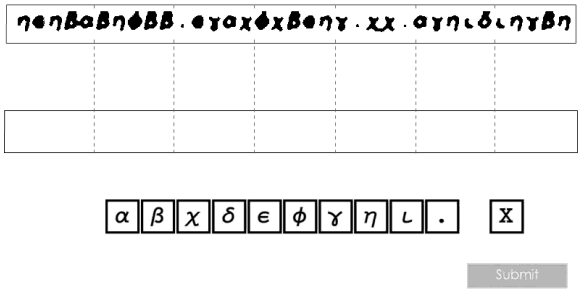
Limited self-control and demand for commitment

Michal Bauer

Warm up: Hypothetical experiment on time discounting: Variant B

- Imagine you agreed to take up the follow job
- Task: transcription of 1000 meaningless Greek texts.



- You can decide **when to work**: whether to work earlier or later
- Once the work is completed, you will receive reward (e.g., USD 100 at the end)
- **<u>Choice 2</u>**

1000 lines in 30 days or 1050 lines in 37 days

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When would you choose to complete the task? Which option would you select? [choice 1]

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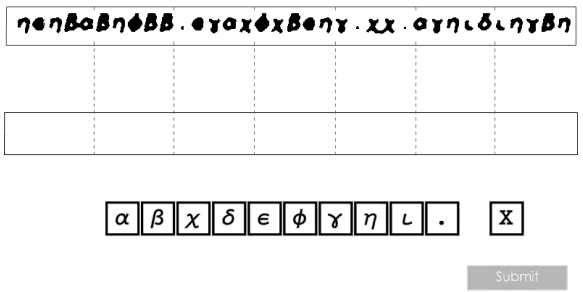
Warm up: Hypothetical experiment on time discounting: Variant A

- Imagine you agreed to take up the follow job
- Task: transcription of 1000 meaningless Greek texts.



- You can decide **when to work**: whether to work earlier or later
- Once the work is completed, you will receive reward (e.g., USD 100 at the end)
- **<u>Choice 1</u>**

1000 lines today or 1050 lines in 7 days

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When would you choose to complete the task? Which option would you select? [choice 2]

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Main questions

Theoretical framework

- What is time inconsistency in preferences?
- How awareness about time inconsistency may affect behavior?

Empirical evidence

- Do people procrastinate? Can deadlines help?
- Do people demand commitment when they want to save?
- Do people demand commitment at work?

Discounting in neoclassical economics

- Time discounting is important for variety of important choices
  - Investments, savings, schooling, health

- **Standard approach: Exponential discounting**

$$U_t = \sum_{s=0}^{T} \delta^s u_{t+s}, \text{ where } \delta \leq 1$$

- Implies **time consistency**
  - Change in discount factor that involves present: δ
    - s=0: u_t
    - s=1: δu_t
  - Change in discount factor for choices in future: $\boldsymbol{\delta}$
    - s=5: $\delta^5 u_t$
    - s=6: $\delta^6 u_t$

- **Implies** that people do **not** have **problems to follow** their **plans**, they have a perfect self-control

Limited self-control and time inconsistency

- **Beta-delta model, quasi-hyperbolic discounting** (Laibson 1997):
  - adding a **parameter $\boldsymbol{\beta < 1}$ capturing a present-bias** (sometimes referred to as quasi-hyperbolic discounting), "temptation parameter"

$$U_t = u_t + \beta\delta u_{t+1} + \beta\delta^2 u_{t+2} + \beta\delta^3 u_{t+3} + \cdots = u_t + \beta \sum_{s=1}^{T} \delta^s u_{t+s}$$

  - Change in discount factor for choice that involve present: $\boldsymbol{\beta\delta}$
    - s=0: u_t
    - s=1: $\beta\delta u_t$
  - Change in discount factor for choices in future: $\boldsymbol{\delta}$
    - s=5: $\beta\delta^5 u_t$
    - s=6: $\beta\delta^6 u_t$

- **Implies** that a person discounts future consumption especially heavily if s/he can consume now (i.e., they are present-biased)
  - Can lead to **over-consumption of tempting goods, procrastination**

Awareness: naivite vs. sophistication about present bias

$$U_t = u_t + \hat{\beta}\delta u_{t+1} + \hat{\beta}\delta^2 u_{t+2} + \hat{\beta}\delta^3 u_{t+3} + \cdots = u_t + \hat{\beta}\sum_{s=1}^{T}\delta^s u_{t+s}$$

$\hat{\beta}$ describes whether the individual is aware of his/her present-bias

Introducing **expectations about future behavior**

- Perfect sophistication: $\hat{\beta} = \beta < 1$
  - Aware about self-control difficulties
- Perfect naivite: $\beta < \hat{\beta} = 1$
  - Not aware about self-control difficulties
- Partial naivite: $\beta < \hat{\beta} < 1$
  - Underestimates the extent of self-control difficulties

Numerical example

- Consider an activity with current and future payoffs (e.g., going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$
- Consider a Person with some values of $\delta, \beta, \hat{\beta}$
  - **Plans**: Ex ante (one period before the decision), does she want to go to gym?
    - yes, if $\beta\delta u_t + \beta\delta^2 u_{t+1} = u_t + \delta u_{t+1} > 0$
  - **Actions**: Will she actually go to gym?
    - yes, if $u_t + \beta\delta u_{t+1} > 0$
  - **Expectations**: Ex ante, will she expect to go to gym?
    - yes, if $u_t + \hat{\beta}\delta u_{t+1} > 0$
- **Insight**: If $\beta \neq 1$, people may not follow their plans

Numerical example 1

- Consider an activity with current and future payoffs (e.g., going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person A: $\delta = 1, \beta = 0.8, \hat{\beta} = 1$
  - Is such person present-biased? Is she naive or sophisticated about present-bias?
  - Plans: Ex ante (e.g., one week ahead of the activity), does she want to go to gym?
  - Actions: Will she actually go to gym?
  - Expectations: Will she expect to go to gym?

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Numerical example 1: Which behavioral type is described in this example (delta=1, beta=0.8, beta_hat=1)? What are the plans, actions and beliefs about future behavior of such individual?

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Numerical example 1

- Consider an activity with current and future payoffs (going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person A: $\delta = 1, \beta = 0.8$, $\hat{\beta} = 1$
  - Naïve present-biased
  - Ex ante, does she want to go to gym?
    - **Yes** $(0.8 * 1 * (-85) + 0.8 * 1^2 * 100 > 0)$
  - Will she actually go to gym?
    - **No** $(-85 + 0.8 * 1 * 100 < 0)$
  - Ex ante, will she expect to go to gym?
    - **Yes** $(-85 + 1 * 1 * 100 > 0)$

Numerical example 2

- Consider an activity with current and future payoffs (going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person B: $\delta = 1, \beta = 1, \hat{\beta} = 1$
  - Is such person present-biased? Is she naive or sophisticated about present-bias?
  - Plans: Ex ante, does she want to go to gym?
  - Actions: Will she actually go to gym?
  - Expectations: Will she expect to go to gym?

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Numerical example 2: Which behavioral type is described in this example (delta=1, beta=1, beta_hat=1)? What are the plans, actions and beliefs about future behavior of such individual?

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Numerical example 2

- Consider an activity with current and future payoffs (going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person B: $\delta = 1, \beta = 1, \hat{\beta} = 1$
  - No present bias
  - Ex ante, does she want to go to gym? Yes $(1 * 1 * (-85) + 1 * 1^2 * 100 > 0)$
  - Will she actually go to gym? Yes $(-85 + 1 * 1 * 100 > 0)$
  - Will she expect to go to gym? Yes $(-85 + 1 * 1 * 100 > 0)$

Numerical example 3

- Consider an activity with current and future payoffs (going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person C: $\delta = 1, \beta = 0.8, \hat{\beta} = 0.8$
  - Is such person present-biased? Is she naive or sophisticated about present-bias?
  - Ex ante, does she want to go to gym?
  - Will she actually go to gym?
  - Will she expect to go to gym?

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Numerical example 3: Which behavioral type is described in this example (delta=1, beta=0.8, beta_hat=0.8)? What are the plans, actions and beliefs about future behavior of such individual?

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Numerical example 3

- Consider an activity with current and future payoffs (going to gym)
  - Current payoff: $a_1 = -85$
  - Future payoff: $a_2 = 100$
  - Utility function: $u_t = a_t$

- Person C: $\delta = 1, \beta = 0.8, \hat{\beta} = 0.8$
  - Present-biased. Sophisticated about present-bias
  - Ex ante, does she want to go to gym? Yes ($0.8 * 1 * (-85) + 0.8 * 1^2 * 100 > 0$)
  - Will she actually go to gym? No ($-85 + 0.8 * 1 * 100 < 0$)
  - Will she expect to go to gym? No ($-85 + 0.8 * 1 * 100 < 0$)

Main questions

Theoretical framework

- What is time inconsistency in preferences?
- How awareness about time inconsistency may affect behavior?

Empirical evidence

- Do people procrastinate? Can deadlines help?
- Do people demand commitment when they want to save?
- Do people demand commitment at work?

Homework deadlines

Ariely and Wertebroch (2002)

- Questions
  - Are people willing to self-impose costly deadlines to increase their performance, if they are given the opportunity to?
  - Do self-set deadlines improve performance?
  - Do people set those deadlines optimally – to maximize performance?
- Predictions
  - Standard model: no benefits of setting deadlines, only additional inflexibility
  - Limited self-control: deadlines may be useful to achieve long-term goals

Homework deadlines

- Study 1
  - 55 executives at MIT, submission of 3 assignments, penalty for late submission
  - Treatment conditions
    - Group A: no choice treatment – deadlines imposed and evenly spaced
    - Group B: choice treatment – student could set binding deadlines ex ante
  - Choice of deadlines
    - 68% students set deadlines prior the last week
    - Students in A (88.76) were more successful than in B (85.67)

Homework deadlines

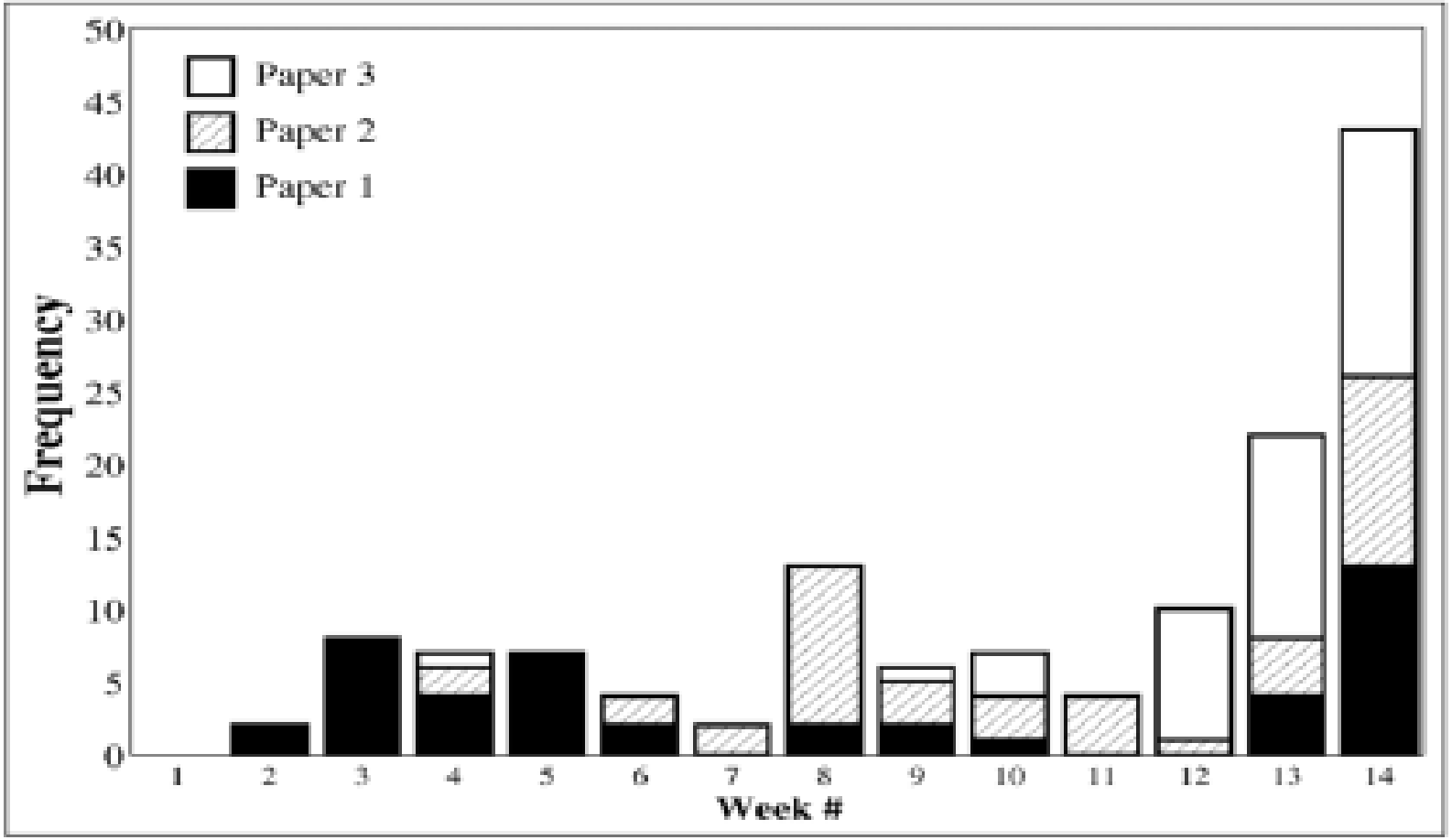

Fig. 1. Frequency distribution of the declared deadlines in Study 1 as a function of the week of class (Week 1 is the first week, and Week 14 the last week), plotted separately for the three papers.

Homework deadlines

- Study 2: Proof-reading task
  - Do self-set deadlines improve performance?
  - 60 students, completing 3 proofreading tasks within 21 days, rewarded based on # of mistakes
    - Group A: no choice treatment – deadlines imposed and evenly spaced
    - Group B: no deadlines, can submit anytime
    - Group C: choice treatment – student could set binding deadlines ex ante
  - Predictions
    - ….
    - ….
    - ….
    - ….

Homework deadlines

- Study 2: Proof-reading task
  - Do self-set deadlines improve performance?
  - 60 students, completing 3 proofreading tasks within 21 days, rewarded based on # of mistakes
    - Group A: no choice treatment – deadlines imposed and evenly spaced
    - Group B: no deadlines, can submit anytime
    - Group C: choice treatment – student could set binding deadlines ex ante
  - Predictions
    - Standard theory: B=C>A
    - Sophisticated present-biased: C>A>B
    - Fully naïve present-biased: A>B=C
    - Partially naïve present-biased: A>C>B

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What are the predictions assuming participants behave according to standard theory. Please rank expected performance:
Group A: deadlines imposed and evenly spaced
Group B: no deadlines
Group C: choice of deadlines

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What are the predictions assuming participants have present-bias and are perfectly sophisticated about it. Please rank expected performance:
Group A: deadlines imposed and evenly spaced
Group B: no deadlines
Group C: choice of deadlines

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What are the predictions assuming participants have present-bias and are perfectly naive about it. Please rank expected performance:
Group A: deadlines imposed and evenly spaced
Group B: no deadlines
Group C: choice of deadlines

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What are the predictions assuming participants have present-bias and are partially sophisticated about it. Please rank expected performance:
Group A: deadlines imposed and evenly spaced
Group B: no deadlines
Group C: choice of deadlines

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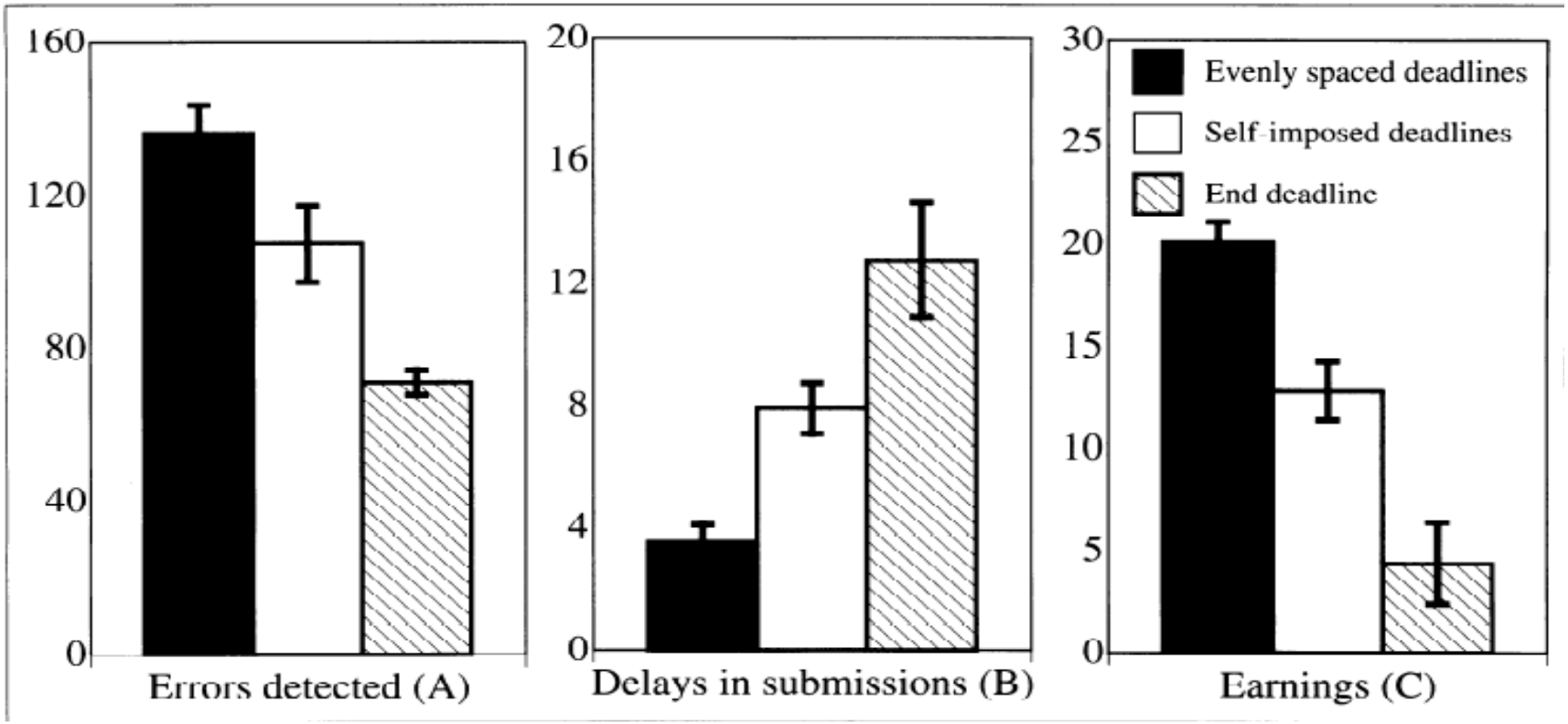
Homework deadlines

- Study 2: Profreading task
  - Results
    - A>C>B



Homework deadlines

- Why important?
  - Deadline setting helps performance -> existence of self-control problems: $\beta < 1$
  - Deadline setting is sub-optimal -> partial naivite: $\widehat{\beta} < \beta$
- Interesting design to fix ideas
- But
  - these result are not always replicated in other settings…
  - Note also super small samples… old times..

Main questions

Theoretical framework

- What is time inconsistency in preferences?
- How awareness about time inconsistency may affect behavior?

Empirical evidence

- Do people procrastinate? Can deadlines help?
- Do people demand commitment when they want to save?
- Do people demand commitment at work?

Anecdotal evidence

- Present-bias & Awarness of it (sophistication) => demand for commitment

- Examples
  - New year resolutions
  - Not keeping alcohol in house, limited amount of cash when heading to a party
  - Credit card limits
  - Buying small expensive packages of junk food
  - Christmas clubs
  - Deposit collectors, Rotating credit and saving associations (more in Bryan et al 2010)
  - ....

Tying Odysseus to the mast

Ashraf, Karlan and Yin (2006)

- Motivation
  - Will people demand saving products that reduce liquidity?
  - Will present-biased people demand it?
  - Will it result in increased savings?
- Design
  - Rural bank in Philippines, 17ths. customers
  - Randomization to 3 treatments
  - Follow up survey (bank's institutional data 6 and 12 monts later)

Tying Odysseus to the mast

Experimental manipulations

- Control group
  - Holders a savings account with a small interest rate (4%)
- SEED group
  - Offered a SEED product: choosing date or amount that has to be reached before money can be withdrawn
    - Free to choose the (binding) goal
  - Commitment savings certificate (stating purpose)
  - Could get a “lock box”
  - IR 4%
- Marketing group
  - The same as above except being offered the SEED

Tying Odysseus to the mast

Front

GREEN BANK

You are chosen to avail of our new commitment savings product

SEED SAVINGS ACCOUNT

GREEN BANK
is ready to help you with our new savings product...

Back

SEED SAVINGS ACCOUNT

Do you want to finance your own business? Thinking, where you can secure tuition fee payments? Do you want a high standard of living?

MAKE YOUR DREAMS COME TRUE!

SEED is the answer

How to open a SEED account?

- You can choose your own goal for saving
- You decide the amount you choose to transfer to your **SEED** account.
- To start with, buy a **SEED** box for only P/25

Make use of your savings, after you reach your goal and make your dreams come true.

Tying Odysseus to the mast

- Recall predictions of theories
  - Time consistent preferences -> no demand
  - Naïve time inconsistent -> no demand
  - (Partially) sophisticated time inconsistent -> demand and increase in savings
- Take up
  - 202 accounts opened (1/3 of those offered)
    - Fewer people chose the target amount than the target date

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TABLE V
DETERMINANTS OF SEED TAKE-UP
PROBIT

	(1) All	(2) All	(3) Female	(4) Male
Time inconsistent	0.125*	0.005	0.158*	0.046
	(0.067)	(0.080)	(0.085)	(0.098)
Impatient, now versus 1 month	−0.030	−0.039	−0.036	−0.041
	(0.050)	(0.050)	(0.062)	(0.075)
Patient, now versus 1 month	0.076	0.070	0.035	0.119
	(0.072)	(0.072)	(0.089)	(0.110)
Impatient, 6 months versus 7 months	0.097	0.108*	0.124	0.078
	(0.065)	(0.065)	(0.087)	(0.091)
Patient, 6 months versus 7 months	0.015	0.022	0.057	−0.021
	(0.064)	(0.064)	(0.081)	(0.093)
Female	0.099	0.070		
	(0.137)	(0.138)		
Female X time inconsistent		0.191**		
		(0.090)		
Married X female	−0.113	−0.117		
	(0.091)	(0.090)		
Married	0.049	0.050	−0.080	0.054
	(0.077)	(0.076)	(0.051)	(0.068)
Some college	0.083**	0.081**	0.081	0.079
	(0.038)	(0.038)	(0.050)	(0.055)
Number of household members	0.000	−0.000	0.003	−0.006
	(0.008)	(0.008)	(0.010)	(0.011)
Unemployed	0.040	0.033	0.039	0.059
	(0.109)	(0.108)	(0.115)	(0.290)
Age	−0.002	−0.002	−0.001	−0.003
	(0.001)	(0.001)	(0.002)	(0.002)
Lending client from bank	−0.014	−0.014	−0.059	0.036
	(0.036)	(0.036)	(0.046)	(0.053)
Lending client with default	−0.032	−0.036	−0.019	−0.057
	(0.072)	(0.071)	(0.088)	(0.103)
Total household income	0.049	0.050	0.136***	−0.026
	(0.031)	(0.031)	(0.045)	(0.043)
Total household monthly income—squared	−0.008*	−0.008*	−0.024***	0.001
	(0.004)	(0.004)	(0.008)	(0.004)
Female X Income share > 0 & <= 25%	0.015	−0.000		
	(0.182)	(0.175)		
Female X Income share > 25 & <= 50%	0.048	0.037		
	(0.169)	(0.164)		
Female X Income share > 50 & <= 75%	0.135	0.110		
	(0.182)	(0.175)		
Female X Income share > 75 & <= 100%	0.018	−0.002		
	(0.155)	(0.148)		

Tying Odysseus to the mast

TABLE
IMPACT ON CHANGE IN SA
OLS, PR

INTENT TO TREAT EFFECT	OLS			
Length	6 months		12 months	
Dependent variable:	Change in total balance	Change in total balance	Change in total balance	Change in total balance
Sample	All (1)	Commitment & marketing only (2)	All (3)	Commitment & marketing only (4)
Commitment treatment	234.678*	49.828	411.466*	287.575
	(101.748)	(156.027)	(244.021)	(228.523)
Marketing treatment	184.851		125.891	
	(146.982)		(153.440)	
Constant	40.626	225.476*	65.183	189.074**
	(61.676)	(133.405)	(124.215)	(90.072)
Observations	1777	1308	1777	1308
R^2	0.00	0.00	0.00	0.00

Robust standard errors are in parentheses. * significant at 10 percent; ** significant at 5 pe
change in total savings held at the Green Bank after six months. Column (1) regresses ch
marketing-treatment groups. The omitted group indicator in this regression corresponds to th
and marketing-treatment groups. Columns (3) and (4) repeat this regression, using change in s
columns (5)–(8) is a binary variable equal to 1 if balances increased by x percent. One hundre
of them had positive savings after twelve months. These individuals were coded as "ones," and
through (8). Exchange rate is 50 pesos for U.S. $1.

Tying Odysseus to the mast

- Why important?
  - Clever designs can help increase savings
  - Low cost
- Limitations
  - New savings or crowding-out of other forms of savings?
  - What particular goods does it prevent from consuming?

Main questions

Theoretical framework

- What is time inconsistency in preferences?
- How awareness about time inconsistency may affect behavior?

Empirical evidence

- Do people procrastinate? Can deadlines help?
- Do people demand commitment when they want to save?
- Do people demand commitment at work?

Self-control at work

Kaur et al. 2015

- Does limited self-control create a demand among workers to have contracts that motivate them to work more?
  - Workers may voluntarily choose a dominated contract, one that pays less for a low-output realization and the same for high output realization

- Research questions
  - Do workers face self-control problems when working? Does effort diminish when distance to payday is large (discounting)?
  - Do workers voluntarily choose a dominated contract that motivates to exert more effort?

Self-control at work

Kaur et al. 2015

- Super ambitious experiment. The researchers actually run a firm for 14 months to test the ideas.
- Setting
  - India, full-time data entry workers
  - They are paid based on the number of accurate field entries each day
  - Advantages of this environment
    - Can measure labor supply each day, effort (amount of fields entered), quality (accuracy of entries)
  - Compensation: a piece rate of Rs. 0.03 for each accurate field entered + small daily show up fee Rs. 15 (~ 8% of their compensation).
  - Workers relatively young, quite educated, mostly male. Hiring based on standard hiring practices

Self-control at work

Kaur et al. 2015

- **Manipulation 1: Payday groups treatments**
  - Workers were paid once a week for their work on the previous week
  - They were randomized into three groups: Tue, Thu, Sat
- **Manipulation 2: Contract treatments**
  - Control condition – Rs. 0.03 for each field entered
  - Dominated contract condition
    - On random days, workers were offered the option to choose a target (how many fields they would like to type in). They could also choose not take up this option
    - if they met the target, they received the standard piece price as before (0.03).
    - If they fell short of the target, they received only half the price of their output

Self-control at work

Kaur et al. 2015

- **Theory - predictions**
  - no self-control problems?
    - No effect of payday (always working hard)
    - No demand for dominated contracts
  - Self-control problems & naivite
    - Effect of payday (-> problem with self-control)
    - No demand for dominated contracts (not aware)
  - Self-control problems & sophistication
    - Effect of payday
    - Demand for dominated contracts
      - especially among those with high payday effects

Self-control at work

Kaur et al. 2015

- **Results: Payday and effort**
  - People produce more on paydays, as compared to days further away from paydays.
  - Attendance also increased over the pay cycle,

TABLE 2
PAY CYCLE TREATMENT EFFECTS

	Dependent Variable				
	Production (1)	Production (2)	Production (3)	Earnings (4)	Attendance (5)
Payday	215	140	428	14.09	.077
	(70)***	(63)**	(94)***	(2.99)***	(.013)***
1 day before payday			539	17.19	.053
			(95)***	(3.02)***	(.013)***
2 days before payday			417	13.54	.037
			(113)***	(3.60)***	(.016)**
3 days before payday			374	11.82	.026
			(112)***	(3.57)***	(.017)
4 days before payday			332	10.15	.047
			(123)***	(3.91)***	(.017)***
5 days before payday			176	5.91	.023
			(119)	(3.79)	(.017)
Piece rate increase					
Lag dependent variable controls	No	Yes	Yes	Yes	No
Observations	8,423	8,423	8,423	8,423	8,423
R^2	.4961	.5889	.5909	.57	.11
Dependent variable mean	5,337	5,337	5,337	172	.88

NOTE.—The sample in cols. 1–5 is the experiment sample. The dependent variables equal zero if a worker was absent. Payday is a l whether that day was the worker's assigned payday. In cols. 3–5, "*X* days before payday" are binary indicators for whether the current da away from the worker's assigned payday; the omitted category in these columns is 6 or more days away from the payday. In col. 6, the sar after the end of the experiment in which workers' wages were randomized. Piece rate increase is a binary indicator that equals one if the was Rs. 0.04 per accurate field that day and equals zero if the worker's piece rate was Rs. 0.03 per accurate field. All regressions include fi date in the sample, each worker in the sample, and each computer seating assignment. Regressions 2, 3, and 6 also include controls for (production on the previous workday and 2 workdays ago); similarly, regression 4 includes controls for lagged earnings. Robust s reported in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Self-control at work

Kaur et al. 2015

- **Results:** Demand for and treatment effects of dominated contracts
  - Being offered the contract increased output (by 6%)
  - No effects on attendance or quality of output
  - ToT: this is a large magnitude – similar as 18 percent increase in wage rate

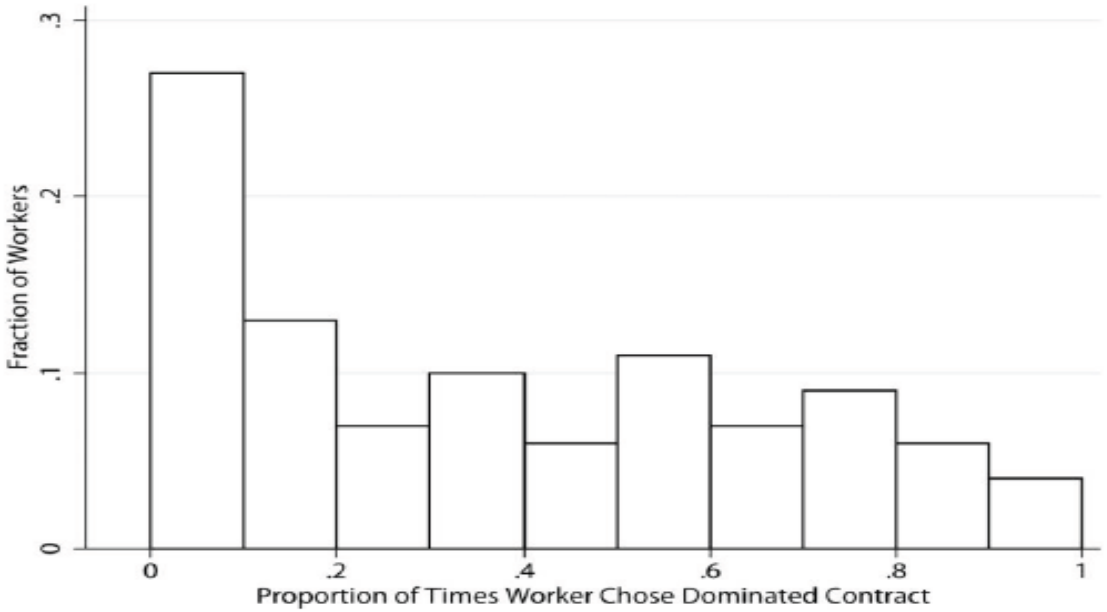

FIG. 4.—Take-up of dominated contracts: distribution of worker means. A worker's take-up rate is the proportion of times the worker chose a dominated contract (i.e., selected a positive target) when given the option (conditional on being present the day before and the day of assignment to the option to choose a dominated contract treatment). The distribution is shown for the 101 workers in the sample who were assigned the option to choose at least once.

Self-control at work

Kaur et al. 2015

- **Results:** Correlation between payday and contract effects
  - people who seem to have greatest self-control troubles are those ones who are most likely to demand contract
-

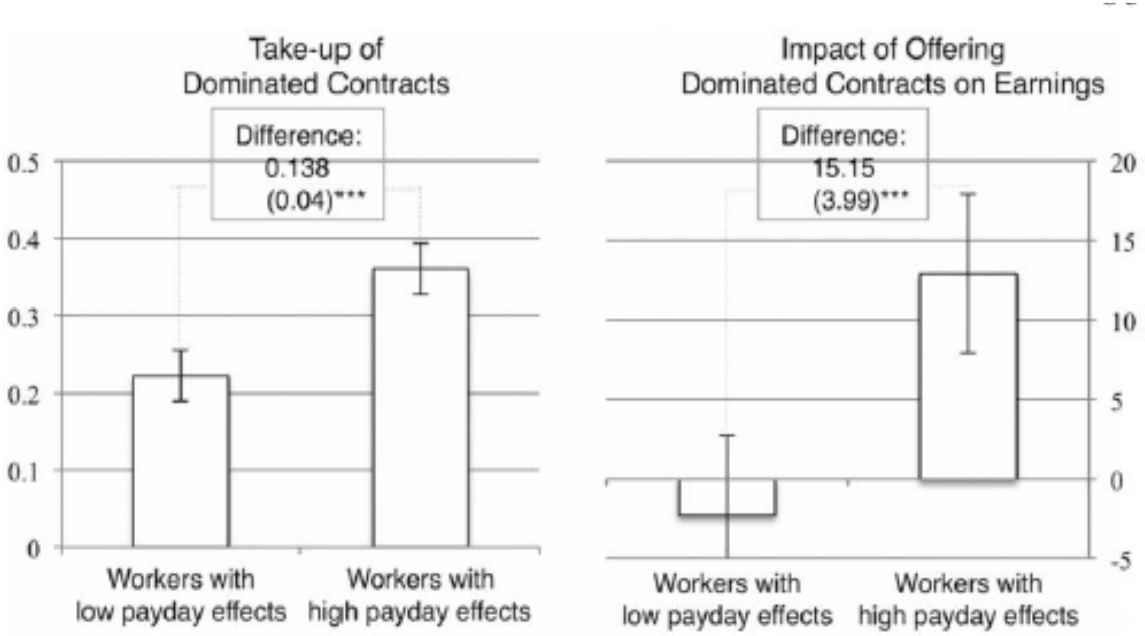

FIG. 5.—Pay cycle effects: correlation with contract choice and earnings impact. These figures show differences in take-up rates and treatment effects of dominated contracts. Workers with low (high) payday effects are those whose payday effect—the difference in production on paydays and nonpaydays under assignment to the control contract, divided by mean production under the control contract—is below (above) the sample average. The top of each chart displays point estimates and standard errors corresponding to regressions shown in table 6. Each bar corresponds to the estimated mean for each group, along with 95 percent confidence intervals.

Self-control at work

Kaur et al. 2015

- **Interpretation**
  - A set of findings consistent with limited self control and awareness of it

Summary

- Many people have imperfect self-control, and consequently not follow their long-term plans
  - This may lead to over-consumption of tempting goods, procrastination
- Some people are aware of this and commitment devices may help them to achieve their plans
  - Reducing choice space may not always be bad, and people might voluntarily do so