

Monitoring Corruption

Evidence from a Field Experiment in Indonesia

Ben Olken

Prepared May 20, 2005

Presented at the When Institutions Are Weak: Strategies for
Change pre-conference July 6, 2005

Motivation

- Corruption serious impediment to development
 - Believed to be endemic in many countries
 - Potentially severe efficiency consequences
- Many questions about corruption remain unanswered
 - How much corruption is there?
 - What forms does it take?
 - How do we design mechanisms to reduce corruption?
- This paper examines these questions by looking at graft in a local-level road building project in Indonesia

Mechanisms for fighting local corruption

- Top-down monitoring – i.e. auditors
 - Traditional economic approach to crime
 - Key difference: Auditors may themselves be corrupt
- Bottom-up monitoring – i.e., community members
 - Local participants may have better information
 - Citizens benefit from good project, so different incentives
 - But decentralized monitoring is a public good, so people may free ride
- Grass-roots monitoring currently favored by development community.
 - 2004 World Development Report:
“Putting poor people at the center of service provision: enabling them to monitor and discipline service providers, amplifying their voice in policymaking, and strengthening the incentives for service providers to serve the poor.”

Preview of Results

- Field experiment to examine top-down and bottom-up methods
- Audits reduce corruption
 - 8 percentage point lower theft in audit villages
 - Audits appear to be cost-effective
- Grass-roots monitoring (e.g., participation in village meetings)
 - Shifts method of corruption from wages to materials
 - But no change in total amount of theft
- “Technology of corruption”
 - Complements vs. substitutes: find several examples of substitution in methods of corruption (w/ potentially different efficiency costs)
 - Substitution may be in where books are cooked, not where theft actually occurs

Outline of talk

- Setting
- Experimental Design
- Measuring Corruption
- Results:
 - Audit Experiments
 - Participation Experiments
- Efficiency calculation
- Conclusion

Setting

- *Kecamatan* Development Program in Indonesia
 - World Bank loan provides \$100,000 annual block-grant to subdistrict (*kecamatan*), consisting of 10-20 villages
 - Village meetings to propose infrastructure (roads, bridges, sanitation, etc.) or microcredit projects
 - Inter-village committee allocates funds to villages
 - Ad-hoc village committee elected to receive funds and implement project (no contractors)
 - Once funds allocated, village is residual claimant
 - Village-level supervision via three open “accountability meetings” after 40%, 80%, and 100% of funds spent
 - Low (4%) baseline probability of external audit
- Study focuses on 608 villages in East/Central Java building small (1-3km) non-asphalt road projects

Experimental Design

- Two types of interventions:
 - External monitoring
 - Audits by government auditors
 - Grass-roots monitoring
 - Invitations to accountability meetings
 - Anonymous comment forms

Experimental Design – Audits

- Audits
 - Conducted by Government Audit Agency (BPKP)
 - Auditors examine books and inspect construction site
 - Penalties: results of audits to be delivered directly to village meeting and followed up by project staff, with small probability of criminal action
- Timing
 - Before construction began, village implementation team in treatment villages informed they would be audited during and/or after construction of road project
 - One village in each treatment subdistrict audited during construction
 - All villages audited after construction
 - Official letter from BPKP sent 2 months after initial announcement, and again after first round of audits

Experimental Design – Participation

- Background: KDP accountability meetings
 - Meetings held in all KDP villages after 40%, 80%, and 100% of funds spent
 - Implementation team reports on how funds spent
 - Meeting must approve accountability report for project to continue
 - Villagers only attend if they receive written invitations from village head
 - Village head typically invites only village elite

Experimental Design – Participation

- Invitations
 - Number and composition of people at meeting affects information, bias
 - *Invitations*: Distribute written invitations 3-5 days before meeting
 - *Number*: 300 or 500 invitations
 - *Insiders*: Distribute via village government or primary schools
- Comment Forms
 - In some villages, distributed anonymous comment forms in addition to invitations
 - Questions on information, road quality, prices, financial management, plus open-ended questions
 - Collect forms 1-2 days before meeting in sealed drop-boxes
 - Read summary of comments at meeting

Accountability Meetings



Experimental Design

- Experimental Design
 - Audits and participation experiments orthogonal
 - Audits randomized by subdistrict, stratified by district
 - Participation experiments randomized by village, stratified by subdistrict

Table 1: Number of villages in each treatment category

	Control	Invitations	Invitations + Comment Forms	Total
Control	114	105	106	325
Audit	93	94	96	283
Total	207	199	202	608

Experimental Design

- Ex-post, what were treatments correlated with?
 - Method: ex-ante, identified 10 variables that might affect corruption, and looked ex-post at their correlation with treatments
 - Results:
 - Invitations and comments appear orthogonal to these variables
 - Audits positively correlated with village head age, mountainous region, and percent of households poor
 - Main results not sensitive to including all these variables as right-hand side controls

Measuring Theft

- Goal
 - Measure the difference between *reported expenditures* and *actual expenditures*
- Measuring reported expenditures
 - Obtain line-item reported expenditures from village books and financial reports
- Measuring actual expenditures
 - Take core samples to measure quantity of materials
 - Survey suppliers in nearby villages to obtain prices
 - Interview villagers to determine wages paid and tasks done by voluntary labor
- Measurement conducted in treatment and control villages, and is completely separate from BPKP “Audits”

Measuring Theft



Measuring Theft

- Measure of theft:

$$THEFT_i = \text{Log}(\text{Reported}_i) - \text{Log}(\text{Actual}_i)$$

- Can compute item-by-item, split into prices and quantities

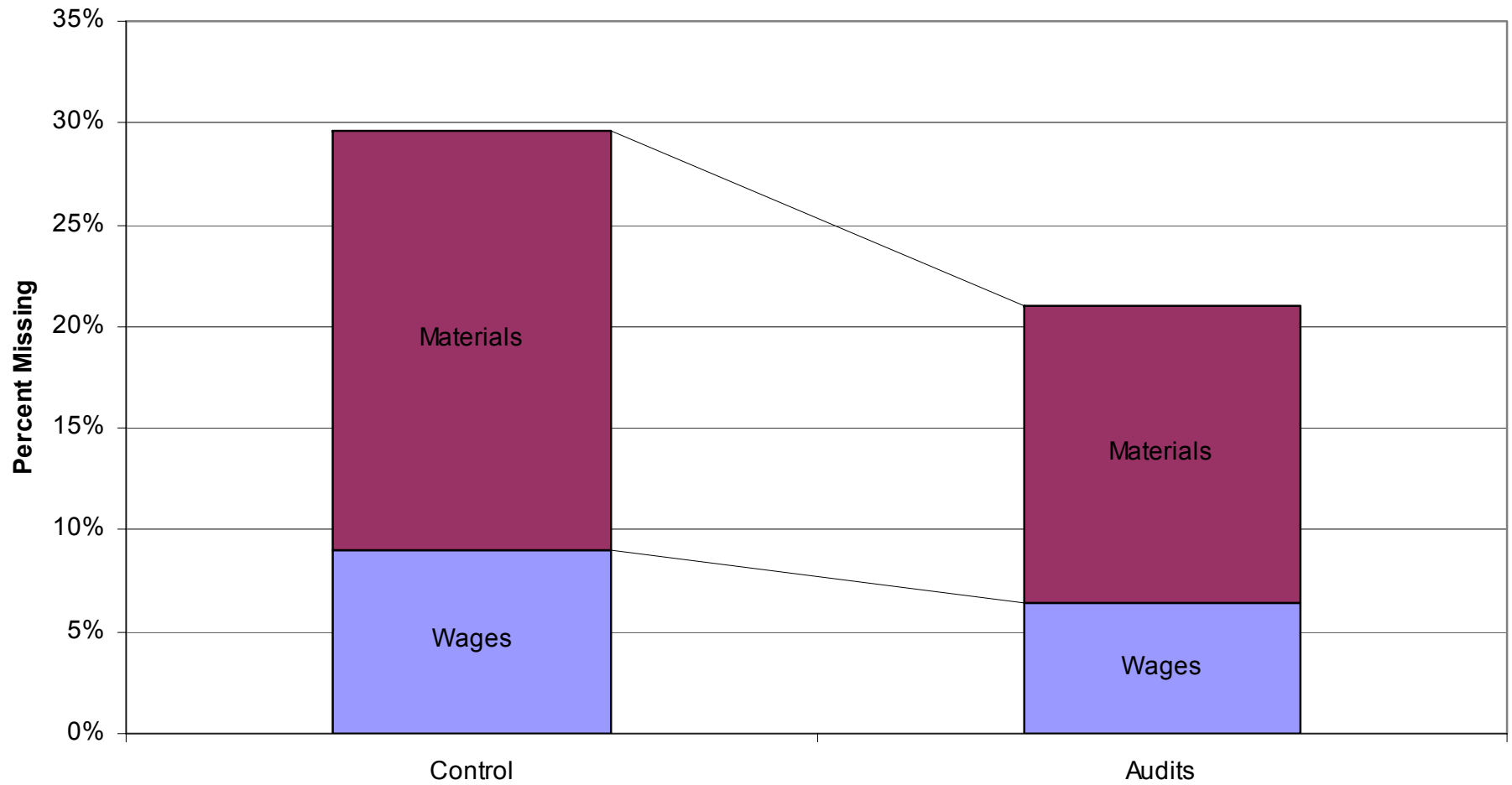
- Assumptions

- Loss Ratios - Material lost during construction or not all measured in survey
- Worker Capacity - How many man-days to accomplish given quantity of work
- Calibrated by building four small (60m) roads ourselves, measuring inputs, and then applying survey techniques

- All assumptions are constant – affect levels of theft but should not affect *differences* in theft across villages

Effect of audits

Effect of Audits on Percent Missing



Audits –Effect on Theft

Table 3: Audits – main theft results

<i>Percent missing: Log reported value – Log actual value</i>	Control Mean	Treatment Mean: Audits	Audit Effect	P-Value	Num Obs
Major items in roads	0.296 (0.036)	0.211 (0.033)	-0.086 (0.049)	0.083	490
Major items in roads and ancillary projects	0.296 (0.031)	0.218 (0.034)	-0.077 (0.046)	0.098	556
Breakdown of roads:					
Materials	0.223 (0.043)	0.175 (0.040)	-0.049 (0.058)	0.404	486
Unskilled labor	0.333 (0.086)	0.263 (0.079)	-0.066 (0.117)	0.573	434

Audits—Other results

- Prices vs. Quantities
 - Decompose corruption into price markups and quantity reductions
 - Find virtually all corruption occurs on quantity dimension
- Reported vs. Actual Expenditures
 - Compare estimated reported and actual expenditures to initial (pre-randomization) budget
 - Results suggest reduction in corruption due to increases in actual expenditures

Nepotism

- Auditors investigate books and construction site, but not who worked on project
- Question: does hiring of family members change in response to audits?
- Investigate using household survey:
 - 4,000 households
 - Asked if anyone in household worked on project for pay
 - Asked if immediate / extended family of village government member or project official
- Specification:

$$\text{WORKED}_{hijk} = \gamma_k + \gamma_2 \text{AUDIT}_{jk} + \gamma_3 \text{FAMILY}_{hijk} + \gamma_4 \text{AUDIT} \times \text{FAMILY}_{ijk} + \gamma_5 X_{hijk} + \varepsilon_{hijk}$$

Nepotism—Complement or Substitute?

Table 4: Nepotism

	(1)	(2)	(3)	(4)
Audit	-0.022 (0.020)	-0.005 (0.018)	-0.021 (0.027)	-0.043 (0.028)
Village Gov't Family Member	-0.026 (0.021)	0.013 (0.015)	0.013 (0.015)	-0.020 (0.020)
Project Head Family Member	0.035 (0.028)	-0.033 (0.036)	0.036 (0.029)	-0.020 (0.037)
Social activities	0.012** (0.005)	0.012** (0.005)	0.008 (0.006)	0.010* (0.006)
Audit × Village Gov't Family Member	0.086*** (0.030)			0.071** (0.030)
Audit × Project Head Family Member		0.142*** (0.053)		0.114** (0.053)
Audit × Social activities			0.008 (0.007)	0.006 (0.007)
Stratum Fixed Effects	YES 4018	YES 4018	YES 4018	YES 4018
Observations	0.21	0.21	0.21	0.21
R-squared	0.25	0.25	0.25	0.25
Mean dep. variable	0.25	0.25	0.25	0.25

Nepotism - Interpretation

- Potential explanations:
 1. Family received rents from the job – alternative, less efficient form of corruption
 2. Family members worked in order to improve project—perhaps family members have less moral hazard
- Suggestive evidence in favor of explanation (1)
 - No change in employment of high social capital workers, who might also have low moral hazard
 - Conditional on observables, family members slightly more likely to be employed in high wage category

Audits – Summary

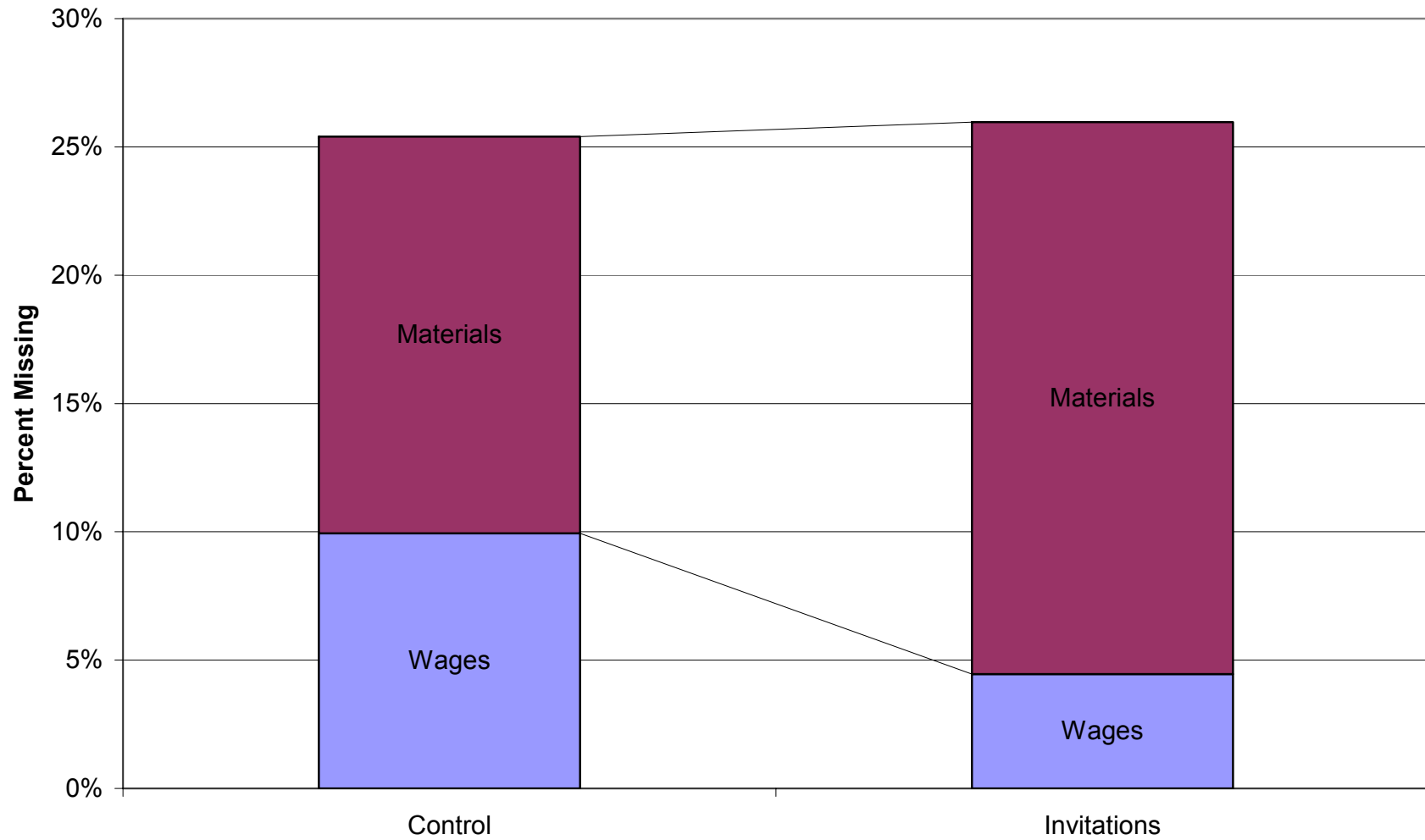
- Effect of top-down monitoring
 - Audits reduce corruption
 - Driven by changes in actual quantities
 - Most corruption on quantity dimension
 - More jobs to family members
- Next... what does increasing grass-roots monitoring do?

Participation Experiments

- Effect of treatments
 - Invitations increase attendance at meetings by 13.5 people (35%), all of whom are non-elite
 - Average of 140 comment forms returned completed per meeting
- Effects on meetings
 - Invitations increase probability of discussing corruption-related problem
 - Comment forms increase probability of serious action (i.e., firing someone) to resolve a problem
 - But these effects are very small in magnitude

Effect of invitations

Effect of Invitations on Percent Missing



Invitations—Theft Effects

Table 7A: Invitations -- Main theft results

<i>Percent missing:</i> <i>Log reported value –</i> <i>Log actual value</i>	Control Mean	Treatment Mean: Invites	Invite Effect	P-Value	Num Obs
Major items in roads	0.254 (0.035)	0.260 (0.035)	0.008 (0.035)	0.820	490
Major items in roads and ancillary projects	0.282 (0.032)	0.251 (0.032)	-0.028 (0.036)	0.431	556
Breakdown of roads:					
Materials	0.186 (0.042)	0.249 (0.042)	0.064 (0.043)	0.137	486
Unskilled labor	0.407 (0.088)	0.175 (0.088)	-0.231 (0.106)	0.032	434

Invitations—Reported vs. Actual

Table 8: Invitations: Actual vs. Reported

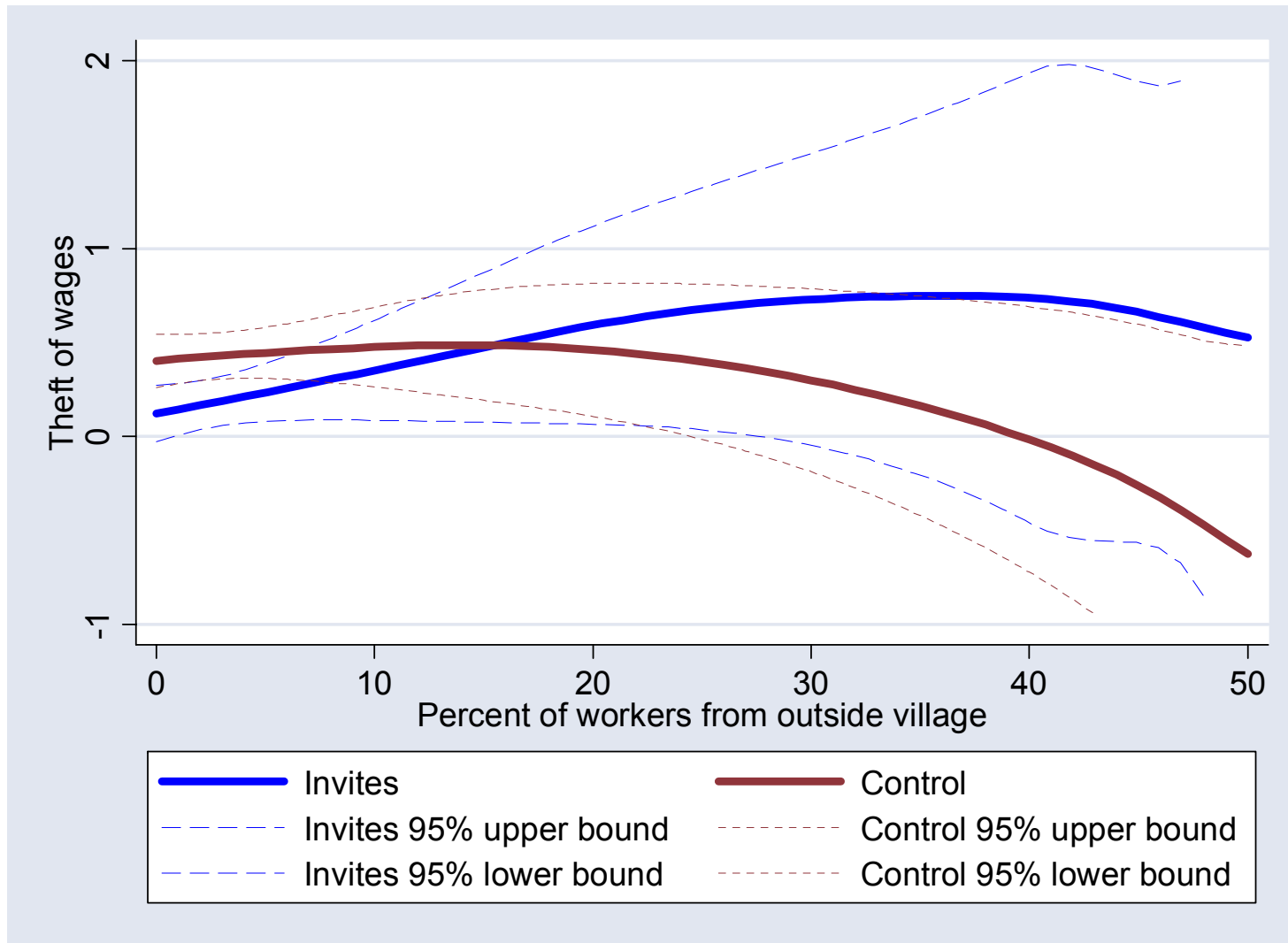
<i>Log value – Log planned value</i>	Control Mean	Treatment Mean: Invites	Invite Effect	P-Value	Num Obs
Actual :					
Materials	-0.221 (0.039)	-0.203 (0.039)	0.014 (0.042)	0.734	406
Unskilled labor	-0.295 (0.080)	-0.221 (0.080)	0.069 (0.092)	0.452	406
Reported:					
Materials	-0.041 (0.013)	0.019 (0.013)	0.059 (0.020)	0.004	406
Unskilled labor	0.063 (0.068)	-0.057 (0.068)	-0.124 (0.078)	0.115	406
Other	0.014 (0.068)	0.083 (0.068)	0.071 (0.075)	0.345	406

Invitations – Why the shift in method?

- Alternative explanations
 - Information: Easier for villagers to detect theft of wages than theft of materials
 - Incentives: Villagers who attend meetings care more about corruption in wages than in materials, because many work on project
- Suggestive evidence in favor of incentives
 - Less shift away from theft of wages when workers come from outside the village
 - Information about project does not change when more workers from outside village
- Suggests grass-roots may be most effective for private goods, where there is both good information and strong personal stake in outcome

Workers from outside village

Theft of wages vs. percent of workers from outside village



Costs and Benefits

- Costs of Audits:
 - Direct cost of audits (including cost of public funds)
 - Time costs
- Reduced rents to corrupt officials
 - Distributional implications: village officials high income
- Benefits:
 - Increased lifespan of road from reduced theft of materials
 - Wages received by workers (transfer from village officials)
- Assumptions:
 - Marginal cost of public funds: 1.4
 - Theft of materials reduces road life, cost-benefit analysis implies NPV social cost of 3.41 per unit stolen (based on World Bank study)
 - Allow for distributional considerations (CRRA utility, $\rho = 2$)
- Result: Audits appear highly cost-effective – net benefits more than 150% cost of audits

Cost-Benefit Analysis

Table 9: Net benefits calculation

	Audits		Invitations	
	Equal Weighted Net Benefits	Distribution Weighted Net Benefits	Equal Weighted Net Benefits	Distribution Weighted Net Benefits
Cost of treatment:				
Monetary cost	-335	-278	-13	-11
Associated dead-weight loss	-111	-92	-4	-4
Time cost	-31	-31	-27	-27
<i>Subtotal</i>	-476	-400	-45	-42
Change in rents received by corrupt officials:				
From theft of materials	-224	-137	292	178
From theft of wages	-90	-55	-312	-191
Subtotal	-314	-192	-20	-12
Change in benefits from project:				
NPV value of road	1346	1346	224	224
Wages received by workers	123	123	94	94
Subtotal	1469	1469	318	318
TOTAL NET BENEFITS	679	878	253	264

Conclusions

- Does threat of audits reduce corruption?
 - Yes – theft declines by about 8 percentage points
 - Even at 100% audit probability, cost effective
- Does increasing grass-roots monitoring reduce corruption?
 - Does increase probability corruption discussed, problems resolved
 - Main effect is a shift in where corruption is hidden, from wages towards materials
 - Suggests grass-roots monitoring most effective for private goods, with good info and personal stake in outcome
- “Technology of corruption”
 - Several types of substitution (nepotism, wages -> materials)
 - Separability of reported and actual expenditures