GR 6307
Public Economics and Development

4. The Personnel Economics of the Developing State: Delivering Services to the Poor

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Outline

Theory

Financial Incentives

Non-financial Incentives

Recruitment & Selection

Outline

Theory

- Banerjee, Hanna & Mullainathan (2012) *Corruption*

Banerjee *et al.* 2012: Setup

- The government is allocating "slots" through a bureaucrat
- Continuum of slots of size 1 to be allocated to population of size $N > 1$
- 2 types of agents, H and L with masses N_H, N_L.
- Social value of a slot for type H if H, L for type L, $H > L$
- private benefits are l, and h, and ability to pay is $y_h \leq h$ and $y_l \leq l$ due to credit constraints.

Banerjee *et al.* 2012: Setup

- Testing technology. Test for an amount of time t
- probability type L fails (outcome F) is $\phi_L(t)$, $\phi'_L(t) \geq 0$
- Type H never fails (always get outcome S) if she wants to pass.
- Both can opt to deliberately fail
- Cost of testing is νt to the bureaucrat and δt to the applicant

Banerjee *et al.* 2012: Possible Mechanisms

- Bureaucrats announce direct mechanisms that they commit to ex ante.
- A mechanism is a vector $R = (t_x, p_{xr}, \pi_{xr})$
  - t_x amount of testing of each announced type $x = H, L$
  - π_{xr} is the probability of getting a slot if announce type x and get result $r = F, S$
  - p_{xr} is the price paid by xr
- Restrict to winner-pay mechanisms
- 2 incentive compatibility constraints:
  1. High types prefer not to mimic low types:

$$\pi_{HS}\left(h - p_{HS}\right) - \delta t_H \geq \pi_{LS}\left(h - p_{LS}\right) - \delta t_L$$

  2. Low types don't mimic high types:

$$\begin{aligned}&\pi_{LS}\left(l - p_{LS}\right)\left[1 - \phi_L\left(t_L\right)\right] + \pi_{LF}\left(l - p_{LF}\right)\phi_L\left(t_L\right) - \delta t_L\\ \geq&\pi_{HS}\left(l - p_{HS}\right)\left[1 - \phi_L\left(t_H\right)\right] + \pi_{HF}\left(l - p_{HF}\right)\phi_L\left(t_H\right) - \delta t_H\end{aligned}$$

Banerjee *et al.* 2012: Possible Mechanisms

- Clients can also walk away $\rightarrow$ 2 participation constraints:
  1. High types don't walk away
$$\pi_{HS}\left(h - p_{HS}\right) - \delta t_H \geq 0$$
  2. Low types don't walk away
$$\pi_{LS}\left(l - p_{LS}\right)\left[1 - \phi_L\left(t_L\right)\right] + \pi_{LF}\left(l - p_{LF}\right)\phi_L\left(t_L\right) - \delta t_L \geq 0$$
- There is only a mass 1 of slots so
$$N_H\pi_{HS} + N_L\pi_{LS}\left[1 - \phi_L\left(t_L\right)\right] + N_L\pi_{LF}\phi_L\left(t_L\right) \leq 1$$
- Finally the clients can't borrow, so they can't pay more than they have
$$p_{Hr} \leq y_H,\ r = F, S$$
$$p_{Lr} \leq y_L,\ r = F, S$$
- Define $\mathbf{R}$ as the set of rules R that satisfy these constraints

Banerjee et al. 2012: Rules

- The government sets rules $\mathcal{R} = (T_x, P_{xr,}\Pi_{xr})$
  - T_x are permitted tests t_x
  - P_{xr} are permitted prices for each type
  - Π_{xr} are permitted assignment probabilities π_{xr}
- Assume that $\mathcal{R}$ is feasible: There's at least one $R \in \mathbf{R}$ satisfying the rules.
- If $\mathcal{R}$ is not a singleton, then the bureaucrat has *discretion*.
- Government also chooses p a price the bureaucrat has to pay the government for each slot he gives out.

Banerjee et al. 2012: Bureaucrats

- For each mechanism $R \in \mathbf{R} \cap \mathcal{R}$ that follow the rules, the bureaucrat's payoff is

$$\underbrace{N_H \pi_{HS} \left(p_{HS} - p\right)}_{\text{profits from } H \text{ types}} + \underbrace{N_L \pi_{LS} \left(p_{LS} - p\right)\left(1 - \phi_L\left(t_L\right)\right)}_{\text{profits from } L \text{ types who pass}}$$
$$+ \underbrace{N_L \pi_{LF} \left(p_{LF} - p\right)\phi_L\left(t_L\right)}_{\text{profits from } L \text{ types who fail}} - \underbrace{\nu N_H t_H - \nu N_L t_L}_{\text{costs of testing}}$$

- If the bureaucrat uses a mechanism $R \in \mathbf{R} \cap \mathcal{R}^c$ that's against the rules, there's an extra cost γ of breaking the rules.
- Assume γ comes from a distribution $G\left(\gamma\right)$. As a result, $R\left(\mathcal{R}, \gamma\right)$ will be the mechanism chosen by a bureaucrat with corruption cost γ when the rule is $\mathcal{R}$

Banerjee et al. 2012: The Government

- Assume the government only cares about social value of slots (Could generalize. How?)
- Government's objective is to choose the rules $\mathcal{R}$ to maximize

$$\underbrace{\int N_H \pi_{HS}\left(R\left(\mathcal{R},\gamma\right)\right) H dG\left(\gamma\right)}_{\text{(expected) social value of slots to } H}$$

$$+ \underbrace{\int N_L \pi_{LS}\left(R\left(\mathcal{R},\gamma\right)\right)\left[1-\phi_L\left(t_L\left(R\left(\mathcal{R},\gamma\right)\right)\right)\right] L dG\left(\gamma\right)}_{\text{social value of slots to } L \text{ who pass test}}$$

$$+ \underbrace{\int N_L \pi_{LF}\left(R\left(\mathcal{R},\gamma\right)\right)\phi_L\left(t_L\left(R\left(\mathcal{R},\gamma\right)\right)\right) L dG\left(\gamma\right)}_{\text{social value of slots to } L \text{ who fail test}}$$

$$- \underbrace{\int \left(\nu+\delta\right) N_H t_H\left(R\left(\mathcal{R},\gamma\right)\right) dG\left(\gamma\right)}_{\text{social cost of testing } H} - \underbrace{\int \left(\nu+\delta\right) N_L t_L\left(R\left(\mathcal{R},\gamma\right)\right) dG\left(\gamma\right)}_{\text{social cost of testing } L}$$

Banerjee et al. 2012: 4 Cases

Valuation of Slot	Agent's Relative Ability to Pay	
	$y_H > y_L$	$y_H \leq y_L$
$h > l$	Case I: Alignment	Case III: Inability to Pay
$h \leq l$	Case II: Unwillingness to Pay	Case IV: Misalignment

- Case I: Social and private value rankings align
  1. Pure market case $H = h = y_H$, $L = l = y_L$
  2. Choosing an efficient contractor: H types are more efficient, make more money $h > l$. Also probably $y_H = h$ and $y_L = l$
  3. Allocating import licenses: H types make most profits. But credit constraints might bind: $y_H < h = H$ and $y_L < l = L$

Banerjee et al. 2012: 4 Cases

Valuation of Slot	Agent's Relative Ability to Pay	
	$y_H > y_L$	$y_H \leq y_L$
$h > l$	Case I: Alignment	Case III: Inability to Pay
$h \leq l$	Case II: Unwillingness to Pay	Case IV: Misalignment

- Case II: Seems pretty unlikely.
  1. A merit good? e.g. subsidized condoms. H are high risk types. But they like risk so $h < l$. Could also be richer so $y_H > y_L$.

Banerjee et al. 2012: 4 Cases

Valuation of Slot	Agent's Relative Ability to Pay	
	$y_H > y_L$	$y_H \leq y_L$
$h > l$	Case I: Alignment	Case III: Inability to Pay
$h \leq l$	Case II: Unwillingness to Pay	Case IV: Misalignment

- Case III: Social and pivate values are aligned, but the high value types can't afford it as much as the low value types
  1. Hospital beds. H needs bed urgently (e.g. cardiac vs cosmetic surgery). $H = h > L = l$. But no reason to assume H can afford more. e.g. $y_H = y_L = y$
  2. Targeting subsidized food to the poor. $H = h > L = l$ but $y_H < y_L$
  3. Allocating government jobs. Best candidates also value job the most (possibly because of private benefits!). But constrained in how much they can pay for the job up front.

Banerjee et al. 2012: 4 Cases

Valuation of Slot	Agent's Relative Ability to Pay	
	$y_H > y_L$	$y_H \leq y_L$
$h > l$	Case I: Alignment	Case III: Inability to Pay
$h \leq l$	Case II: Unwillingness to Pay	Case IV: Misalignment

- Case IV: The government wants to give the slots to those who value it the least
  1. Law enforcement: Slot is avoiding jail $H > 0 > L$, $y_H = y_L = y$, $h = l > 0$
  2. Driving licenses. Bad drivers more likely to get in trouble, so $H > 0 > L$, $y_H = y_L = y$. $h < l$
  3. Procurement: Imagine there are high and low quality firms. The slot is the contract. Want to buy from high quality firms $(H > L)$ even though costs higher $(l > h)$. Without credit constriants, $y_H = h$ and $y_L = l$

Banerjee et al. 2012: Alignment

- Assume $N_H < 1$ but $L > 0$ so optimal to give leftover slots to L
- We will analyze 4 possible mechanisms:

1. The socially optimal mechanism
2. All slots to the highest bidder: The *auction* mechanism
3. Pay to avoid missing out on a slot: The *monopoly* mechanism
4. Using testing to deter mimicry: The *testing* mechanism

- We will characterize each mechanism and show when the bureaucrat will pick each one

Banerjee et al. 2012: Alignment

- Candidate solution:

$$\begin{aligned} p_H &= y_L + \epsilon,\ p_L = y_L \\ \pi_H &= 1,\ \pi_L = \frac{1 - N_H}{N_L} \\ t_H &= t_L = 0 \end{aligned}$$

- Low types can't mimic (can't afford p_H). High types won't mimic as long as

$$\underbrace{h - (y_L + \varepsilon)}_{\text{slot for sure at } p_H} \geq \underbrace{\frac{1 - N_H}{N_L}(h - y_L)}_{\text{slot w/pr } (1-N_H)/N_L \text{ at price } p_L}$$

Banerjee et al. 2012: Alignment

- This can always be guaranteed for small enough ϵ
- Affordable to H since $y_H > y_L$
- Feasible since π_L chosen to satisfy slot constraint
- Let E be set of ϵs such that this mechanism is in $\mathcal{R}$
- Will the bureaucrat choose $\epsilon \in E$? Given the fixed cost of breaking the rules, if he breaks them, he'll maximize his profits.

Banerjee et al. 2012: Alignment

- How can the bureaucrat extract more rents? Given π_L the highest price he can charge Hs is

$$p_H = p_H^* = \min \left\{ y_H, y_L + (h - y_L) \frac{N-1}{N_L} \right\}$$

- $\Rightarrow$ Auction mechanism

$$p_H = p_H^*,\ p_L = y_L$$
$$\pi_H = 1,\ \pi_L = \frac{1 - N_H}{N_L}$$
$$t_H = t_L = 0$$

Banerjee et al. 2012: Alignment

- The auction mechanism still leave Hs positive surplus: $p_H^* < y_H$. Can the bureaucrat extract more?
- He needs to satisfy the mimicry constraint. So he can play with π_L to do this and maybe get more money.
- $\Rightarrow$ the Monopoly mechanism.

$$p_H = \tilde{p}_H \leq y_H,\ p_L = y_L$$
$$\pi_H = 1,\ \pi_L = \min\left\{\frac{h - \tilde{p}_H}{h - y_L}, \frac{1 - N_H}{1 - N_L}\right\}$$
$$t_H = t_L = 0$$

- Note, this mechanism is inefficient whenever $\pi_L < (1 - N_H) / (1 - N_L)$. Slots are wasted

Banerjee et al. 2012: Alignment

- Will the bureaucrat prefer the auction or monopoly mechanism?
- The profits to the bureaucrat from the monopoly mechanism are

$$N_H\left(\tilde{p}_H - p\right) + N_L \frac{h - \tilde{p}_H}{h - y_L}\left(y_L - p\right)$$

- Note that at $\tilde{p} = y_L + \left(h - y_L\right)\left(N - 1\right)/N_L$ he gets the auction mechanism profit
- Profits are increasing in $\tilde{p}_H$ iff

$$N_H > N_L \frac{y_L - p}{h - y_L}$$

- If this condition holds, the monopoly mechanism with $\tilde{p}_H = y_H$ dominates.

Banerjee et al. 2012: Alignment

- Finally, consider the testing mechanism:

$$p_H = \min\left\{y_H, h - (h-l)\,\frac{1-N_H}{N_L}\right\},\ p_{LS} = p_{LF} = y_L$$

$$\pi_H = 1,\ \pi_{LS} = \pi_{LF} = \frac{1-N_H}{N_L}$$

$$t_H = 0,\ t_L = \max\left\{0, \frac{1}{\delta}\min\left\{(h-y_L)\,\frac{1-N_H}{N_L} - (h-y_H)\,,\ (l-y_L)\,\frac{1-N_H}{N_L}\right\}\right\}$$

- Aim: Use testing to relax the IC constraint that Hs don't mimic Ls

Banerjee et al. 2012: Alignment

- Note testing here is completely wasteful: Nothing depends on the outcome.
  - H types more likely to pass, so don't want to reward passing (trying to discourage pretending to be L)
  - H types can fail on purpose, so don't want to reward failing
- Testing relaxes the IC constraint though:

$$h - p_H \geq (h - y_L) \frac{1 - N_H}{N_L} - \delta t_L$$

  - RHS decreasing in t_L so can increase p_H
- Can't go past y_H so

$$\delta t_L \leq h - y_H - (h - y_L) \frac{1 - N_H}{N_L}$$

- Also can't scare away all the Ls

$$\delta t_L \leq (l - y_L) \frac{1 - N_H}{N_L}$$

Banerjee et al. 2012: Alignment

- This doesn't exhaust all possible mechanisms, but they're useful archetypes. So which one will the bureaucrat choose?
- Scenario 1: Suppose that $(h - y_L)\frac{N-1}{N_L} + y_L \geq y_H$. Now the auction mechanism extracts the most rents. The government gives the bureaucrat full discretion and sets p to divide the surplus between them.
- Scenario 2: $(h - y_L)\frac{N-1}{N_L} + y_L < y_H$ but testing is a) easy: $\nu = 0$, and b) effective, $y_H \leq h - (h - l)\frac{1-N_H}{N_L}$.
  - Government can set a rule that price must be below $(h - y_L)\frac{N-1}{N_L} + y_L$ and there cannot be any testing. Bureaucrats with high γ will follow this rule and choose the auction mechanism. Those with low γ will break it and choose either the testing or monopoly mechanism. In equilibrium there are both bribes and inefficiency.
  - Note that therefore the optimal rules depend on the degree of corruptibility of the bureaucrats.

Banerjee et al. 2012: Alignment

- Scenario 3: $(h - y_L)\,\frac{N-1}{N_L} + y_L < y_H$ but testing is hard: $\nu \gg 0$ so bureaucrats don't use red tape.
- Without rules the bureaucrats choose either auction or monopoly mechanism.
- They choose the monopoly mechanism (which the govt dislikes) if

$$N_H > N_L \frac{y_L - p}{h - y_L}$$

  - Government can set low p to avoid monopoly mechanism
- Government may prefer to cap the price again. There will be bribery, and also inefficiency amongst those choosing the monopoly mechanism.

Banerjee et al. 2012: Inability to Pay

- Focus on Banerjee (1997) special case: $L > 0$, $N_H < 1$, $h > l$, $y_H = y_L = y < l$, $\phi_L(t) = 0$
- Three mechanisms:

1. Auction mechanism:

$$p_H = y,\ p_L = l - \frac{N_L}{1 - N_H}(l - y)$$
$$\pi_H = 1,\ \pi_L = \frac{1 - N_H}{N_L}$$
$$t_H = t_L = 0$$

- H types prefer paying the higher price and getting the slot for sure.

Banerjee et al. 2012: Inability to Pay

2. Testing mechanism:

$$p_H = y,\; p_L = y$$
$$\pi_H = 1,\; \pi_L = \frac{1 - N_H}{N_L}$$
$$t_H = \frac{N_H + N_L - 1}{N_L}\left(l - y\right),\; t_L = 0$$

- Satisfy the IC constraint by making H types do the test, even though they're guaranteed to pass.

3. Lottery mechanism:

$$p_H = y,\; p_L = y$$
$$\pi_H = \pi_L = \frac{1}{N_H + H_L}$$
$$t_H = 0,\; t_L = 0$$

Banerjee et al. 2012: Inability to Pay

- Scenario: $\nu = 0$.
- With no rules, the bureaucrat prefers the lottery $\Rightarrow$ inefficient allocation of slots
- Suppose rule is set to require $\pi_H = 1$, $\pi_L = (1 - N_H)/N_L$.
- Now bureaucrat uses the testing mechanism. Yields same payoff as lottery.
- To stop this the government can set rule that the auction mechanism must be followed.
  - Bureaucrats with high γ will follow the rule. Bureaucrats with low γ will use the testing mechanism.
  - Bribery and red tape.
- Alternatively the government could have the rule be the lottery.
  - No corruption and no red tape. But misallocation

Banerjee et al. 2012: Misalignment

- Focus on the following case:
  - $N_H > 1$: Slots are scarce.
  - $y_L = l > h = y_H$: social and private values are misaligned
  - $L < 0$: Low types should not have a slot.
- Consider three types of mechanisms the bureaucrat might use

Banerjee et al. 2012: Misalignment

1. "testing + auction"

$$p_{HS} = p_H^*,\ p_{HF} = p_L = l$$
$$\pi_{HS} = 1/N_H,\ \pi_{HF} = \pi_L = 0$$
$$t_H = t_H^*,\ t_L = 0$$

where t_H^* and p_H^* solve

$$h - \delta t_H^* - p_H^* = 0$$
$$\left(1 - \phi_L\left(t_H\right)\right)\left(l - p_H^*\right) - \delta t_H^* = 0$$

- Note the IC constraint for the L types:

$$\left(1 - \phi_L\left(t_H\right)\right)\left(l - p_H^*\right) - \delta t_H^* \leq 0$$

they have to prefer not getting the slot to pretending to be H and getting it with some probability

Banerjee et al. 2012: Misalignment

2. “auction”

$$
\begin{aligned}
p_H &= p_L = l \\
\pi_H &= 0,\ \pi_L = 1/N_L \\
t_H &= 0,\ t_L = 0
\end{aligned}
$$

   Noone is tested, but the allocation is terrible: Only Ls get slots

3. “lottery”

$$
\begin{aligned}
p_H &= p_L = h \\
\pi_H &= \pi_L = 1/\left(N_L + N_H\right) \\
t_H &= 0,\ t_L = 0
\end{aligned}
$$

Banerjee et al. 2012: Misalignment

- What should the government do?
- With no rules the bureaucrats choose the auction mechanism. Terrible!
- Government could set rules to be the testing + auction mechanism.
  - Bureaucrats with low γ break rules and use the auction mechanism.
- Government could set rules to be the lottery
  - Bureaucrats make more money $\rightarrow$ smaller incentive to deviate $\rightarrow$ fewer bureaucrats give all slots to Ls
  - But some slots go to L types even when rules are followed.

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Theory

Financial Incentives

Non-financial Incentives

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Non-financial Incentives

Ashraf Bandiera & Jack (JPubE 2014) *No Margin, No Mission? A Field Experiment on Incentives for Public Service Delivery*

Ashraf et al 2014: Introduction

- Evidence on performance pay for pro-social tasks is mixed (teachers papers)
- Theory says that intrinsic motivation will interact with extrinsic incentives (Benabou & Tirole, Besley & Ghatak)
- Design an experiment to compare effects of intrinsic and extrinsic motivation and their interaction.

Ashraf et al 2014: Context

- Work with Society for Family Health (SFH), a public health NGO working in Lusaka, Zambia
- SFH program to distribute female condoms through hair salons. Study ran 12/09-12/10
- Hair salons:
  - familiarity between stylists and clients permits targeting and, duting styling, a captive audience to explain benefits to.
  - Many many salons throughout salons: census found 2500 for a population of $\sim$2 million people in Lusaka
- Agents have to exert effort to diffuse information
  - about HIV
  - about the product, which is unfamiliar to many

Ashraf et al 2014: Rrecruitment

1. SFH attempts to invite 1,222 stylists to a 1-day training program
2. 981 can be reached and get the letter
3. 771 accept and do the training
4. 747 join up. They get
   4.1 12 packs at a subsidized price of 2,000 ZMK (US$.033 per pack)
   4.2 a range of promotional materials
   4.3 access to more packs at 500 ZMK per pack
   4.4 Retail price set at 500 ZMK per pack, same as male condoms

Summary statistics.

	Mean	Median	Min	Max	sd	N
Panel A: outcome variables						
Packs sold (restocked)	9.01	0.00	0.00	216.00	18.08	771
Packs sold (calculated)	13.90	12.00	0.00	148.00	15.77	771
Promoter attention	2.52	2.56	0.00	3.00	0.30	725
Promoter interest	2.15	2.12	0.00	3.00	0.38	697
Logbook filled	0.47	0.50	0.00	1.00	0.23	725
Total displays (promotional material)	2.26	2.20	0.00	8.00	0.90	726
Panel B: control variables						
Salon is a barbershop (0–1)	0.44	0.00	0.00	1.00	0.50	771
Salon is near a bar (0–1)	0.88	1.00	0.00	1.00	0.32	770
Salon size (number of employees)	1.75	2.00	1.00	9.00	0.99	770
Number of trained salons in the same area	4.46	3.00	1.00	30.00	5.06	173
Stylist sells other products in salon (0–1)	0.27	0.00	0.00	1.00	0.45	771
Stylist is in bottom quartile of asset distribution (0–1)	0.21	0.00	0.00	1.00	0.40	771
Stylist's socio-economic status is low (0–1)	0.19	0.00	0.00	1.00	0.40	771
Stylist's dictator-game donation (Kwacha)	5728.94	5000.00	0.00	40,000.00	3744.67	767
Stylist's reported work motivation is intrinsic (0–1)	0.58	1.00	0.00	1.00	0.49	771
Stylist's religion is Catholic (0–1)	0.23	0.00	0.00	1.00	0.42	771
Panel C: other descriptors						
Monthly income of the salon (Kwacha)	332,569	250,000	0	10,000,000	572,050	700
Stylist can read and write in at least one language (0–1)	0.94	1.00	0.00	1.00	0.23	771
Stylist can read and write in English (0–1)	0.85	1.00	0.00	1.00	0.35	770
Total number of products sold	0.47	0.00	0.00	6.00	0.94	771

Ashraf et al 2014: Treatments

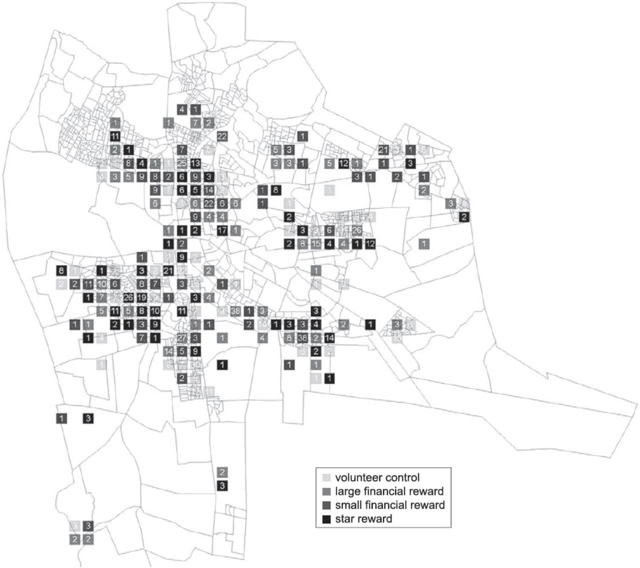
- 4 treatment groups

1. *Control* group recruited as volunteers. No incentives
2. *Large financial-margin* treatment receive 450 ZMK for each pack sold, a 90% margin over retail
3. *Small financial-margin* treatment get 50 ZMK for each pack sold, a 10% margin.
4. *Non-financial reward (star)* treatment. Get a thermometer display and each sale is rewarded with a star stamped on the thermometer. Stylists told if they sell >216 packs they will get a certificate at a ceremony

- Rewards paid only on restocks, not the original 12 packs.

Ashraf et al 2014: Randomization

- Treatment is at the neighborhood level. All salons in each neighborhood in the same treatment arm
- Census of hair salons with GPS coordinates and characteristics
- Make a grid: 650m x 650m cells with 75m buffers on all sides.
- grid cells are the unit of randomization
- salons in the buffer zones not invited to join
- Final sample: 205 cells with 1222 hair salons in them
- Balance randomization on variables likely to affect sales (type, size, location)
  - do 1,000 random draws
  - for each draw calculate the t-stats on all the differences in the attributes.
  - the maximum t-stat is this draw's score
  - choose the draw with the lowest score: "minmax t-stat method" (see Bruhn & McKenzie 2009 for discussion of this and other balancing methods)

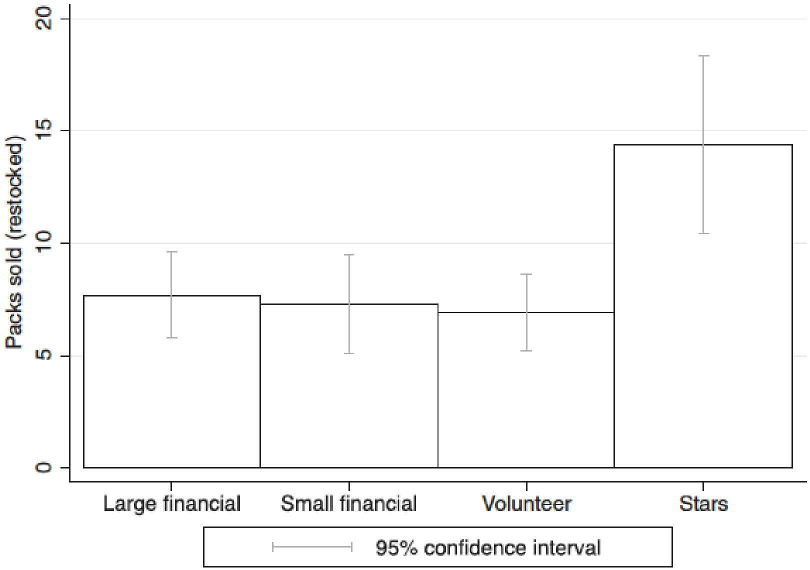

volunteer control
large financial reward
small financial reward
star reward

Ashraf et al 2014: Estimation

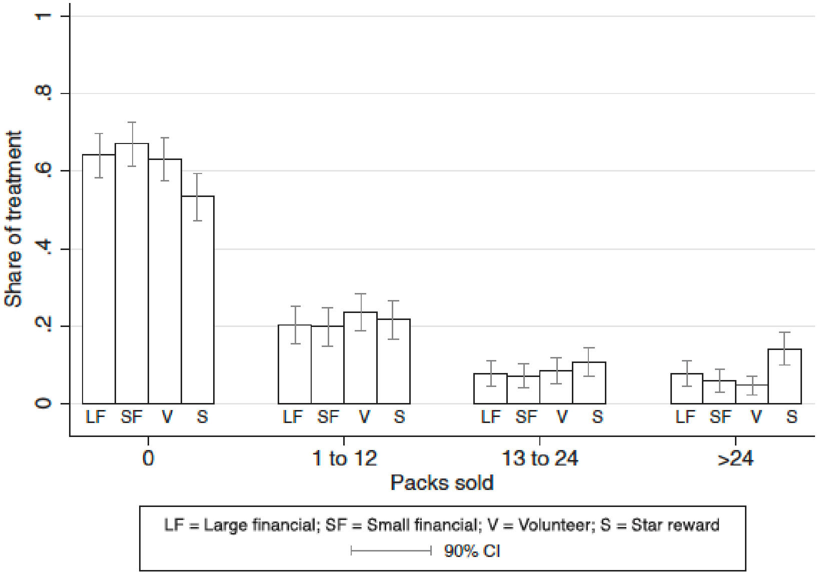
- To evaluate impact on sales, estimate

$$y_{ic} = \alpha + \sum_{j=1}^{3} \delta_{0j} \text{treat}_c^j + \mathbf{X}_i \eta_i + u_{ic}$$

- Not everyone who was invited got the letter, and not everyone who got the letter came to the training. To look for selection, estimate same equation with participation on lhs. No effects of the treatments.
- The buffer zones are there to deal with spillovers. But
  1. People move around. Stylists only kept their treatment status if moved within a neighborhood, or to another neighborhood with the same treatment status
  2. People talk. Gathered data on relationships with other stylists. Median only has 1. during first 4 months, 60-80% of stylists make one new connection to a stylist, but none after 4 months.



Packs sold (restocked)
0
5
10
15
20
Large financial
Small financial
Volunteer
Stars
95% confidence interval


Share of treatment
0
.2
.4
.6
.8
1
LF
SF
V
S
0
1 to 12
13 to 24
>24
Packs sold
LF = Large financial; SF = Small financial; V = Volunteer; S = Star reward
90% CI

Average treatment effects on sales.

Dependent variable	Packs sold (restocked)		Packs sold (calculated)	=1 if sells at least one pack	=1 if sells 12 or more packs	=1 if sells 24 or more packs
Mean in control group	*6.93*	*6.96*	13.30	*.368*	*.341*	*.128*
	(1)	(2)	(3)	(4)	(5)	(6)
Large financial reward	0.769	1.187	−0.653	−0.003	0.01	0.031
	[1.618]	[1.759]	[1.848]	[0.067]	[0.063]	[0.042]
Small financial reward	0.378	0.826	−0.135	−0.025	−0.018	0.011
	[1.528]	[1.530]	[1.603]	[0.066]	[0.060]	[0.040]
Star reward	7.482***	8.022***	6.283**	0.114*	0.128*	0.101**
	[2.448]	[2.639]	[2.451]	[0.066]	[0.065]	[0.049]
Salon is a barbershop (0–1)		2.751*	3.193**	0.101**	0.098**	0.031
		[1.600]	[1.467]	[0.039]	[0.040]	[0.031]
Salon is near a bar (0–1)		0.544	0.772	−0.048	−0.031	−0.005
		[2.108]	[1.971]	[0.074]	[0.063]	[0.050]
Salon size (log number of employees)		2.379	1.195	−0.082	−0.069	0.037
		[2.950]	[2.917]	[0.063]	[0.063]	[0.049]
Number of trained salons in the same area		0.02	0.069	0.001	0.000	−0.001
		[0.087]	[0.094]	[0.003]	[0.003]	[0.002]
Stylist sells other products in salon (0–1)		5.110***	2.758*	0.084**	0.085**	0.073**
		[1.701]	[1.542]	[0.039]	[0.041]	[0.035]
Stylist in the bottom quartile of asset distribution (0–1)		1.303	0.448	0.006	−0.001	0.018
		[1.743]	[1.639]	[0.051]	[0.052]	[0.036]
Stylist's socio-economic status is low (0–1)		−1.048	−0.962	−0.008	−0.012	−0.042
		[1.411]	[1.212]	[0.046]	[0.047]	[0.029]
Stylist's dictator-game donation above the median (0–1)		3.353***	2.210**	0.152***	0.143***	0.016
		[1.125]	[1.115]	[0.031]	[0.032]	[0.028]
Stylist's reported work motivation is intrinsic (0–1)		−0.541	−0.458	−0.035	−0.034	−0.03
		[1.298]	[1.166]	[0.036]	[0.035]	[0.031]
Stylist's religion is Catholic (0–1)		−3.567**	−3.163***	−0.085**	−0.074*	−0.035
		[1.370]	[1.185]	[0.041]	[0.040]	[0.033]
Constant	6.929***	0.175	8.176**	0.355***	0.313***	0.086
	[1.123]	[4.002]	[3.957]	[0.098]	[0.093]	[0.073]
R-squared	0.0285	0.0631	0.0526	0.0499	0.0482	0.0267
Observations	771	765	743	765	765	765
Large financial = small financial (p-value)	0.803	0.823	0.747	0.694	0.578	0.583
Large financial = stars (p-value)	0.00719	0.0108	0.00502	0.0517	0.0501	0.145
Small financial = stars (p-value)	0.00365	0.00548	0.00725	0.018	0.0119	0.0502

Ashraf et al 2014: Effort

Average treatment effects on effort measures.

Dependent variable	Total displays	Logbook filled	Promoter attention	Promoter interest	Average standardized effect
Mean in control group	2.285	0.479	2.498	2.111	
Standard deviation in control group	*1.19*	*0.28*	*0.41*	*0.42*	
	(1)	(2)	(3)	(4)	(5)
Large financial reward	0.071	0.028	−0.004	0.024	0.029
	[0.102]	[0.029]	[0.034]	[0.035]	[0.033]
Small financial reward	−0.101*	0.007***	0.021	0.049	−0.006
	[0.126]	[0.028]	[0.044]	[0.049]	[0.050]
Star reward	0.264**	0.067**	−0.036	0.094**	0.097**
	[0.127]	[0.029]	[0.034]	[0.044]	[0.042]
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.099	0.0232	0.0317	0.0603	
Observations	722	722	721	694	726
Large financial = small financial (p-value)	0.151	0.5	0.529	0.603	0.49
Large financial = stars (p-value)	0.108	0.189	0.32	0.128	0.108
Small financial = stars (p-value)	0.0118	0.0582	0.167	0.437	0.07

Ashraf et al 2014: Motivation

- Expect different effects according to how pro-socially motivated people are.
  - Play dictator game: At signup agents told that on-top of 40,000 ZMK show-up fee, they'll get 12,500 ZMK to donate to a well known HIV/AIDS charity or keep. Amount donated measures prosociality.
- We also expect different effects for high/low socio-economic status (utility is concave).
  - measure with education level and English speaking ability (19% classified as low status)
- Allow treatment effects to be heterogeneous by motivation.

$$y_{ic} = \alpha + \mathbf{X}_i\beta + \gamma\sigma_i + \sum_{j=1}^{3} \delta_{0j} \text{treat}_c^j (1 - \sigma_i) + \sum_{j=1}^{3} \delta_{1j} \text{treat}_c^j \sigma_i + u_{ic}$$

where $\sigma_i = 1$ if the agent's donation in the dictator game is above the median; or $\sigma_i = 1$ if low socio-economic status

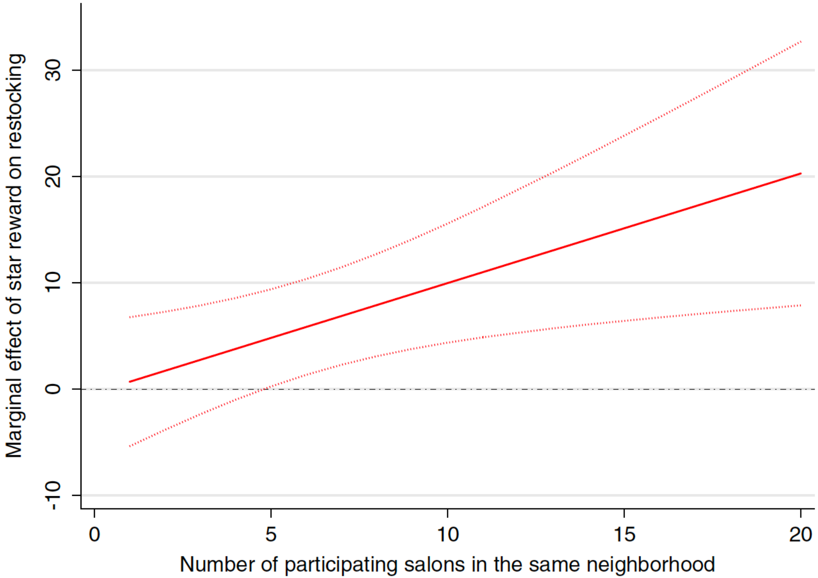
Heterogeneous treatment effects, by stylist motivation.

Dependent variable is packs sold (restocked)		
Motivation variable	Stylist's dictator game donation is above the median	Stylist's socio-economic status is low
Mean in control group = 6.96	(1)	(2)
Motivation variable	0.778*	−3.984**
	[1.518]	[1.605]
Effect of large financial when motivation variable = 0	−2.215	0.806
	[1.633]	[2.095]
Effect of small financial when motivation variable = 0	1.141	−0.041
	[1.933]	[1.705]
Effect of stars when motivation variable = 0	4.537	7.462**
	[2.859]	[3.021]
Effect of large financial when motivation variable = 1	3.462	3.542**
	[2.476]	[1.780]
Effect of small financial when motivation variable = 1	0.352	4.741*
	[1.889]	[2.858]
Effect of stars when motivation variable = 1	10.480***	11.110***
	[3.411]	[3.126]
Controls	Yes	Yes
R-squared	0.07	0.064
Observations	765	765
Large financial: p-value of the null that difference by motivation variable = 0	0.029	0.326
Small financial: p-value of the null that difference by motivation variable = 0	0.731	0.146
Stars: p-value of the null that difference by motivation variable = 0	0.091	0.350

Ashraf et al 2014: Signaling

- The signaling value of the stars might be higher when there are more peers in the neighborhood to see them
- Experiment is balanced on number of salons, so exploit random variation in the number of peers.

$$y_{ic} = \alpha + \mathbf{X}_i \beta + \gamma N_c + \sum_{j=1}^{3} \delta_{0j} \text{treat}_c^j + \sum_{j=1}^{3} \delta_{1j} \text{treat}_c^j \times N_c + u_{ic}$$


Marginal effect of star reward on restocking
-10
0
10
20
30
0
5
10
15
20
Number of participating salons in the same neighborhood

Outline

Theory

Financial Incentives

Non-financial Incentives

Recruitment & Selection