Why is Mobility in India so Low? Social Insurance, Inequality and Growth

Kaivan Munshi

Brown University and NBER

Mark R. Rosenzweig

Yale University

October 2005

1, Increased mobility is usually a hallmark of economic development - individuals no longer tied to land born on or occupations of their families.

2. India appears to be an exception among developing countries:

A. Occupation: For decades, caste-based occupations locked groups of individuals to narrowly-defined occupations in Bombay

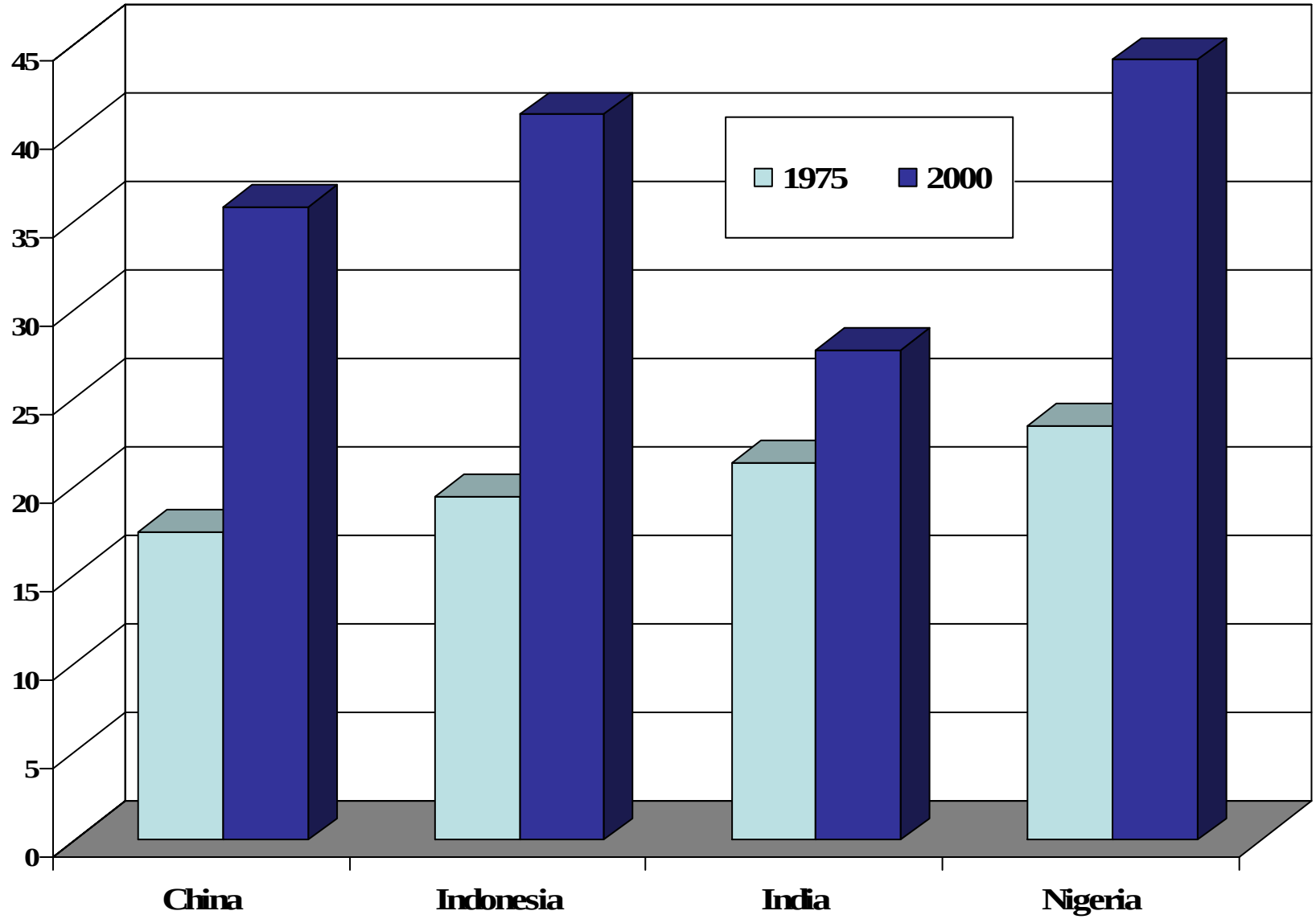
B. Migration:

1. India lags behind other similar countries: UNDP change in percent urbanized, 1975-2000 by country

2. In rural India, rate of migration by men out of their village fell from 10% to 6% between 1982 and 1999.

Indeed, in most studies of Indian rural economy migration is assumed to be absent (determinants of local public goods, returns and schooling choice)

Figure 1. Change in Percent Urbanized, by Country, 1975-2000



C. Marriage: tradition to marry within sub-castes (*jatis*): restrict matches, given age restrictions, to narrow pool.

1. Bombay: only 7.6% of individuals aged 25-40 in 1991 married outside their *jati* in 2001

2. South Indian tea plantations in 2003: 6.2% out-married in same age group;

3. All rural India (except J & K state): 9.1% out-married in same age group.

Explanations for low mobility: *ad hoc*, incapable of explaining who is mobile

1. Low out-migration: tied to relative high rates of growth in agriculture (Indian green revolution) - but accelerated growth in past 15 years in urban industrial sector and a decrease in migration

2. Low out-marriage: tied to need for marriage between similar mates - but inequality within *jatis* has risen, and yet no increase in out-marriage

Figure 2: Distribution of the Number of *jatis* per Village, 1999

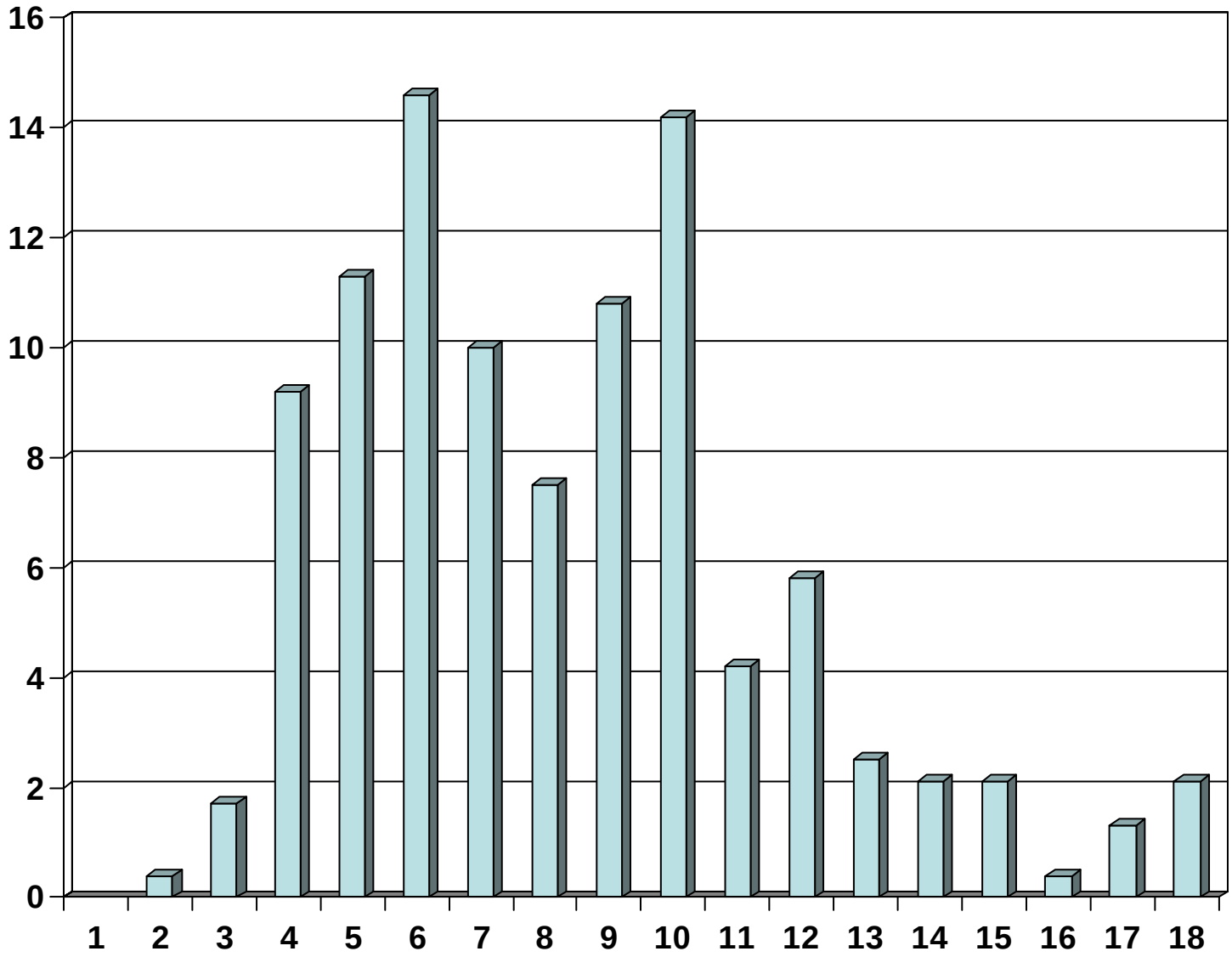


Figure 3: % Growth in Average Maximum HYV Yield Index (Laspeyres-weighted HYV Crops), by Period: 1971-1982 and 1982-1999

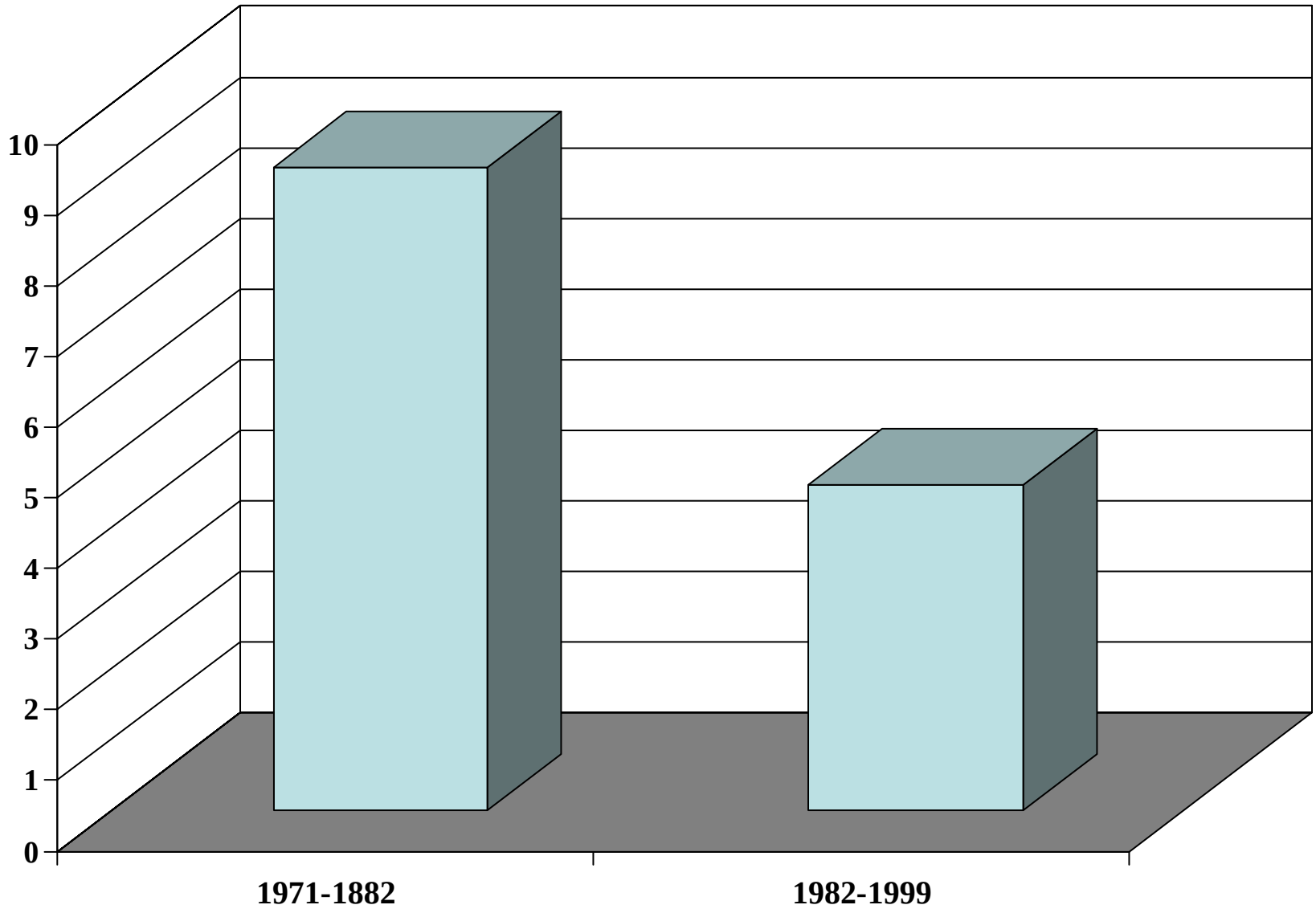
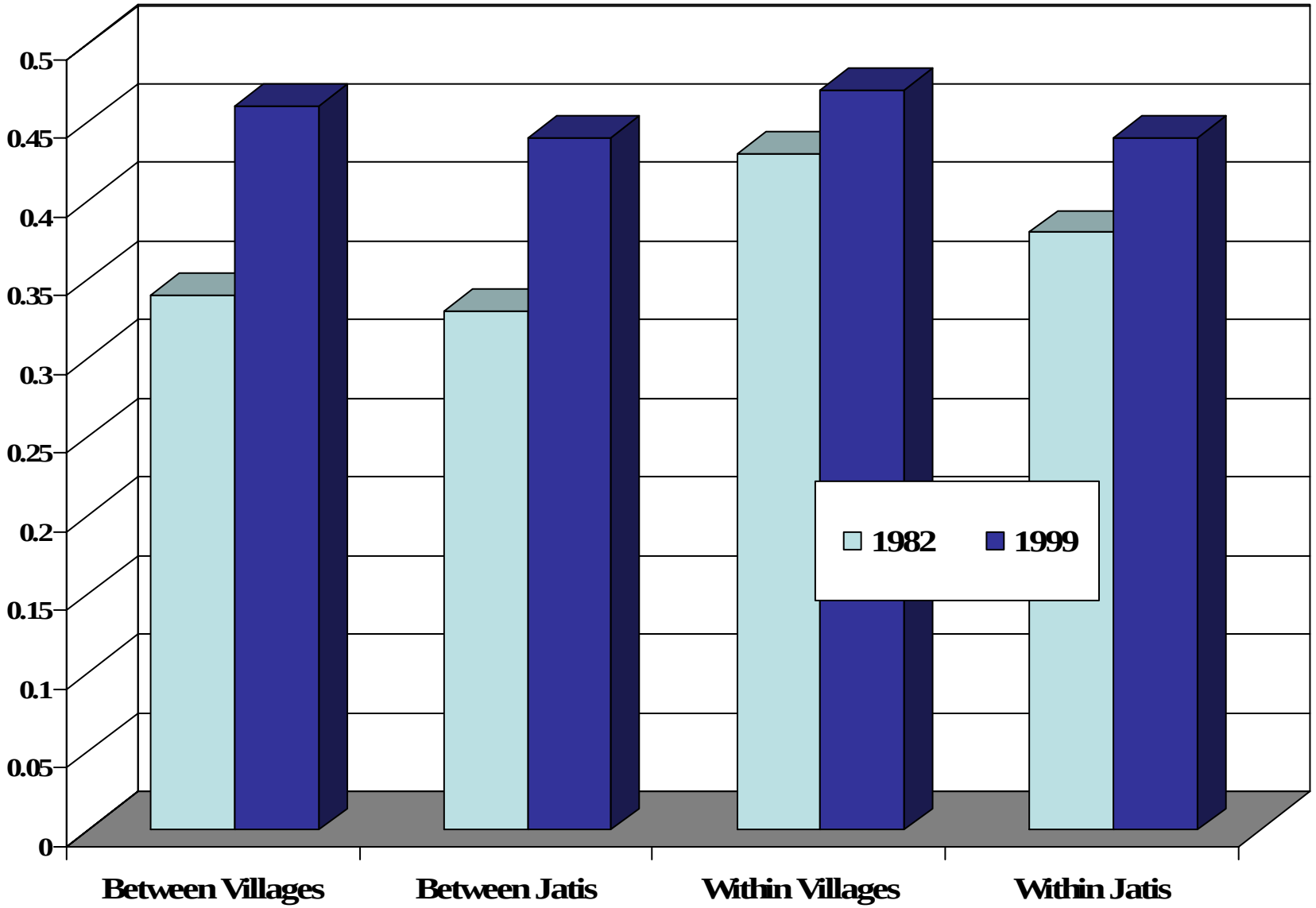


Figure 2: Changes in Gini Coefficients for Household Wealth, 1982-1999
Between and Within Villages and *Jatis*



Our explanation for low mobility:

Mobility reduces ability of risk-sharing networks to function

Out-marriage: lower ability to sanction via family

Out-migration: lower ability to sanction individual who is away

Those who cannot be sanctioned are higher risks, and will be excluded from networks (Grief)

So mobile individuals lose network services

Risk reduction a fundamental problem of rural areas in India - many studies

Such studies reject perfect insurance, but high degree of smoothing

But Indian studies ignore caste networks - village is relevant group

Imperfect commitment models imply quasi loans used to smooth rather than transfers

But literature on rural credit focuses on local money lenders and banks, ignoring caste loans implied by limited commitment models

We show using new data providing both sub-caste affiliation and loans by source and purpose for national panel of rural Indian households

1. Caste loans are as important as money lender loans in portfolio.

2. Caste loans have superior terms - lower interest rates, lower collateral requirements.

3. Using consumption data, importance of *jati* as the risk-sharing group.

4. Consistent with a limited commitment model of risk sharing with wealth inequality indicating who benefits least from networks, we find:

A. Higher-wealth households within *jatis* pay lower interest rates on caste loans, but not on bank loans or money-lender loans

B. Households with out-married or out-migrant men are significantly less likely to receive caste loans - but this is <u>not</u> causal

C. Exogenous changes in relative wealth within the *jati* affect the probability of mobility - relatively more wealthy always exit first (identification strategy)

D. Overall growth has little effect on mobility, given networks, but growth in inequality <u>within</u> *jatis* lowers mobility - overall inequality does not matter

Data Sets

1. NCAER ARIS 3-year panel: 4,118 households in 259 villages in 17 states surveyed in each of three crop years: 1968-69, 1969-70, 1970-71

A. Information on consumption, income, location, HYV use, village infrastructure

2. NCAER 1982 REDS: 4,979 households in same villages, except for Assam: 1971 panel

A. Information on consumption, income, location, HYV use, village infrastructure

B. Information on loans, by source and use: obtained in reference year and outstanding at beginning of period

3. NCAER 1999 REDS: 7,578 households from the 1982 households, except for J&K state

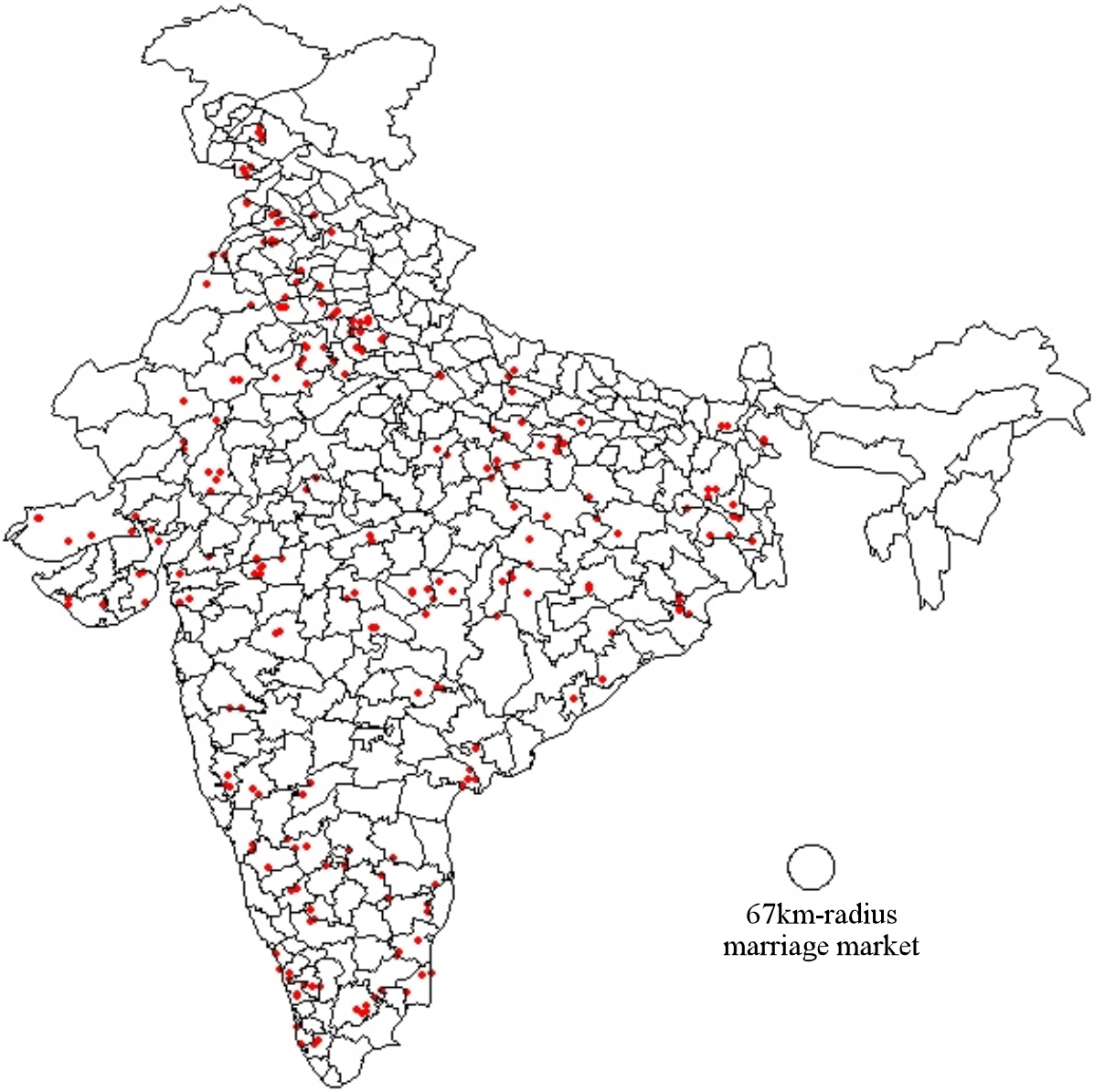
A. Information on consumption, income, location, HYV use, village infrastructure

B. Information on loans, by source and use: obtained in reference year and outstanding at beginning of period

C. Sub-caste (jati) identified for all immediate relatives of head and spouses

D. Marital and migration histories for all immediate relatives of heads

Figure 3
Location of ARIS-REDS Villages and District Boundaries



Caste Networks and Consumption Smoothing: Loan Data

1. Are loans from caste members a significant part of loan portfolios? Yes

2. Are caste loans important for consumption smoothing? As important as moneylender loans

Use 1982 loan information: loans by source (caste, bank, moneylender) and purpose:

investment, operating expenses, consumption, contingencies (illness, weddings)

3. Do caste loans have superior terms compared with bank and money lender loans?

Use 1982 and 1999 loan information:

Average interest rates: lower than bank or moneylender

Percentage of loans with no interest charged: higher than bank or moneylender

Collateral requirements: smaller proportion for caste loans

Table 1: Loans Received by Source and Purpose, 1982

Loan source:	Caste	Bank	Moneylender	Other
	(1)	(2)	(3)	(4)
Total loan value (%)	12.33	46.30	12.19	29.18
Loan value by purpose (%):				
Investment	17.07	26.47	16.83	39.63
Operating expenses	6.08	53.47	1.82	38.63
Contingencies	42.61	20.56	27.48	9.35
Consumption	23.11	15.08	47.42	14.39

Note: N=1,423 loans received by the sampled households in 1982.
Loan values sum up to 100 across the four sources in each row.
Investment includes land, house, business, etc.
Operating expenses are for agricultural production.
Contingencies include marriage, illness, etc.

Table 2: Terms of Loans, by Source and Year

Year:	1982			1999		
Source:	Caste	Bank	Moneylender	Caste	Bank	Moneylender
	(1)	(2)	(3)	(4)	(5)	(6)
Interest rate	10.70	14.88	16.99	8.23	10.16	30.63
	(0.50)	(0.47)	(0.42)	(0.91)	(0.23)	(2.30)
Percentage zero-interest loans	34.87	0.27	2.84	59.78	0.17	15.07
Percentage loans requiring collateral	16.23	48.95	18.99	1.31	83.21	24.78

Note: N=3,158 loans received by the sampled households in 1982 and 1999.
Statistics are weighted by the value of the loan.
Standard errors in parentheses.

Caste Networks and Consumption Smoothing: Test of Full Risk Sharing using Consumption Data

Optimal consumption allocation is solution to the planner's problem (no storage or saving) for some pre-defined group of *N* households:

$$\max \Sigma_s \pi_s \Sigma_i \lambda_i U(C^s_i) \quad \text{st} \quad \Sigma_i C^s_i = \Sigma_i y^s_i$$

where π_s = probability of state s occurring

λ_i = household i's welfare weight

C^s_i = consumption allocation in state s to i

y^s_i = income of i in state s

Solution is that ratio of the marginal utilities of any two hh's = in any state s

Regression specification (Townsend (1994), with CRRA preferences, derived from above, is:

$$log(C^s_i) = 1/N \, \Sigma_j^N (C^s_j) + [1/\gamma (log\lambda_i - 1/N \, \Sigma_j^N log\lambda_j)] \text{ for all time periods}$$

so $$log(C_{it}) = \alpha log(y_{it}) + \beta log(C_t) + f_i \qquad \alpha = 0, \beta = 1$$

where C_t = is the average consumption in the group - but what is the group?

Table Extra
Test of Perfect Insurance, Full Sample

Dependent variable:	log own-consumption	
	(1)	(2)
Log own-income	0.321	0.321
	(0.032)	(0.032)
Village log-consumption	0.783	0.784
	(0.035)	(0.029)
District log-consumption	--	0.002
		(0.034)
R-squared	0.900	0.900
Number of observations	12,338	12,338

Note: regressions use three years of data 1969-71 for each household.
All regressions include household fixed effects.
Standard errors in parentheses are clustered at the state-year level.

Table 3: Tests of Full Risk-Sharing

Dependent variable:	log own-consumption				
	(All housholds)	(1)	(2)	(3)	(4)
Log own-income	0.184	0.174	0.171	0.172	0.168
	(0.038)	(0.040)	(0.041)	(0.041)	(0.042)
Village log-consumption	0.735	0.725	0.635	0.576	0.638
	(0.039)	(0.041)	(0.052)	(0.057)	(0.048)
Jati log-consumption	--	--	0.232	0.216	0.239
			(0.038)	(0.038)	(0.041)
District log-consumption	--	--	--	0.095	--
				(0.059)	
Caste log-consumption	--	--	--	--	-0.024
					(0.080)
R-squared	0.883	0.824	0.826	0.826	0.825
Number of observations	5,394	3,543	3,543	3,543	3,387

Note: regressions use three years of data 1969-71 for each household.
All regressions include household fixed effects.
Standard errors in parentheses are clustered at the state-year level.
Only jatis with more than 10 sample households are included in columns 1-4.
Caste in column 4 measures broad hierarchical category in each state.

Mutual Insurance Models

Assume two identical (=wealth) individuals and two iid payoffs H (high) and L (low)

A. 4 states of the world: P_{HH}, P_{LL}, $P_{HL,}$ P_{LH}

B. $P_{HH} + P_{LL} + P_{HL} + P_{LH} = 1$

C. $P_{HL} = P_{LH}$ (equal wealth condition)

1. Perfect Insurance (Rejected in Townsend test, importance of loans for consumption smoothing):

Consumption in any period = (H + L)/2 obtained via transfers of (H - L)/2

Ratio of marginal utilities equal across all states

2. No commitment (Coate and Ravallion, 1993):

In H,L state, incentive to quit network for person with H based on comparison of

gain from deviating H - (H + L)/2 versus future permanent loss of insurance

Transfers < (H - L)/2

3. Limited commitment (Ligon, Thomas and Worrall, 2002):

In H,L state, H person given promise of future compensatory transfers in all future periods with equal payoffs by L, until new H,L or L,H state occurs

Expectation of future transfers in are such that in H,L state H does not deviate

Note: transfers are like loans in that they imply future payoffs, although state-contingent

What happens if partners are unequal in wealth? Two characterizations

1. Mean-preserving spread in wealth via change in probabilities

Assume $P_{HL} > P_{LH}$, with ($\Delta P_{HL} = - \Delta P_{LH}$) so mean-preserving spread

Rationale: irrigation for some

A. Less wealthy individual is now more likely to be a net borrower

And, to maintain participation in the H,L state for the wealthier individual:

B. Future compensatory transfers must be higher when states equal (worse loan terms for low-wealth L): interest rates on loans out higher

C. Transfers to wealthy when he is an L (borrower) have lower compensatory transfers (better loan terms for high-wealth H): borr. interest rates are lower

2. Mean-preserving spread in wealth via change in payoffs in H states

Rationale: HYV availability for some

A. Wealthier agent better off compared to before (for given transfers) but given declining risk aversion, as before benefits less from insurance in future L state

So ambiguous results for loan position and interest rates on loans out and in (note in first case declining risk aversion reinforces)

Now, introduce social sanctions imposed by network:

1. Raises cost of reneging, so improves loan terms for all

2. Ensures that those who leave the network will be less able to obtain loans on favorable terms because those with lower possibility of sanctions are undesirable insurance partners (Greif): cannot participate

Implications for Network Exit and Stability

1. Implication is that an increase in inequality requires that transfers be responsive so that participation constraint is met for the wealthiest

2. Limits on responsiveness: A. Subsistence: consumption floor

B. Norms of redistribution: customary obligations of wealthy

3. If rigidity, then increase in inequality increases "tax" on wealthy - who are net lenders

If there is network exit, then will be by the wealthiest

Then scope for redistribution lowered for poorest, network gains less for them

4. Mobility, given sanctions, is associated with loss of network benefits - exit=mobility

A. Out-marriage: lowers capacity to sanction via families

B. Migration: lowers capacity to sanction individual who is away

Does mobility lead to loss of insurance network benefits?

1. Estimate "effect' of exiting on benefits: caste loans, consumption variability

Correlation should exist between ability to obtain caste loans and exit, but could be because those who are not able to get caste loans more likely to exit

2. Assess implications of model that incorporates loss of benefits:

those with least to lose (most to gain) exit (stay)

A. For given average *jati* wealth, those with greater own wealth more likely to leave (relative wealth, more likely net lender) if adjustment imperfect, but:

1. Higher wealth households may have more outside options in "open" marriage market too (reinforce)

2. Higher-wealth can afford to invest in mobility; opportunity cost higher (oppose)

B. For given own wealth, increase in average *jati* wealth should decrease exit

Also show: higher average *jati* wealth, for given own wealth, increases *jati* loan access

Are the data on loan terms consistent with the model?

Wealthy *within* caste group should give and receive caste loans on terms that are more favorable to them compared to the less wealthy for caste loans:

interest rates lower for loans obtained, higher for loans given out

Sample divided into two groups based on whether household wealth was above or below the median within each caste group in survey period

Compare terms by within-*jati* wealth group also for bank and money lender loans

Results:

1. Caste loans: Wealthy pay lower interest rates, lend at higher rates

2. Bank loans: Wealthy pay same rates as less wealthy

3. Money lender loans: Wealthy pay higher rates (monopsonistic discrimination?)

Table 5: Interest Rates by Source and Household Wealth

Loan source:	Caste		Bank		Moneylender	
Wealth category:	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Borrowing	10.08	11.98	12.09	12.08	28.78	14.22
	(0.83)	(0.69)	(0.25)	(0.26)	(2.04)	(0.66)
Lending	10.83	9.20	--	--	--	--
	(1.82)	(2.16)				

Note: the household is the unit of observation.
Interest rates are computed by pooling loans in 1982 and 1999.
Standard errors are in parentheses.
The cut-off separating low and high wealth is the median wealth level within the jati in each year.

Loan Access and Network Exit (Mobility)

Do those households in which immediate relatives have married out or migrated (men) receive less caste loans?

Exit causes access to drop

Low access lowers cost of exiting

Out-marriage household: any immediate relative of the head (sibling, child) married someone from another *jati* prior to the survey

Out-migrant household: any brother or son of the head left the village prior to the survey

Results:

Out-marriage household 30% less likely to receive a caste loan

Out-migrant household 20% less likely to receive a caste loan

Does exit *cause* loss of network services? Indirect tests

Table 6: Out-Marriage, Out-Migration, and Access to Network Loans

Reported statistic:	Percent households receiving a caste loan	
Network exit:	No	Yes
	(1)	(2)
Measures of exit:		
Married outside jati	6.17	4.76
	(0.25)	(0.66)
Migrated outside village	6.30	5.27
	(0.28)	(0.43)

Standard errors in parentheses.

Specification and Estimation: Model implies that both own and *jati*-level wealth affect the household's equilibrium loan position (net lender):

$$b_{it} = \alpha w_{it} + \beta W_t + f_i + \epsilon_{it} \qquad \alpha<0,\ \beta>0$$

where b_{it} = household i's loan position at t

w_{it} = own wealth at t

W_t = average wealth in the *jati* at t

f_i = household fixed effect

We estimate using two surveys (1982 and 1999) aggregating households at the dynasty level:

$$\Delta b_{it} = \alpha \Delta w_{it} + \beta \Delta W_t + \Delta \epsilon_{it}$$

Note: $\text{cov}(\Delta w_{it}, \Delta \epsilon_{it}) \neq 0$ $\text{cov}(\Delta W_{it}, \Delta \epsilon_{it}) \neq 0$

So, use instruments to predict wealth change:

1. Land (acreage) inherited by the household prior to 1982

2. Initial (1971) conditions characterizing state of village HYV availability and use

Table 6: Descriptive Statistics, Panel Sample

Year:	1982	1999
	(1)	(2)
Panel A: Loan Value by Source		
Caste loans-in minus loans-out	44.21	41.34
	(31.55)	(13.83)
Caste loans	71.42	81.72
	(11.43)	(10.78)
Bank loans	393.96	235.39
	(89.54)	(35.03)
Moneylender loans	47.77	46.13
	(7.61)	(10.42)
Panel B: Marriage and Migration		
Out marriage	0.07	0.09
	(0.01)	(0.01)
Migration	0.10	0.06
	(0.01)	(0.01)
Panel C: Wealth and Access to Banks		
Household wealth	4831.91	20311.48
	(163.98)	(1408.72)
Jati wealth	4609.11	20103.21
	(81.18)	(1182.78)
Bank in village	0.19	0.36

Standard errors in parentheses.
Statistics are computed using households in the 1982-1999 panel.
Statistics computed using jatis with at least 10 sample households.

Table A: First-Stage Estimates

Dependent variable:	HH wealth change	Jati wealth change	HH wealth change	Jati wealth change
	(1)	(2)	(3)	(4)
Inherited land	13.84	0.02		
	(2.56)	(1.47)		
Inherited land (jati avg.)	47.98	77.81		
	(15.56)	(25.09)		
Inherited unirrigated land	--	--	14.66	-0.44
			(4.20)	(1.77)
Inherited irrigated land	--	--	13.63	3.61
			(6.13)	(6.61)
Inherited unirrigated land (jati)	--	--	26.27	55.32
			(9.91)	(19.13)
Inherited irrigated land (jati)	--	--	87.04	117.48
			(14.92)	(45.97)
HYV in the village in 1971 x 1(	1.66	-1.85	1.09	-2.78
	(2.80)	(1.73)	(2.61)	(1.81)
HYV in the village in 1971 x 1(	18.36	29.96	14.74	26.35
	(7.44)	(11.92)	(5.92)	(10.77)
IAADP district x 10^3	5.72	11.56	3.42	8.92
	(3.84)	(4.89)	(3.30)	(4.22)
Village bank in 1971 x 10^3	-0.33	-2.91	-0.65	-3.33
	(2.71)	(2.98)	(3.29)	(2.89)

Table A: First-Stage Estimates

Bank change (1982-1999) x 10^3	-0.27	-5.00	-1.49	-6.20
	(3.79)	(4.20)	(3.56)	(4.69)
F statistic	7.79	3.24	32.97	3.68
p-value	0.0008	0.0328	0.0000	0.0146
R-squared	0.087	0.198	0.100	0.219
Number of observations	2094	2094	2,094	2,094

Standard errors in parentheses are robust to clustering at the state level.
Dependent variables are computed as the change between 1982 and 1999.
All variables in the regression are excluded from the second stage except bank change (1982-99).
Regressions restricted to jatis with at least 10 households in sample and households with heads at least age 35 in 1982

Table 7: FE-IV Loan Estimates

Loan source:	Caste	Bank	Moneylender
	(2)	(3)	(4)
Household wealth	-0.009	-0.060	0.004
	(0.004)	(0.031)	(0.004)
Jati wealth	0.007	0.020	-0.006
	(0.003)	(0.026)	(0.004)
Bank in village	141.654	453.976	31.762
	(68.575)	(340.690)	(96.710)
Constant	-73.021	219.995	12.409
	(75.098)	(124.592)	(68.736)
F-statistic (over-id)	1.46	1.39	2.14
p-value	0.26	0.28	0.11
N	2,094	2,094	2,094

Standard errors in parentheses are robust to clustering at the state level.

Table 8: FE-IV Out-Marriage and Out-Migration Estimates

Instrument set:	Restricted		Full			
Specification:	Symmetric wealth effects				Asymmetric wealth effects	
Dependent variable:	Out marriage	Migration	Out marriage	Migration	Out marriage	Migration
	(1)	(2)	(3)	(4)	(5)	(6)
Own wealth x 10^{-6}	0.62	1.24	0.63	1.41	1.84	5.06
	(0.34)	(0.55)	(0.31)	(0.57)	(1.22)	(2.32)
Own wealth*	--	--	--	--	-1.24	-3.70
Above-mean x 10-6					(0.95)	(1.86)
Jati wealth x 10^{-6}	-0.93	-0.64	-0.88	-0.91	-1.19	-1.68
	(0.36)	(0.48)	(0.34)	(0.45)	(0.61)	(0.97)
Bank dummy x 10^{-2}	-0.70	-0.25	-0.69	-0.35	-0.72	0.15
	(0.85)	(1.71)	(0.84)	(1.73)	(0.85)	(1.63)
Constant x 10^{-2}	2.94	3.03	2.81	3.14	2.94	2.87
	(0.83)	(2.14)	(0.86)	(2.10)	(0.71)	(2.02)
F-statistic (over-id)	0.56	0.25	2.23	1.07	0.93	0.79
p-value	0.76	0.95	0.09	0.44	0.54	0.69
N	896	925	896	925	896	925

Standard errors in parentheses are robust to clustering at the state level.
Regression use 1982 and 1999 data and are run using differenced variables.
Instruments include inherited land, initial HYV adoption in the village in 1971, bank in 1971.

Implications of the Point Estimates

1. What is the effect of average wealth on mobility? $\alpha + \beta$

   Fourfold increase in wealth 1982-99:

   Out-marriage: -0.4 percentage points

   Out-migration: +0.75 percentage points

2. What is the effect of a within-*jati* wealth increase (hh)? α

   Median standard deviation of within-*jati* wealth in 1999: 13,318 rupees

   Out-marriage: 0.8 percentage points (9 percent)

   Out-migration: 1.9 percentage points (32 percent)

3. What is the effect of a mean-preserving increase in within-*jati* inequality?

Transfer 13,318 rupees from below- to above-mean wealth households

Need responses to differ by own wealth: re-estimate

Out-marriage: -1.7 percentage points (19 percent decline)

Out-migration: -5.0 percentage points (84 percent decline)

4. Seeds of self destruction? Will selective exit, which reduces average *jati* wealth, lead to more exit? β

Discard top 10% of households in *jati* with average wealth at the mean of all *jatis* (20,445 Rupees) - reduction in average jati wealth by 8,852 Rupees

Out-marriage: 0.8 percentage points

Out-migration: 0.8 percentage points

Figure 4: % Marrying Outside the *jati* in Bombay, by Age of Person in 2001