# Week 8: Social Networks and Informal Institutions

## Introduction

- Standard economic view: we are all atomistic agents, and we need external enforcement to mediate any exchange between us

- When you buy something in the supermarket using your credit card, the law protects both parties against opportunism

- However we are really not atomistic and a lot of exchange takes place without external enforcement

- Social networks are important in obtaining jobs, and influence our consumption, education, fertility decisions

- Sociologists knew this all along, we have realized this more recently

- The goal is still to understand the allocation of resources and the basic assumption is still rational choice

- See Matthew Jackson (2007) for a nice review ("The Study of Social Networks in Economics")

- A social network is a network of nodes (individuals) connected by social links

- This enables them to interact, exchange without external enforcement

- For example, they may have better information, or impose sanctions not available to outsiders

- Solve collective action and coordination problems & alleviate market failures

- What are the economic foundations of the links between the nodes? Possible candidates
  - Repeated interaction
  - Self-enforcing social norms (e.g., help your neighbour) with non-conformists punished by sanctions
  - Altruism (e.g., family, tribe)
  - Better information
  - Richer strategy sets (e.g., impose sanctions not available to outsiders).
- Close-knit and stable social structure of rural areas allow social networks to solve collective action problems, support informal institutions that (partly) compensates for lack of formal institutions (e.g., legal system)

- Can do good (ROSCA, group lending) as well as bad things - the mafia, street gangs, or repressive social structures (e.g., women in traditional societies, discrimination)

- Important implication for programme evaluation in a network based economy
  - Suppose rural education programme raises wages among its randomly selected participants
  - These individuals could improve the quality of the network
  - Alternatively, they could leave, making remaining members worse off
  - Simply comparing the treatment group with another rnadomly selected control group will lead to bias
- Just as a physical asset such as a building can be left unused or used for good or bad activities, the same with these networks

- Social networks (as well as the things that they do) are sometimes (loosely) lumped under the term social capital (Loury, Coleman)

- Like physical, financial or human capital, social capital may facilitates productive activity.
  - Physical or financial capital are embodied in material objects and therefore wholly tangible and alienable
  - Human capital is less tangible, being embodied in the skills and knowledge acquired by an individual and also less easily alienable.
  - Social capital is even less tangible : it is embodied in social networks, i.e., the relations among individuals.

- Capital results from investment, and social capital requires investment on the part of agents to survive - investing in acquiring information, participation in community activities and at the very least, living within the community.

- In this lecture
  - Study a formal model of why individuals have an incentive to conform to the norms of a social network & how this improves efficiency (Greif AER93)
  - Study a formal model of how presence of social capital may improve efficiency in partial eqm, but may act as a barrier to development (Banerjee-Newman RES98)
  - Study empirical studies trying to see if social capital affects economic outcomes (Knack-Keefer, QJE97 and Munshi QJE 2003)

## Theory

*Role of Social Networks in Reducing Agency Costs Greif (AER 1993)*

- Organization of trade by 11th century Maghribi traders operating mainly around the western basin of the Mediterranean Sea.

- In pre-Modern trade, the primitive nature of the transport and communication technology caused a lot of uncertainty
  - Whether the ship will reach in time, if at all
  - Whether the goods will be in good shape or not

  - Prices in various places

- It was efficient for traders to employ overseas agents rather than travel with the merchandise from the point of saving time and money

- But huge agency costs in these relationships in the absence of supporting enforcement institutions.

- Greif studied documents like contracts, letters and accounts to find out how Maghribi traders overcame this problem.

- Basically, they formed a coalition among themselves, and used a *multilateral reputation mechanism* whereby an agent refrained from cheating with

a trader because then that would lead all other traders to refuse to hire him.

- In the absence of an effective formal contracting mechanism the fact that there is only a handful of documents containing allegations of misconduct shows that the informal enforcement mechanism worked well.

- The question here is: how could they induce people to follow this norm? What prevented someone from not boycotting an apparently tainted agent?

- Earlier work by Akerlof (QJE 1976) argued a norm such as this is self-enforcing if not only those who do not follow are punished, but also those who refuse to punish are punished and so on...

- Difficult to enforce such norms since its not directly in the self-interest of people to participate (only fear of punishment)

- Greif showed that under this particular strategy its in the self-interest of people to follow it.

Standard Efficiency Wage Model with Bilateral Punishment Strategies (BPS)

- Everyone is risk-neutral and infinitely-lived and has a discount factor $\delta$, where $0 < \delta < 1$.
- If an agent is caught cheating, fired by current employer
- Have to go to the pool of unemployed
- As no one looks at an agent's past record - so can get reemployed next period with some probability $p$ (same as anyone who is unemployed)

- Let $B$ be the one period payoff from cheating and $b$ be the one period payoff from not cheating ($B > b$)

  1. If you are unemployed you earn $\overline{u}$ for sure for one period

- $b$ is endogenous - this is like the "efficiency" wage to be paid to the agent

- Let $V$ be the lifetime expected utility of an employed agent (who does not cheat)

- Let $U$ be the lifetime expected utility of an unemployed agent (and who is expected not to cheat if employed)

- If you are employed then with probability $q$ you could separate for exogenous reasons

- Then

$$\begin{aligned} V &= b + \delta\{qU + (1-q)\,V\} \\ \text{or,} \qquad V &= \frac{1}{1-\delta(1-q)}b + \frac{\delta q}{1-\delta(1-q)}U \end{aligned}$$

-

$$\begin{aligned} U &= \overline{u} + \delta p V + \delta(1-p)U. \\ \text{or,} \qquad U &= \frac{1}{1-\delta(1-p)}\overline{u} + \frac{\delta p}{1-\delta(1-p)}V \end{aligned}$$

- The incentive-compatibility constraint is

$$V \geq B + \delta U$$

- Since costly to pay $b$ this will hold with equality.

- This enables solving out for $V, U$, and $b$ using the above three equations.

## History-dependent Multilateral Punishment Strategies (MPS)

- Two changes
  - now an agent's history is taken into account
  - if an agent ever cheated anyone, no one touches him
- We will refer to an agent with a good history by $\gamma$ and one with a bad history by $\beta$
- Therefore, a $\beta$ agent faces a probability of reemployment $p = 0$ once fired

- Therefore, for them

$$U' = \frac{\overline{u}}{1-\delta}.$$

- For a $\gamma$ agent, $U$ is, as before

$$U = \overline{u} + \delta p V + \delta(1-p)U.$$

- Notice that $U > U'$

- When an agent cheats, whether he has a good or bad record, his expected payoff is the same, i.e.,

$$B + \delta U'.$$

- Therefore, the incentive-compatibility constraint is

$$V = B + \delta U'$$

- Compare it the incentive-compatibility constraint in the previous case:

$$V = B + \delta U.$$

- As $U > U'$, $b$ will have to be lower to keep agents honest as the punishment is much stronger.

- This is an example of networks reducing agency costs

- Key question for Greif: how is this enforced?
- In other words, would not an individual employer have an incentive to deviate from this?
- After all, a $\beta$ and a $\gamma$ agent are equally productive
- He shows that the norm is self-enforcing
- Suppose an individual employed wants to give a $\beta$ agent a "second chance" and offer him $b'$

- The key difference with a $\gamma$ agent is that even if there is an exogenous split (with probability $q$) no one will ever hire him

- Therefore

$$V' = b' + \delta\{qU' + (1-q)\,V\}.$$

- In contrast, for a $\gamma$ agent

$$V = b + \delta\{qU + (1-q)\,V\}$$

- We can immediately see therefore that $V'$ is lower than $V$ as $U'$ is lower than $U$

- Since the incentive-compatibility constraint is the same for both $\beta$ agents and $\gamma$ agents (once blacklisted, how many times you have done it does not matter):

$$V' = B + \delta U'.$$

- We can immediately see that we must have $b' > b$ for these conditions to be satisfied

- But then agents with a bad record are more costly to hire & so its in the self-interest of a principal not hire him

- A key element in this model is exogenous separation

- If $q = 0$ then both $\gamma$ and $\beta$ agents will have the same wage rate

- For $q = 0$, $V = \frac{b}{1-\delta}$ and $V' = \frac{b'}{1-\delta}$

- The incentive-compatibility constraints are

$$\begin{aligned} V &= B + \delta U' \\ V' &= B + \delta U'. \end{aligned}$$

- Now $b = b'$

- Intuition: the reason why $\beta$ agents are costly to hire is because even if they don't shirk, but there is an exogenous separation, they are treated worse by the market than $\gamma$ agents

- If they shirk, both $\beta$ and $\gamma$ agents are treated the same.

- So, their incentive to behave well is less for the same wage.

- This link is broken if $q = 0$.

What did we learn from this model?

- The above model assumes that traders could exchange information among each other
- In close-knit societies, agency costs can be lowered by using local information (similar to microfinance)
- Moreover, these can be self-enforcing - otherwise you would have to spend resources to enforce social norms (e.g., social sanctions)
- Here the model was simple, but you could show that this will lead to more production, more trade, in general higher income

- So social networks can act as a second-best device that will raise income
- In urban anonymous settings these punishments may not work because of poor information flows
- There one would need formal institutions such as courts
- Credit rating based on computerized records bypasses this problem - indeed, the Greif model shows why it is in the interest of banks to use MPS

*Costs of Social Networks: Inefficient Undermigration - Banerjee and Newman (RES 1998)*

- The above argument would seem to suggest that social networks are good for development
- But one can also think of reasons why they may be costly
- (After all they are more prevalent in developing countries which are, by definition, less developed!)
- Networks generate entry barriers: after all if anyone can enter a network, then the informational advantages are unlikely to persist

- Therefore, they prevent competition - which we can expect will lead to loss of output

- This paper provides a nice model that demonstrates the cost of social networks

- Two sector economy - modern ($M$) and traditional ($T$)

- An economic agent lives for one period.

- Born with an endowment of one unit of labor & some wealth $a$ inherited form his parent.

- Leaves a fraction $\beta$ of his income as bequest to his own offspring.

- Modern sector has a more productive technology than the traditional sector:

  - In the $T$ sector an agent can produce $w$ units of output using his labor endowment

  - In the $M$ sector he can produce $\lambda w$ where $\lambda > 1$

- But $T$ has lower transaction costs than $M$ in the form of cheaper enforcement of loan contracts.

- With his initial wealth an agent makes a location choice between these two sectors which does not involve any direct cost.

- Agents are prone to a negative utility shock (say, an illness) which happens with probability $q$ before production takes place.

- If it happens, then agents have the option to spend an amount $m$ (getting medical treatment) or do nothing and suffer the full utility loss of $s$ where $s > m$.

- Thus the preference of agents have the form

$$u = y - ql$$

- $y$ is income and $l = s$ or $m$.

- Naturally, you need to borrow only if $a < qm$ : otherwise, can self-finance

- An agent who does not have enough inherited wealth would want to borrow to get medical treatment.

- If credit markets are perfect the equilibrium of this economy is simple : everyone locates in the modern sector, agents borrow and lend at the gross interest rate $r$.

- In particular, everyone buys medical insurance by paying a premium $qm$

- With probability $q$ they are sick and are paid $m$ by the insurance company.

- Thus the expected utility of an agent with wealth $a$ would be

$$\lambda w + (a - qm)r.$$

More likely to get a loan in $T$ than $M$ because of lower transactions costs

- Credit markets are not perfect - with probability $\pi^i$ a borrower who is born in sector $i$ can run away without repaying in sector $M$ or $T$.

- The traditional sector has stronger social networks and hence credit markets work better than in the modern sector:

$$\pi^T = 0 \text{ and } \pi^M = \pi \in (0, 1).$$

- Only reason an agent needs to borrow in this model is to buy insurance: so needs $qm$

- So the incentive-compatibility constraint (ICC) is

$$y - (qm - a)r \geq \pi^i y.$$

- Since the his initial wealth $a$ must satisfy

$$a \geq qm - \frac{1 - \pi^i}{r} y$$

- The thresholds are:

$$\begin{aligned} a^T(r) &\equiv qm - \frac{1}{r} w \\ a^M(r) &\equiv qm - (1 - \pi)\, \lambda \frac{1}{r} w \end{aligned}$$

- Notice that both $a^T(r)$ and $a^M(r)$ are increasing in $r$.

- We assume $(1-\pi)\lambda < 1$: transactions costs are lower in $T$, easier to get loan: $a^T(r) < a^M(r)$

- Interpretation: the productivity advantage of the modern sector is not big enough to outweigh the transaction-cost disadvantage.

- Otherwise, everyone moves to $M$ and that is the end of story.

## The Very Rich and the Very Poor will Always Migrate

- Let $G^M(a)$ and $G^T(a)$ be the distribution function of inherited wealth in the modern and the traditional sector respectively at birth of the current generation.

- $G^i(a)$ means number of people in sector $i$ $(i = M, T)$ divided by total population (both $M$ & $T$ sectors) who have wealth $\leq a$

- Therefore, for any given $a$, $G^M(a) + G^T(a)$ gives the fraction of people in both sectors taken together who have wealth $\leq a$

- For a given interest rate $r$, agents who have wealth $a \geq a^M(r)$ (the "rich") can borrow in both sectors and hence they would want to locate in the modern sector as they are more productive there.

- Similarly, agents with wealth $a \leq a^T(r)$ (the "poor") cannot borrow to buy insurance in any sector and hence they too would locate in the modern sector where they are more productive.

## High Interest Rates Stimulate More Migration by the "Middle"

- Agents with wealth $a \in [a^T(r), a^M(r)]$ (the "middle-class") will migrate only if the loss in terms of not being able to borrow to buy insurance in the urban sector is offset by the gains in terms of higher productivity:

$$w - qmr - ar \leq \lambda w - qs - ar$$

- That is,

$$r \geq \frac{s}{m} - \frac{\lambda - 1}{qm} w \equiv \widehat{r}$$

- If the interest rate is low, then you can borrow in the village, and its not very expensive so you want to stay.

- If the interest rate is high, then you can borrow in the village, but its expensive and you might as well go to the city, where you cannot borrow at the present interest rate but can earn the high wage

## Credit market equilibrium

- Look at gross (and not *net* ) demand and supply
- Every agent puts his money in a bank first and then depending on how much they put in (i.e., so long as $a \geq a^i(r)$) they borrow for their insurance premium
- The supply of loans is simply aggregate inherited wealth, $\overline{a}$ so long as the interest rate is above the minimum possible level, namely, 1.
- If $r > \widehat{r}$ everyone migrates to the modern-sector, only those with wealth $a \geq a^M(r)$ demand loans

- So, the demand for loans is

$$D(r) = qm[1 - G^M(a^M(r)) - G^T(a^M(r))] \qquad r > \widehat{r}$$

- If $r < \widehat{r}$ then people with wealth $a^T(r) \leq a \leq a^M(r)$ enter the market - these are the agents who remain in the traditional sector.

- So, the demand for loans is

$$D(r) = qm[1 - G^M(a^M(r)) - G^T(a^T(r))], \qquad r < \widehat{r}$$

- Notice there is a discrete increase in demand since the rural middle class now demands loans

- For $r = \widehat{r}$, $D(r)$ is takes any value within the interval defined by the above two values

- Naturally $D(r)$ is decreasing in $r$ as $a^M(r)$ & $a^T(r)$ are decreasing in $r$

- Highest possible interest rate : $\overline{r}qm = qs$ or $\overline{r} = \frac{s}{m}$

- If $\pi = 0$ then credit markets are perfect in both $M$ and $T$ sectors, and for any given interest rate the demand for credit is given by

$$\begin{aligned} D(r) &= qm \ , r < \frac{s}{m} \\ &= [0, qm], r = \frac{s}{m} \end{aligned}$$

- The supply curve is as before

- Assume $qm > \overline{a}$ and so there is excess demand & the equilibrium interest rate is $\frac{s}{m}$.

- Note that national income in this economy takes its highest possible value $:\overline{Y} = \lambda w$

- Also, total surplus needs to be taken into account: everyone is insured (although they pay a high interest rate, that is income for the lenders and so cancels out)

- Under the second best, when $r^* \geq \widehat{r}$, everyone migrates to the modern sector and national income $Y = \lambda w$ is as high as $\overline{Y}$ but because some guys are uninsured total surplus is lower

- When $r^* \leq \widehat{r}$, then agents born in the traditional sector and with $a \in [a^T(r^*), a^M(r^*)]$ stay in the traditional sector so that national income is :

$$Y^* = \{1 - p(r^*)\}\lambda w + p(r^*)w$$

where $p(r^*) \equiv (G^T(a^M(r^*)) - G^T(a^T(r^*)))$

- $Y^*$ is lower than before

- More people get insurance though.

- Is there a policy that could raise total surplus?

- Case 1: If $qm\{1 - G^M(a^M(\widehat{r})) - G^T(a^M(\widehat{r}))\} \geq \overline{a}$ then $r^* > \widehat{r}$.
  - Everyone migrates
  - The level of migration is efficient.

- Case 2: If $D(1) > \overline{a}$and $qm\{1 - G^M(a^M(\widehat{r})) - G^T(a^M(\widehat{r}))\} < \overline{a}$ then $1 < r^* \leq \widehat{r}$.

- In this case output can be raised by policies that promote more migration

- Demand for loans when everyone migrates to the modern sector is less than supply at the old equilibrium interest rate

- Given the total amount of supply of capital, $\overline{a}$ is fixed, the new equilibrium interest rate falls.

- $a^M(r)$ will fall

- So the new migrants could actually be better off - higher wages, plus get a loan in $M$ sector

- Net surplus goes up.

- It is not a Pareto-improvement as net lenders will be worse off (which include both the rich and the poor) while net borrowers would be better off.

- Notice that if the economy is very wealthy, i.e., $\overline{a} \geq qm$ , then $r^* = 1 \leq \widehat{r}$ so that everyone migrates.

- Similarly, if the economy is too poor, i.e., $r^* = \frac{s}{m} > \widehat{r}$ so that everyone migrates.

- It is medium income economies that are likely to have inefficient level of migration.

- Highlights the dual character of social capital
  - in this equilibrium those agents who do not migrate are better off than they would be in the modern sector because they get loans which they would not get there
  - at the same time if they were forcibly moved to the modern sector, national product will increase.
  - But the interest rate would have to fall for the funds released by forced migration to be absorbed by urban borrowers and so total interest income would fall.
- Thus social capital in the traditional sector creates a loss in net surplus by pushing the interest rate to be too high compared to the second-best level (although both these rates will be lower than the first-best level)

- It is helping those who stay back, and that is why they stay back,

- But if they were forced to leave then the fall in the equilibrium interest rate could actually make them better off.

## Comments and Criticisms

- If capital was not mobile, then this argument breaks down - forced migration would leave the modern-sector interest rate unchanged and those migrants would be worse off and net surplus will fall.

- The model does not allow for wage rates to adjust in response to migration.

- Similarly, with migration the strength of social networks that allows rural areas to have lower transaction costs may go down (see Kranton AER 96)

- The former would tend to reduce, and the latter increase the level of migration.

- Allowing for remittances will remove the stark trade-off between higher productivity in the cities and lower transaction costs in villages.

- Allowing saving to respond to interest rate would again weaken the inefficiency result..

## Empirical Work

- Putnam (1993): strong correlation between measures of civic engagement (clubs, sport associations etc) & the local government is more effective at providing public goods

- Knack and Keefer (QJE 1997) do cross country analysis with data from 29 market economies

- Run a usual cross country growth regression, but add the following two "social capital" measures

  - Level of civic cooperation (averaging answers to questions such as it is justified to cheat on taxes etc)

  - Trust: Trustworthiness of others - do you think most people can be trusted

- Control for usual things plus measures of institutions such as trade openness, financial development, property rights

- Obvious problem of endogeneity

- Instruments

  - ethnic homogeneity: % of population belonging to the largest ethnolinguistic group (more homogeneous population - more trust)

  - fraction of law students among all postsecondary students (more lawyers - less trust, high crime)

- Not good instruments since ethnic homogeneity could directly affect government policy, and growth

- High growth economies can afford more lawyers, could be picking up quality of formal institutions which directly affect growth

- Narayan and Pritchett (World Bank, 1999) study household level data from rural Tanzania

- Household income is regressed on family specific controls, village specific controls, and village-level measures of trust

- The latter is based on measures of membership to various groups, characteristics of these groups, and general trust-related attitudes

- Same problem of endogeneity

- Instruments: individuals' trust in fellow tribesmen, government officials, strangers

- In a village where you trust others means there are a lot of trustworthy people there, who are also likely to be hardworking

- Also, villages where public goods are well provided, you trust government officials

- In a village where people trust strangers a lot means they have faith in the formal institutions or that they are very trusting people

- Munshi (QJE 2003): Do networks help people find a job?
- Nice identification strategy of effect of networks in the labour market
- Test whether networks improve labour market outcomes for its members
- Mexican migrants to the US
- Small number of Mexican communities are surveyed every year (24 communities in South-Western Mexico)
- Mexican Migration Project

- Each community is surveyed once only, and retrospective information on migration patterns, labour market outcomes

- Collected for 200 randomly selected HHs, 15 years worth recall data

- People from the same community tend to go to the same places

- Find that the same individual is more likely to find a job the larger the network at destination, due to referrals/contacts

- Referrals from incumbent migrants are more valuable.

## Innovations of the paper

1. Does not exploit inter-community variation (all the above studies do)
    - Then as with all cross-sectional comparison, you could be picking up other inter-community differences (not related to networks)
    - The network at destination is drawn from the same origin-community
    - Exploit variation within the community over time
2. Controls for individual fixed effects
    - These migrants are recurrent - individuals move back & forth

- Otherwise, effect of networks will affect the composition of pool of migrants

3. Finally, network size in US may pick up local labour demand effect
   - Need supply side variation
   - Instrument: rainfall shocks in community of origin.
   - Assumption

- – ∗ rainfall in Mexico determines the scale of migration (irrigation is rare)
  ∗ rainfall in Mexico does not affect labour market conditions in the US

    - does not affect the composition of pool of migrants - just the size

- Bad rainfall causes more people to migrate

- This can have two effects
  - A supply side shock in the US labour market - more migrants mean less chance of getting a job
  - More migrants mean larger size of network & this helps newcomers to

find a job

- Munshi finds that
  - more rainfall in distant-past (3-6 years ago) is negatively correlated with employment in the US at time $t$
  - more rainfall in recent past $t$ to $t-2$ has little effect on employment in the US at time $t$
- Why is an individual located in the US less likely to be employed if ranfall in his Mexican origin community was good more than 3 years ago?
- So the second effect more likely to be in operation

- Indeed, (good) rainfall in Mexico is strongly negatively correlated with (immediate) migration to the US

- Munshi controls for individual fixed effects and year effects, and runs the probability of being employed on

  - size of network at destination (varies over time) defined as % of sampled people located at destination

  - put individual fixed effects (recurrent migration allows this)

  - but size of network could pick up local (US) labour market demand conditions

- Finds

- Lower rainfall 3-6 years ago induced more migration at that time
- Higher average size pool of established migrants
- They help a newcomer find a job
- Also, channel them towards higher paying non-agri jobs (as opposed to agri jobs)

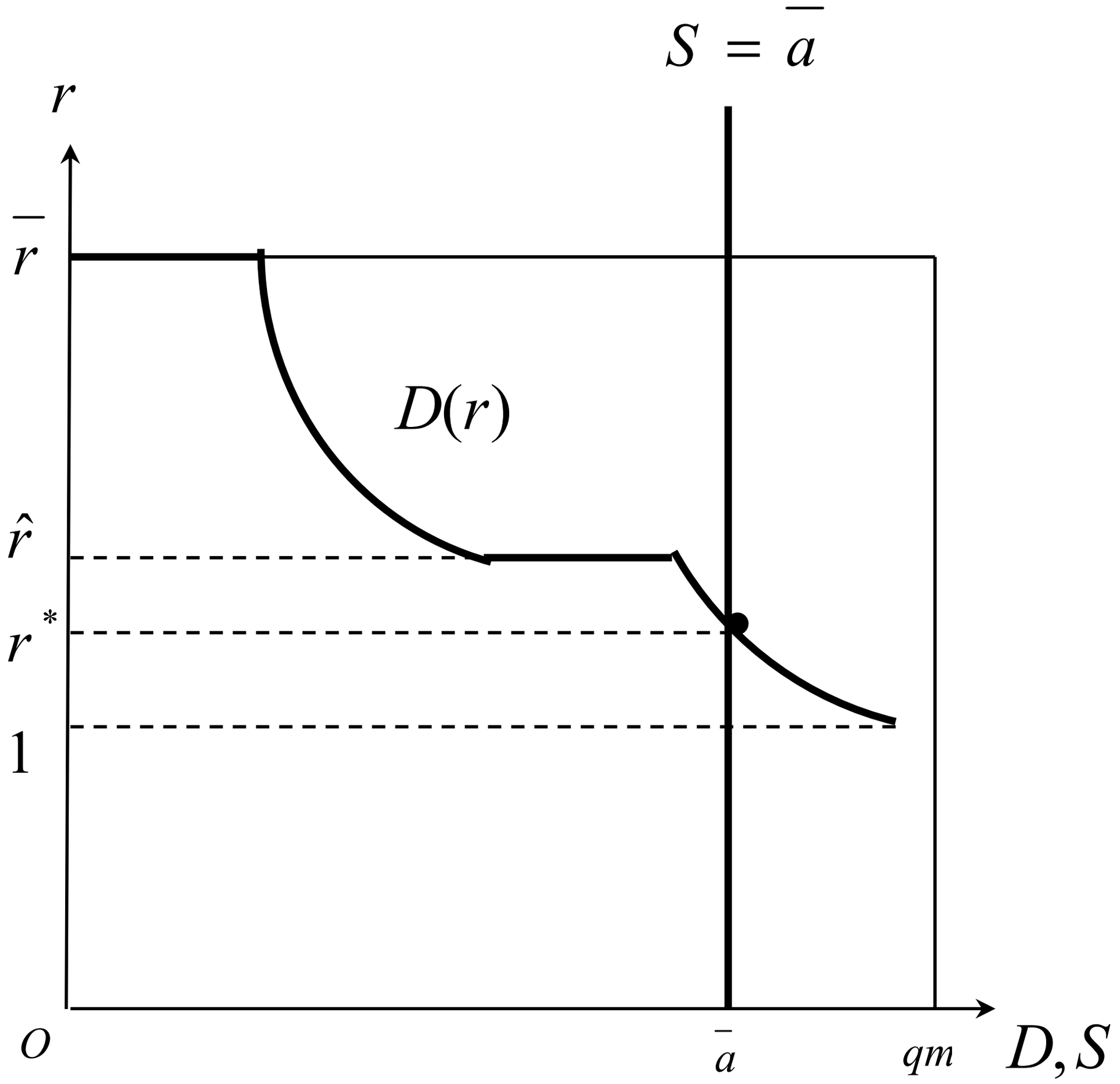
- How big are the effects?
  - Munshi calculates that if networks were shut down, unemployment among migrants will go up from 4% to 10%
  - Share of non-agri jobs will go down from 51% to 32%

- Questions: IV effect "too large"..maybe rainfall affects low ability individuals more than high ability, and low ability migrants are more sensitive to network effects.

- That is, there could be interaction effects between networks and individual ability that are not taken care of by fixed effects

- Indeed, dropping "disadvantaged" individuals from the sample reduces the estimated effect

- Suggests he does not have a perfect measure for ability


$S = \bar{a}$
$r$
$\bar{r}$
$D(r)$
$\hat{r}$
$r^*$
1
$O$
$\bar{a}$
$qm$
$D, S$

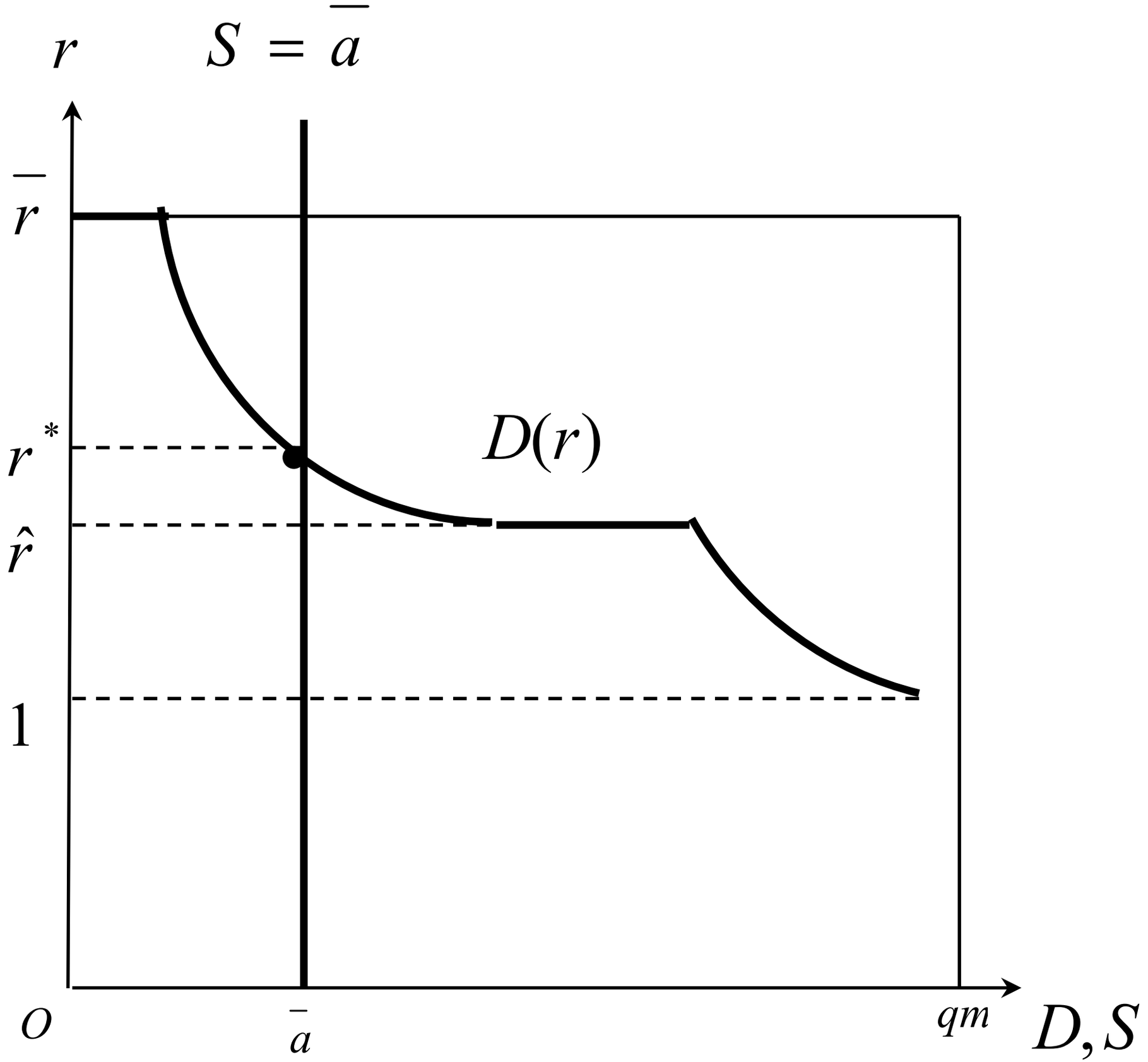

r
S = a
r
r*
r̂
1
D(r)
O
a
qm
D, S

TABLE IV
REDUCED-FORM REGRESSIONS: FINE PARTITION OF RAINFALL LAGS

| Dependent variable: | Employment at the destination | Employment at the origin |
|---|---|---|
| | (1) | (2) |
| rain ($t$) | −0.003 | **0.027** |
| | (0.013) | (0.009) |
| rain ($t - 1$) | −0.007 | **0.027** |
| | (0.015) | (0.009) |
| rain ($t - 2$) | −0.016 | **0.035** |
| | (0.014) | (0.009) |
| rain ($t - 3$) | −0.027 | **0.024** |
| | (0.016) | (0.009) |
| rain ($t - 4$) | **−0.033** | 0.008 |
| | (0.014) | (0.008) |
| rain ($t - 5$) | **−0.032** | 0.008 |
| | (0.013) | (0.008) |
| rain ($t - 6$) | **−0.032** | 0.009 |
| | (0.013) | (0.010) |
| Individual fixed effects | Yes | Yes |
| Year dummies | Yes | Yes |
| $R^2$ | 0.705 | 0.812 |
| Box-Pearson $Q$ statistic | 0.042 | 2.813 |
| Number of observations | 4,546 | 41,120 |

Standard errors are in parentheses.
Standard errors are robust to heteroskedasticity and clustered residuals within each community-year.
$Q \sim X_1^2$ under $H_0$: no serial correlation.
The critical value above which the null is rejected at the 5 percent level is 3.84.
Employment is a binary variable that measures the individual's labor market outcome in a given year. The individual is employed if he worked for more than one month in that year.
The individual is located at the destination in a given year if he spent more than one month in the United States.
Lagged rainfall at the origin as regressors in column (1) and column (2).
Rainfall coefficients in boldface are significant at the 5 percent level.
Column (1): employment at the destination as the dependent variable.
Column (2): employment at the origin as the dependent variable.

estimated network effects actually increase when the women are included in the sample, so the results that I report are most likely conservative estimates of the network effects.

### *V.A. Reduced-Form Regressions: Fine Partition of Rainfall Lags*

We begin in Table IV with the reduced-form specification of the model, regressing employment on lagged annual rainfall. Turning to column (1), the first empirical result of this section is that employment at the destination is negatively correlated with

TABLE VI
OLS AND INSTRUMENTAL VARIABLE REGRESSIONS

| | Employment at the destination | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | IV | | | | | | | | | |
| | | Basic specifications | | | | Robustness to individual characteristics | | | Robustness to sample lengths | | |
| Dependent variable: | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| New migrants | −0.032 | 0.397 | 0.522 | 0.093 | 0.626 | 0.623 | 0.394 | 0.424 | 0.511 | 0.377 | 0.251 |
| | (0.070) | (0.315) | (0.376) | (0.537) | (0.501) | (0.353) | (0.306) | (0.326) | (0.321) | (0.400) | (0.356) |
| Established migrants | 0.670 | 1.554 | 1.474 | 2.073 | 1.745 | 2.021 | 1.321 | 1.565 | 1.699 | 1.304 | 1.058 |
| | (0.154) | (0.551) | (0.545) | (1.069) | (0.661) | (0.594) | (0.534) | (0.656) | (0.526) | (0.578) | (0.491) |
| Individual fixed effects | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.707 | — | — | — | — | — | — | — | — | — | — |
| $Q$ statistic | 0.042 | 0.041 | 0.041 | 0.036 | 0.660 | 0.110 | 0.0005 | 0.015 | 0.049 | 0.022 | 0.001 |
| Number of observations | 4546 | 4546 | 4546 | 1732 | 4546 | 4710 | 3371 | 4067 | 5214 | 3894 | 3614 |

Standard errors are in parentheses. Standard errors are robust to heteroskedasticity and clustered residuals within each community-year.
$Q \sim X^2_1$ under $H_0$: no serial correlation. The critical value above which the null is rejected at the 5 percent level is 3.84.
Employment was defined in Table IV. New migrants, Established migrants were defined in Table V.
Recent-past rainfall and Distant-past rainfall are used as instruments for New migrants and Established migrants.
Column (1): OLS employment regression with individual fixed effects.
Column (2): IV employment regression with individual fixed effects.
Column (3): recent-past rainfall (new migrants) defined as four lags, distant-past rainfall (established migrants) preceding three lags.
Column (4): restrict attention to person-years in which the migrant arrived at the destination in the current year or the previous year.
Column (5): IV employment regression with community dummies.
Column (6): include both men and women in the sample (the sample is restricted to male migrants in all other regressions).
Column (7): restrict sample to men less than 45 years only.
Column (8): restrict sample to individuals with less than ten years of education.
Column (9): extended twenty-year sample period in each community.
Column (10): discard survey year and previous year from the sample.
Column (11): discard survey year and two previous years from the sample.

# Do Television and Radio Destroy Social Capital?

## Evidence from Indonesian Villages

Ben Olken
Harvard University

January 2008

# Introduction

- Substantial interest in economics in causes and effects of social capital
- Putnam (1993): "Making Democracy Work"
  - Social capital is a critical determinant of good governance
  - Measured by showing correlations between participation in social groups and government outcomes in Italy
- Putnam (1995, 2000): "Bowling Alone"
  - Social capital in US has been declining
  - Television negatively associated with social participation
- But relatively little causal evidence

# Why might TV and social capital be related?

- Putnam's hypotheses on why social capital and media exposure might be related
  - Mechanical effect through time budget , although:
    - There are other types of leisure, labor
    - Some aspects of social capital may not require time (e.g., trust)
  - Content
  - Psychological effects
- To uncover causal impact of media, need exogenous variation
  - Omitted variables, e.g., poverty

# This paper

- Examines the impact of television (and radio) on social capital in Indonesian villages
- Main source of identification: plausibly exogenous variation in signal strength associated with the mountainous terrain of East / Central Java

# Setting

- Indonesian villages have extremely dense social networks
  - Typical Javanese village of 2,600 adults has 179 groups of various types
  - Types of groups: Neighborhood associations, religious study groups, ROSCAs, health and women's groups, volunteer work
- Television and radio
  - 80 percent of rural households watch TV per week in 2003
  - 11 national TV stations, showing mix of news, soap operas, movies, etc
  - Broadcasting centered around major cities
  - Will not separately identify TV and radio as he doesn't have independent data on radio, and they are likely collinear in any case

# Data

- Central / East Java survey (2003-2004):
  - Conducted in over 600 villages building road projects
  - Detailed household and key informant data on TV reception, TV/radio use, participation in social groups, trust
  - Governance data associated with road project – meetings, corruption
- National data
  - Which TV channels can be received in village (2006 Podes)
  - Key informant survey with data on social organizations (1990 and 2003 Podes)
  - Household survey with data on participation in social organizations (1991 and 2003 Susenas)

# Does better reception translate into increased use?

- Show that in Central / East Java sample, television reception is orthogonal to a large number of village characteristics
- Estimate impact of channels on use at individual level with data from East / Central Java survey:

$$\begin{aligned} MINUTES_{hvsd} &= \alpha_d + NUMCHAN_{sd} \\ &\quad + Y_{hvsd}\gamma + X_{vsd}\delta_1 + \delta_2 ELEVATION_{sd} + \varepsilon_{hvsd} \end{aligned}$$

where:

- $MINUTES_{hvsd}$ is number of minutes respondent spends watching TV or listening to radio
- $Y_{hvsd}$ are respondent covariates (gender, predicted per-cap expenditure, has electricity)
- all specifications include district FE $\alpha_d$
- standard errors clustered by subdistrict

# Does better reception translate into increased use?

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | Individual-level data (Java survey) | | |
| | Total minutes per day | TV minutes per day | Radio minutes per day | Own TV | Own Satellite Dish |
| Number of TV channels | 10.871*** | 6.017*** | 4.636** | 0.004 | -0.004** |
| | (2.752) | (1.522) | (1.807) | (0.008) | (0.002) |
| Observations | 4277 | 4314 | 4286 | 4330 | 4308 |
| R-squared | 0.14 | 0.13 | 0.09 | 0.14 | 0.04 |
| Mean dep. Var | 180.36 | 124.58 | 55.99 | 0.70 | 0.02 |

Notes: Each observation is a household. Robust standard errors in parentheses, adjusted for clustering at subdistrict level. The dependent variable for each column is listed in the column heading. All specifications include district fixed effects, the geographic variables and other village characteristics from Table 3, the respondent's gender, predicted per-capita household expenditure, and a dummy for whether the household has electricity.
* significant at 10%; ** significant at 5%; *** significant at 1%

# Participation in social groups

## Results from Java survey

- Estimate using village-level data on total number of groups, as well as direct participation data from household survey

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Village-level data (Java survey) | | Individual-level data (Java survey) | |
| | Log number of groups in village | Log attendance per adult at group meetings in past three months | Log number types of groups participated in during last 3 months | Log number times participated in last 3 months |
| Number of TV channels | -0.059*** | -0.099*** | -0.042** | -0.041 |
| | (0.022) | (0.037) | (0.016) | (0.029) |
| Observations | 592 | 563 | 4067 | 4042 |
| R-squared | 0.64 | 0.49 | 0.30 | 0.22 |
| Mean dep. Var | 4.94 | 1.97 | 1.32 | 2.86 |

Notes: In columns (1) and (2), each observation is a village; in columns (3) and (4), each observation is an individual. Robust standard errors in parentheses, adjusted for clustering at subdistrict level. The dependent variable for each column is listed in the column heading. All specifications include district fixed effects and the geographic variables and other village characteristics from Table 3.

# Summary Statistics for Java sample

| | |
|---|---|
| Average number of TV channels | 5.067 |
| | (2.028) |
| Average number of TV channels | 0 |
| (after removing district FE) | (1.059) |
| | |
| *Share of villages receiving channel:* | |
| TVRI (government run) | 0.616 |
| | (0.341) |
| RCTI (major network) | 0.908 |
| | (0.163) |
| SCTV (major network) | 0.751 |
| | (0.324) |
| Indosiar (major network) | 0.916 |
| | (0.172) |
| Metro TV (news station) | 0.327 |
| | (0.350) |
| ANTV | 0.331 |
| | (0.379) |
| TV 7 | 0.306 |
| | (0.378) |
| Trans TV | 0.391 |
| | (0.401) |
| TPI | 0.520 |
| | (0.415) |

# Summary Statistics for Java sample

| | |
|---|---|
| *Village characteristics:* | |
| Number of Social Groups | 178.963 |
| | (135.324) |
| Attendance at Social Group Meetings Per Adult | 10.852 |
| (total attendance Per Adult in last 3 months) | (11.112) |
| Adult population (thousands) | 2.668 |
| | (1.616) |
| Number hamlets | 3.988 |
| | (2.005) |
| Mean years of adult education | 4.882 |
| | (1.290) |
| Elevation (thousands of meters) | 0.314 |
| | (0.313) |
| Distance to nearest district capital (km) | 26.883 |
| | (18.778) |
| Travel time to nearest district capital (hours) | 1.072 |
| | (0.695) |
| Poverty rate | 0.412 |
| | (0.208) |
| TV ownership | 0.694 |
| | (0.460) |
| Radio ownership | 0.713 |
| | (0.452) |
| Number villages | 606 |

# Is residual variation orthogonal to village characteristics?

- Estimate following regression:

$$NUMCHAN_{sd} = \alpha_d + X_{vsd}\delta_1 + \delta_2 ELEVATION_{sd} + \varepsilon_{vsd}$$

where:

- $NUMCHAN_{sd}$ is average number of channels households who own TVs in subdistrict $s$ in district $d$ can receive
- $\alpha_d$ are district fixed effects
- $X_{vsd}$ are village characteristics (distance and travel time to nearest city, population, education, poverty rate)

# Is residual variation orthogonal to village characteristics?

| | Number channels can receive in 2003 | Number channels can receive in 2003 |
|---|---|---|
| | (1) | (2) |
| *Geographic variables* | | |
| Elevation (thousands of meters) | 0.007 | -0.036 |
| | (0.037) | (0.028) |
| Distance to nearest city (km) | -0.007 | -0.013* |
| | (0.008) | (0.007) |
| Travel time to nearest city (hours) | -0.014 | -0.028 |
| | (0.108) | (0.106) |
| Coastal subdistrict dummy | 0.567 | 0.150 |
| | (0.345) | (0.244) |
| North-facing subdistrict dummy | 0.076 | -0.088 |
| | (0.268) | (0.253) |
| East-facing subdistrict dummy | 0.097 | -0.226 |
| | (0.430) | (0.328) |
| South-facing subdistrict dummy | -0.207 | -0.173 |
| | (0.315) | (0.269) |
| *Village characteristics from 1990 village census* | | |
| Log adult population | 0.649 | 0.597 |
| | (0.540) | (0.466) |
| Population share in agriculture | 0.403 | -0.065 |
| | (1.016) | (0.845) |
| Number of schools in village | -0.137 | -0.132 |
| | (0.115) | (0.114) |
| Number of mosques in village | 0.019 | 0.075 |
| | (0.161) | (0.136) |
| Number of mushollas in village | 0.026 | 0.016 |
| | (0.025) | (0.024) |
| Any sports group in village | -1.384 | -1.614 |
| | (1.157) | (1.197) |
| Any arts group in village | -0.133 | 0.113 |
| | (0.406) | (0.397) |
| Any social welfare group in village | -0.654* | -0.541 |
| | (0.370) | (0.340) |
| Any youth group in village | 2.948 | 2.782 |
| | (3.106) | (2.992) |
| *Village characteristics from 2000 census:* | | |
| Mean adult education | -0.045 | -0.056 |
| | (0.042) | (0.041) |
| Ethnic fragmentation | -0.724 | -0.650 |
| | (0.636) | (0.616) |
| Religious fragmentation | -1.830 | 0.382 |
| | (1.544) | (0.630) |
| *Village characteristics from 2003 survey* | | |
| Log number of hamlets | -0.279** | -0.083 |
| | (0.136) | (0.098) |
| Share poor | 0.092 | 0.142 |
| | (0.223) | (0.212) |
| District fixed effects | YES | YES |
| Sample | All | Drop highest and lowest subdistrict |
| Observations | 592 | 584 |
| R-squared | 0.76 | 0.82 |
| P-value from joint F-test of non-geographic variables | 0.18 | 0.34 |
| P-value from joint F-test of all listed variables | 0.14 | 0.20 |
| Mean dep. Var | 5.07 | 5.06 |

Notes: Each observation is a village from the java survey. Robust standard errors in parentheses, adjusted for clustering at subdistrict level. Dependent variable is average number of television channels households in the subdistrict can receive. All 1990 variables, as well as distance to nearest city, coastal dummy, and aspect dummies, are calculated as the average value for all villages in the subdistrict. All specifications include district fixed effects. * significant at 10%; ** significant at 5%; *** significant at 1%