,6	0, 0,0	-4, 4,-4		$R_F=6$	4, -10,-4	4, -8,-4	4, -4,-4	0, 0,-4
$R_F=10$	-8, -10,8	-8, -8,8	-8, -4,4	-8, 0,0		$R_F=10$	-4, -10,4	-4, -8,4	-4, -4,4	-4, 0,0		$R_F=10$	0, -10,0	0, -8,0	0, -4,0	0, 0,0

Notes: The first number in interior cells is the excess interest on the joint account. The excess interest on the husband's and wife's account follow respectively.

Key: Random variation in $excess_a = R_a - \max\{R_{a'} : a' \neq a\}$

Courtesy of Simone G. Schaner. Used with permission.

"Baseline" Results

▶ Respondents have low levels of education ($<$8 years), save in variety of ways

▶ Randomization was successful

▶ Respondents robustly respond to interest rates (higher savings rates, higher average balances)

Measuring Rates of Time Preference - Survey Questions

- ▶ Respondents administered 10 tables of 5 questions each, asking them to choose between Ksh $x \in \{290, 220, 150, 80, 10\}$ at time $t_1 \in \{\text{tomorrow, 2 weeks, 4 weeks}\}$ or Ksh 300 at time $t_2 \in \{1, 2, 3, 4, 8, 12 \text{ weeks}\}$

  - ▶ Assume Ksh 300 at $t_2 \succ$ Ksh 0 at t_1 and Ksh 300 at $t_1 \succ$ Ksh 300 at t_2

- ▶ Calendars to enhance salience

- ▶ 1 in 5 chance of winning one of their choices (drawn at random)

- ▶ Only estimate exponential discount factor (in spirit of model)

  - ▶ Nonlinear least squares

Courtesy of Simone G. Schaner. Used with permission.

Substantial Intracouple Heterogeneity in Preference Parameters

Measure of heterogeneity for couple c: $\hat{\delta}_{Mc} - \hat{\delta}_{Fc}$
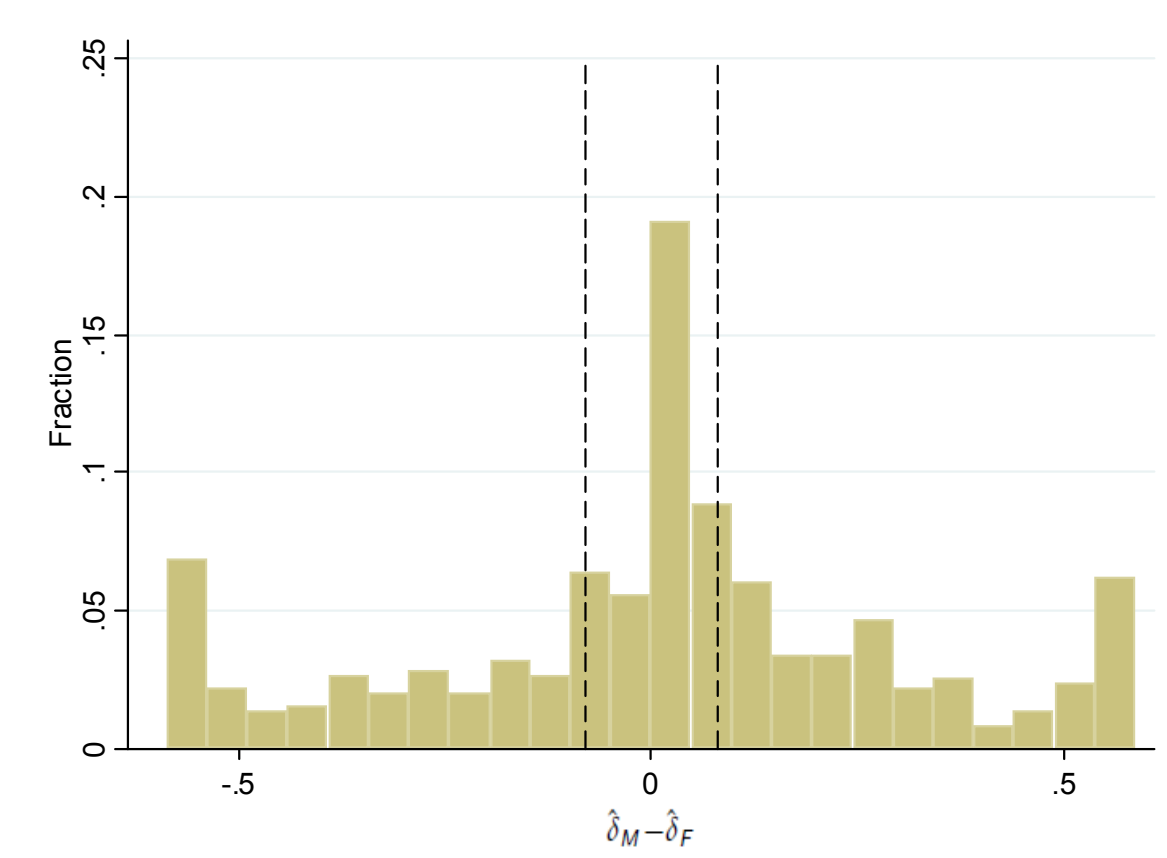
$\Rightarrow$ Label 33% of couples with $\hat{\delta}_{Mc} - \hat{\delta}_{Fc}$ closest to 0 as "well-matched"

$\Rightarrow$ *See Demographics by Match Quality*

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Account Use Patterns Match Theory, Robust to Wide Range of Controls

$$y_c = \beta_0 + \beta_1 match_c + \beta_2 joint\_dev_c + x_c'\delta + \gamma_{sessn} + \varepsilon_c$$

Estimates of β_1 by Account Type

	Saved	Avg. Balance	Frac. Savings
Individual Accounts			
Well Matched	-0.0870***	-84.2	-0.119***
	(0.0228)	(56.2)	(0.0324)
DV Mean (Omitted)	0.114	126	0.200
N	1194	1194	512
Joint Accounts			
Well Matched	0.109**	95.6	0.241***
	(0.0518)	(103)	(0.0740)
DV Mean (Omitted)	0.271	174	0.601
N	597	597	256

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Measuring Responses to the Excess Interest Rate

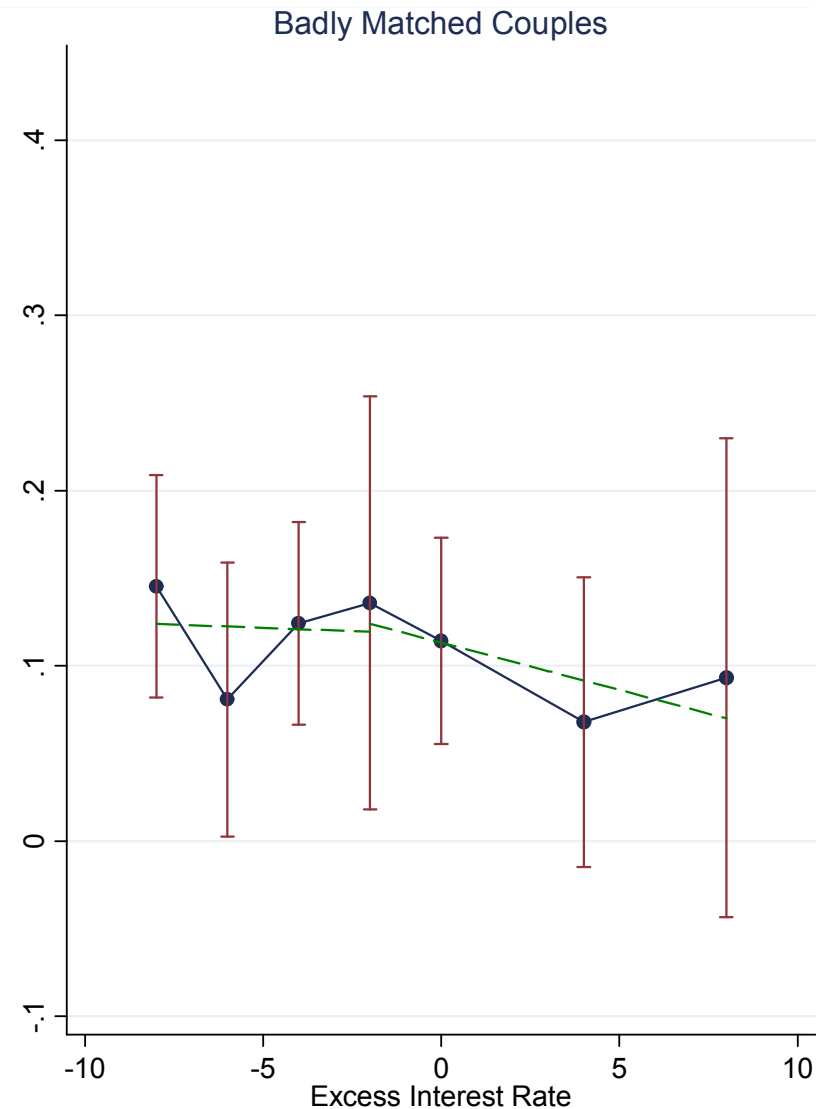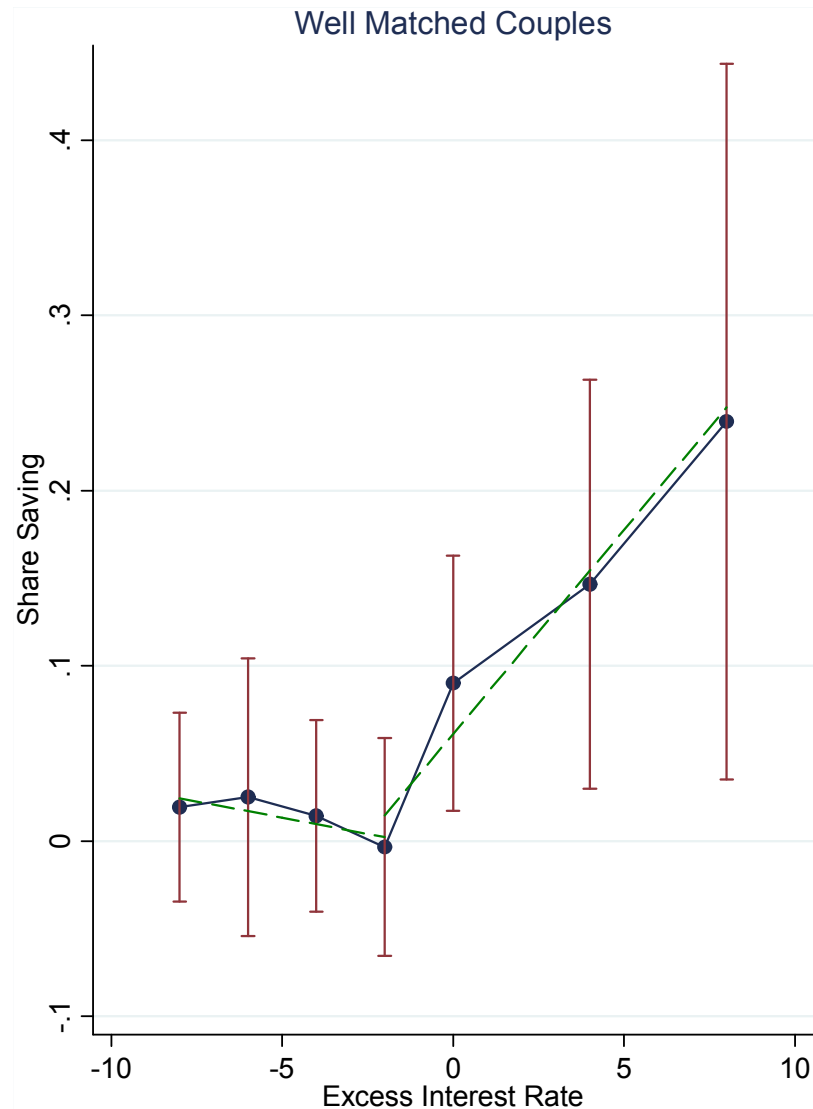Run following *separately* for well matched, badly matched by account type

$$saved_{ac} = \beta_0 + \lambda_{excess} + int'_{ac}\gamma + \varepsilon_{ac}$$

$\Rightarrow$ Predicted savings rates for each excess rate, conditional on account type, interest rate

$\Rightarrow$*Review Theoretical Responses*

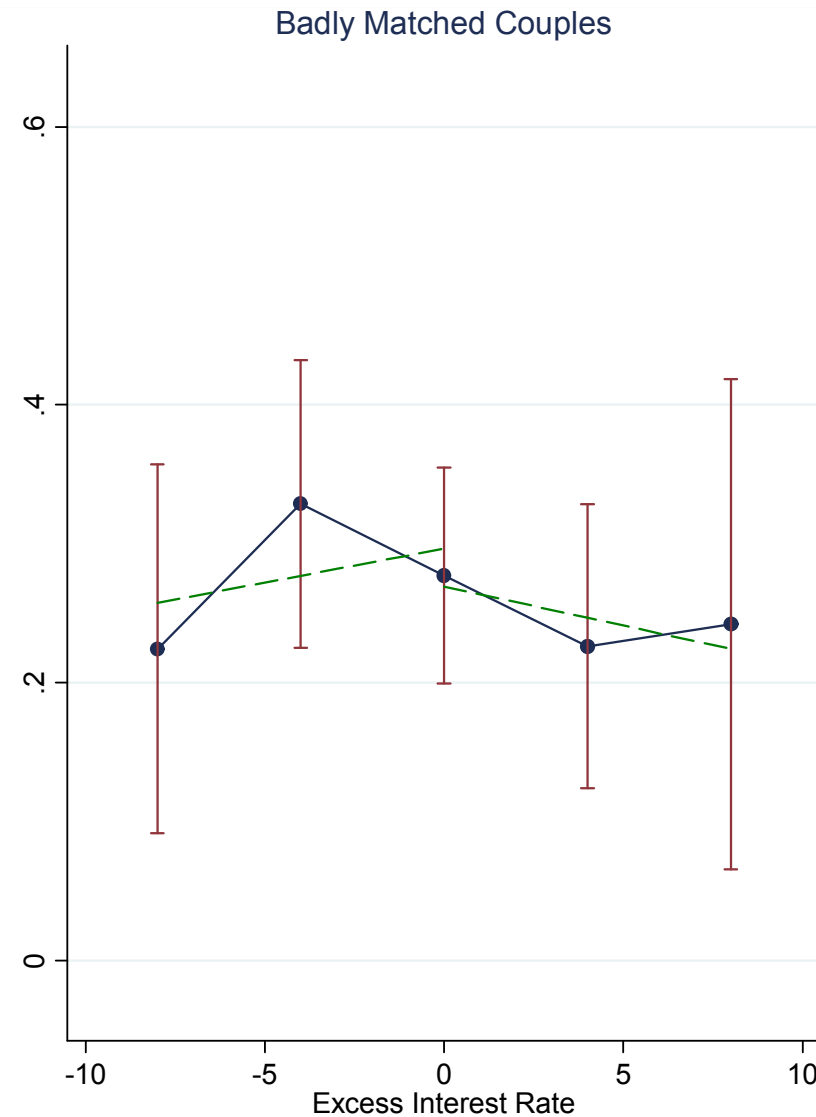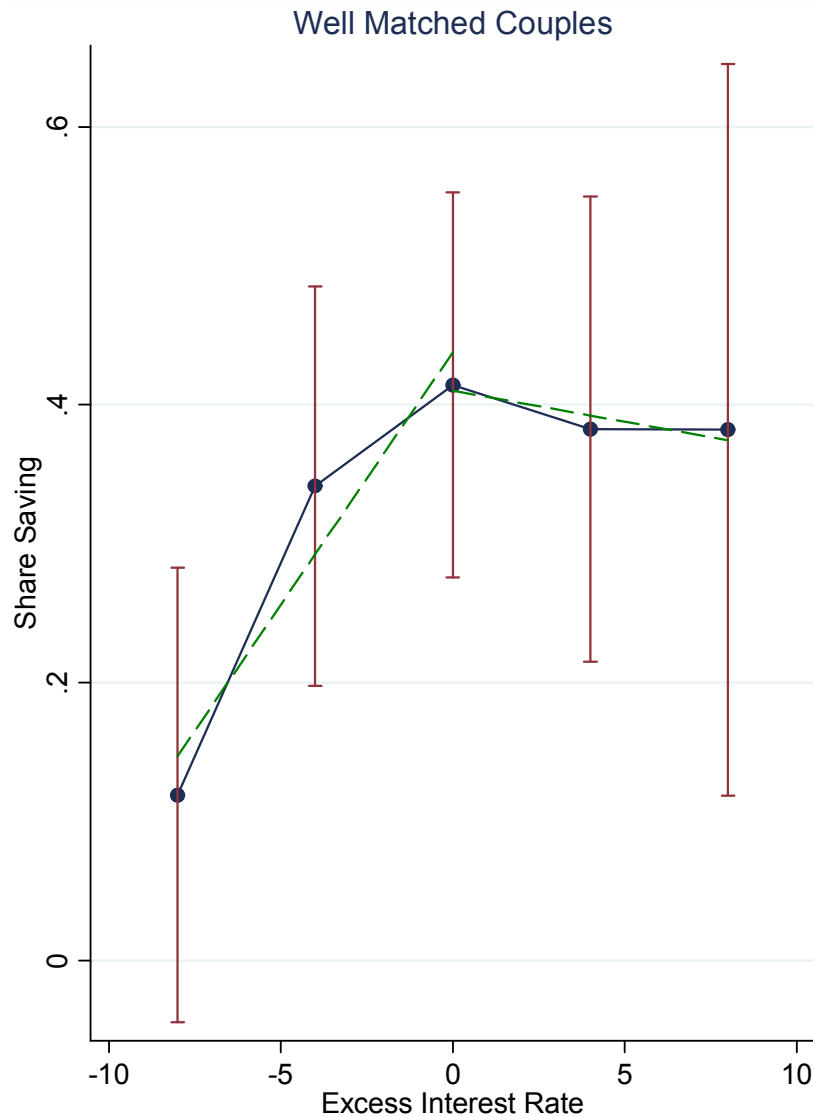Courtesy of Simone G. Schaner. Used with permission.

Well Matched Couples Respond to Individual Excess Interest As Expected

Courtesy of Simone G. Schaner. Used with permission.

Well Matched Couples Respond to Joint Excess Interest As Expected

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14.73 The Challenge of World Poverty

Spring 2011