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# Improving Tax Collection Capacity in the Developing World: Experimental Evidence from Ghana

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# Low Tax Collection Capacity May Constrain Development

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Besley-Persson (2013), Gordon-Li (2009)

Public goods provision facilities development process

Lack of 'state capacity' limits taxation, which limits public goods provision

How to raise tax collection capacity?

Better incentives for collectors (Khan, Khwaja, Olken, 2016)

Sending more letters / reminders (Hjort, Rao ...)

Better citizen engagement / morale

# This Paper: Role of Technology in Tax Collection

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Focus on a new revenue collection technology designed to raise property taxes

- Electronic tablet loaded with database on ratepayers

- Software designed to help assist in bill distribution, collections

Reasons technology may raise property tax collections

- Makes locating households easier

- Makes it easier to track payments

Technology not necessarily equipped to address

- Lack of will to enforce tax collections

- Poor internet, road and addressing infrastructure

- Corruption in collections

# Setting: Local Governments in Ghana

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216 local governments; provide few public goods on average

Collect on average \$0.75 per capita per year

Property taxes particularly under-collected (Government of Ghana, 2014)

Limited prior evidence on why property tax collections so low

# What We Do: Survey and Experiment

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Survey all local governments in Ghana about property tax collection practices

Few households actually served a bill; enforcement is secondary issue

All bill delivery and collection done by hand / on foot; hard to locate households

Randomized evaluation of new tax collection technology

Builds on new electronic database of properties built by private Ghanaian tech company

Treatment collectors armed with electronic with GPS, loaded with property data

Delivered 26% more bills, collected 100% more revenue

More likely to know who is aware of taxpaying duties, satisfied with public services

More likely to take unofficial payments

# Local Tax Collection in Ghana: New Survey Evidence

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# Survey of Collection Capacity in Ghana's Local Governments

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Fall 2017; covers all 216 local governments

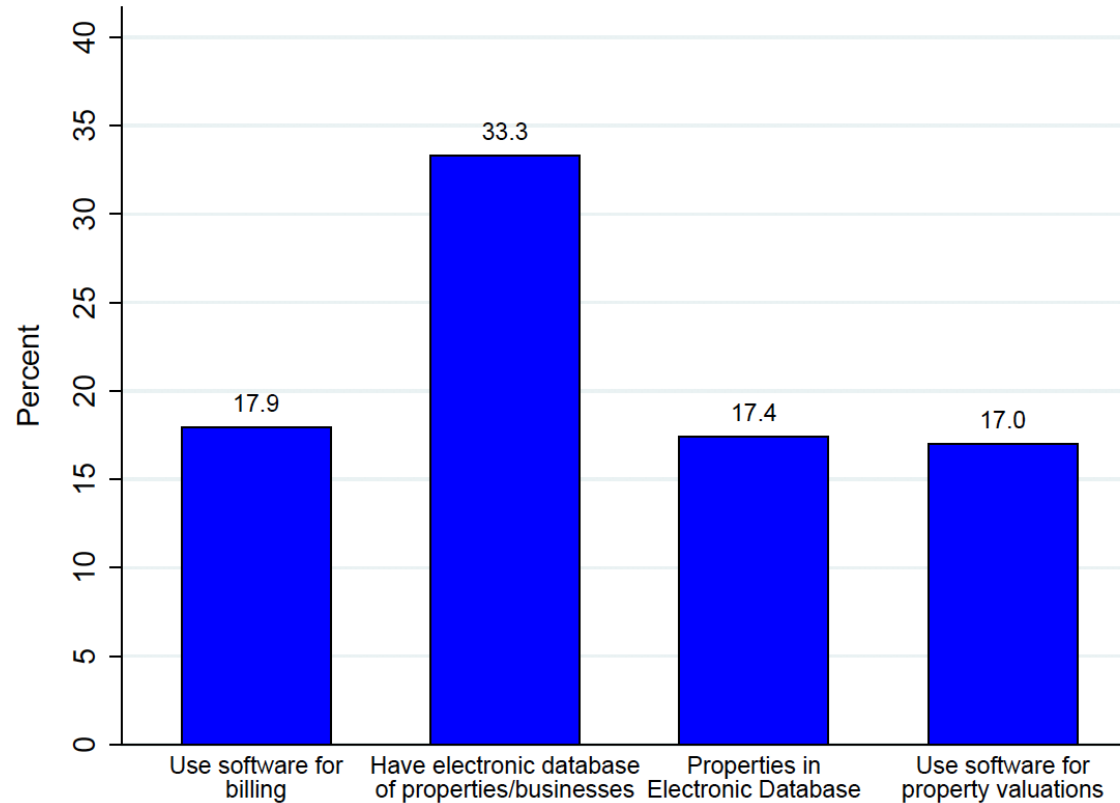
Surveyed nearly all officials involved in tax collection (2,300 in total)

Comprehensive questions on tax collection practices and constraints



# Technology Use in Billing + Collections is Low

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# Billing, Collections and Enforcement are All Challenging

	Mean	Median	10th percentile	90th percentile
Properties delivered a billed (%)	50.0	60.0	0.0	95.0
Property tax bills paid in cash (%)	63.6	80.0	0.0	98.0
Business license bills paid in cash (%)	72.3	80.0	20.0	100.0
Collector salaries as percent of taxes collected (%)	68.1	41.7	14.7	156.8
Households billed but in default after one year (%)	40.0	30.0	5.0	100.0
Took tax defaulters to court in last year (%)	7.6	0.0	0.0	5.0

# Billing, Collections and Enforcement All Challenging

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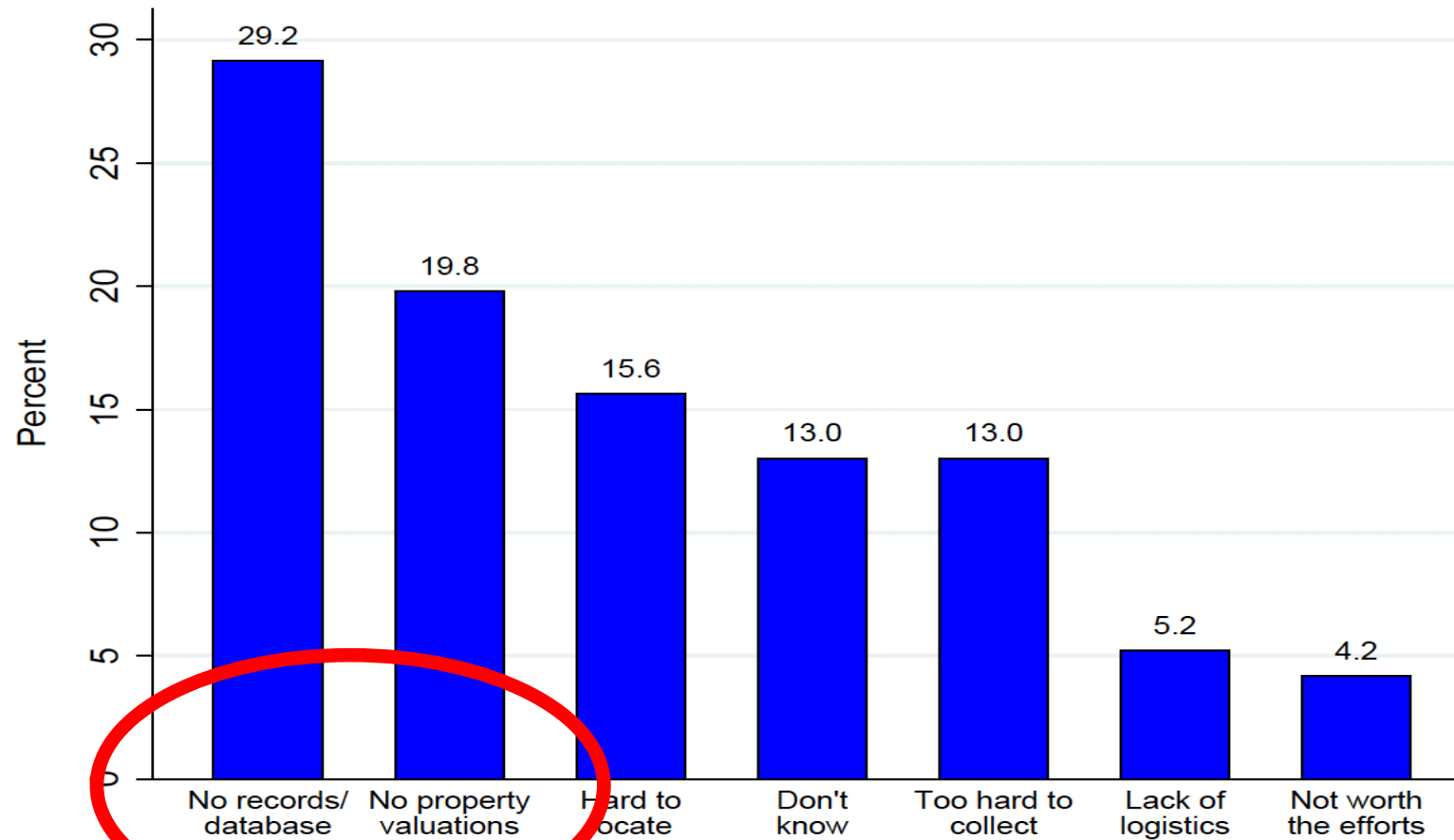
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# Billing, Collections and Enforcement All Challenging

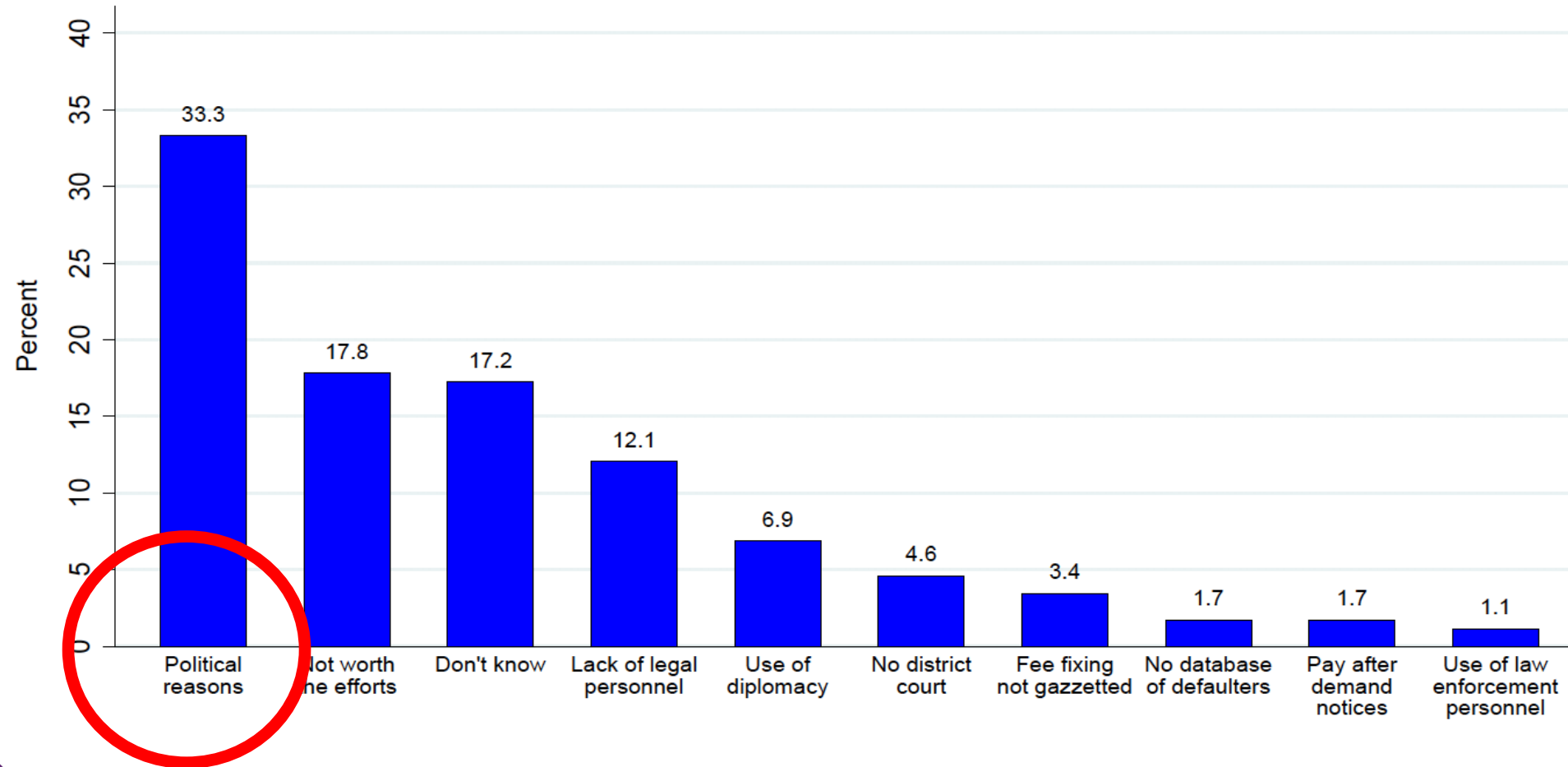
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# Why More Bills not Sent?

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# Why Not Take More Non-Payers to Court?



# Summary of Survey Evidence

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Not simply an enforcement issue – only billing half the properties on average

Signs that lack of technology is a big constraint

- Lack of software and databases main reasons

- Collection costs very high

Signs that technology may not be key binding constraint

- Payments in cash still allow for leakage

- Political will to enforce non-payment seems low

Causality Issues

# Experimental Evidence on New Tax Collection Technology

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# New Technology: Enhanced Revenue Management System

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Designed by Ghanaian Tech Firm, Melchia Investments

Based on comprehensive new database of properties

Includes businesses and residences

Constructed by Melchia from satellite images and in-person data collection

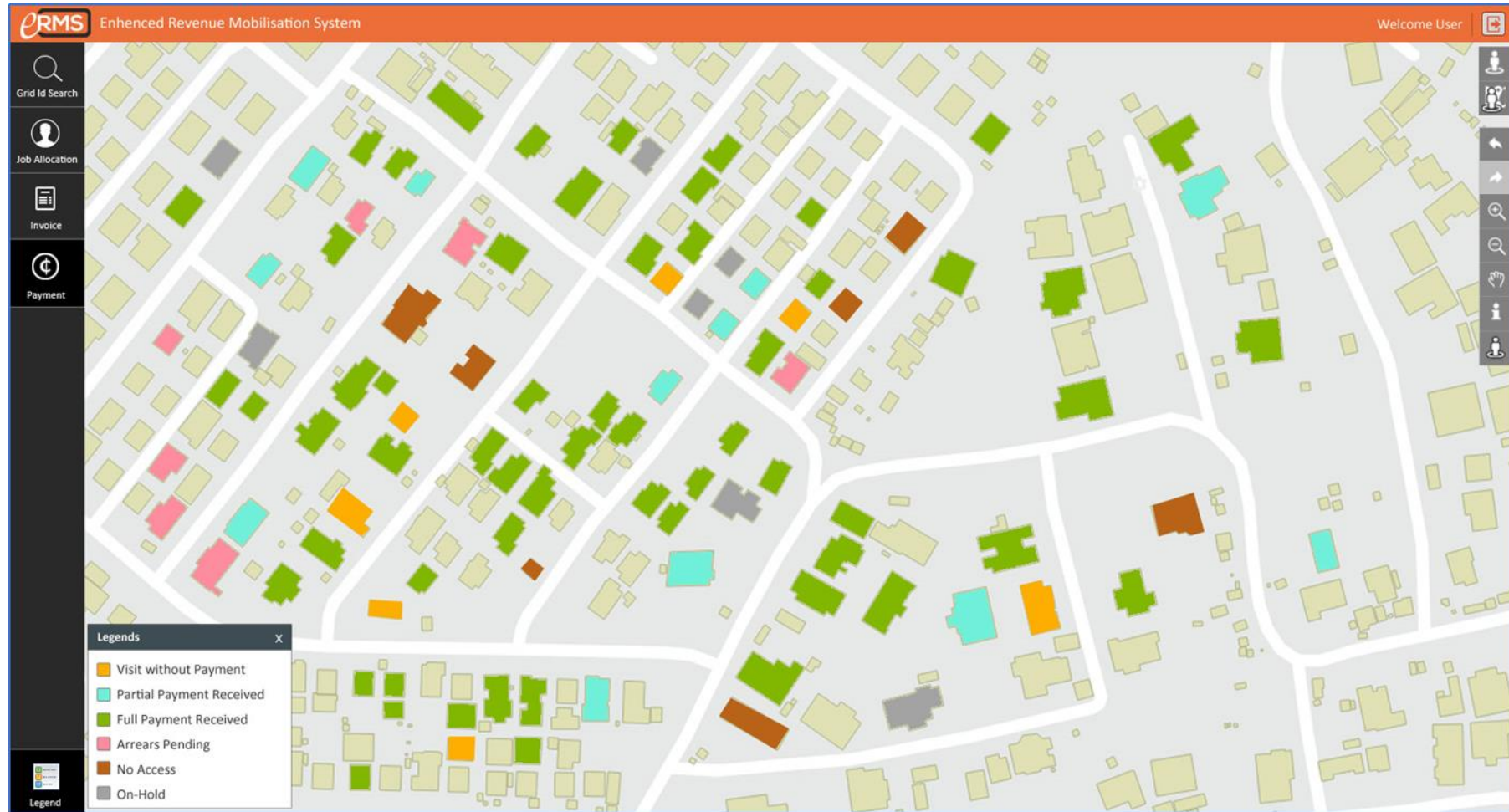
Used by revenue collectors on tablets with GPS

# Technology Helps with Bill Distribution





# Technology Helps Manage Collections



# Setting + Experimental Design

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Setting: La Nkwantanan Madina Municipal Assembly, Accra

More urban and richer than average district

Not randomly selected: recently began work with Melchia

Randomly assigned each revenue collector to “collection unit” consisting of 150 bills in same vicinity

Then randomly assigned

28 collectors to use ERMS (“Treatment Group”)

28 collectors to use manual methods (“Control Group”)

Treatment and control group balance:

Number of bills, average amount per bill, fraction of collectors “experienced” and “high performing,” fraction of bills in arrears and with any prior payment

# Experiment: Data Collection

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## Daily activity summaries from each collector for six weeks of study

- Number of bills distributed

- Total amount collected

## Bi-weekly surveys of collectors

- Questions about collection and distribution strategies & challenges

## End-line survey of households from all collection units

- Amounts paid, whether bill distributed

- Perceptions about revenue collections, potential leakages, satisfaction with public goods provision, other items

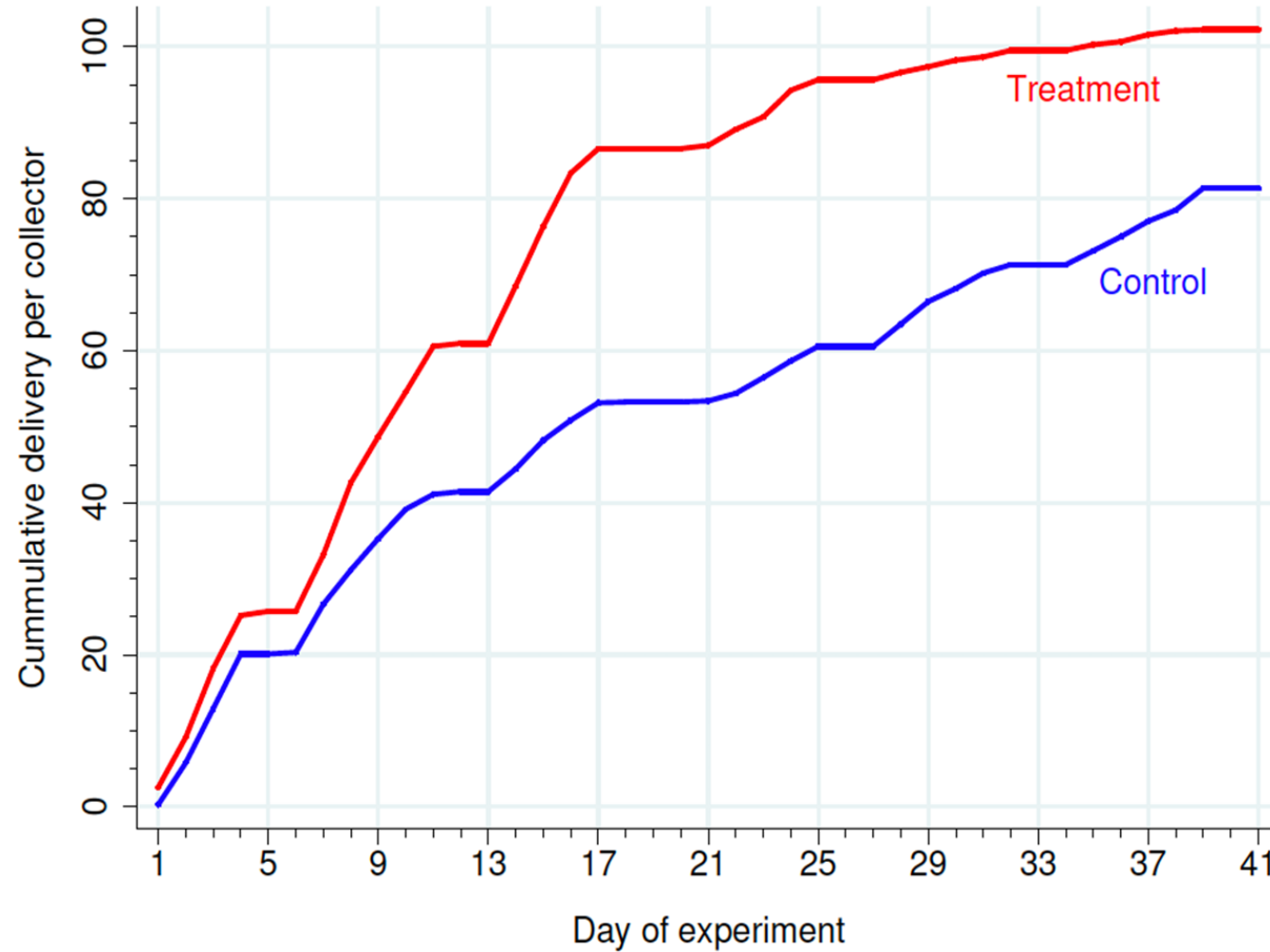
## Bill-level database from company + phone audits

- Amount paid

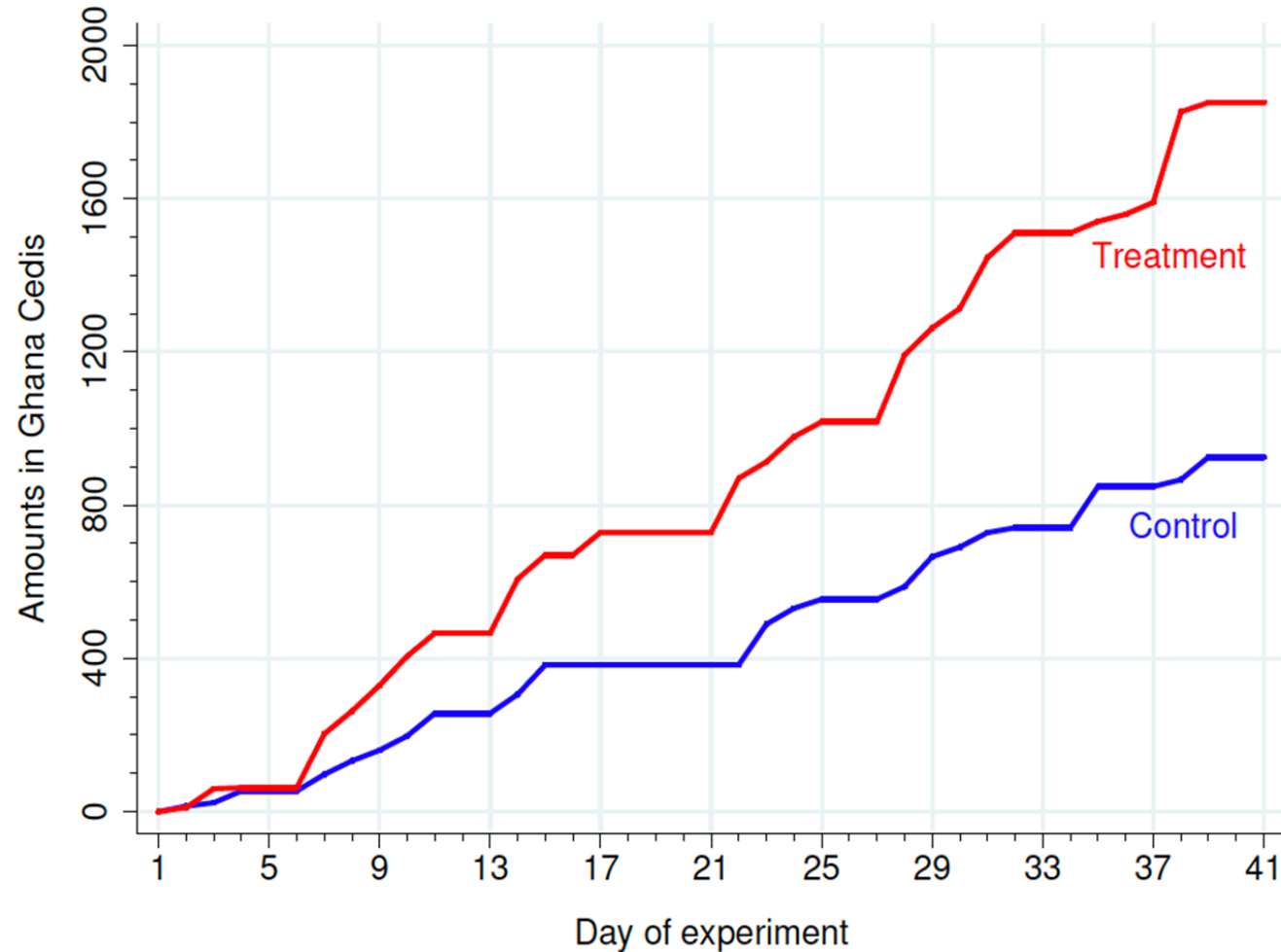
# Experimental Impacts of New Technology

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# Bill Deliveries 26% Higher in Treatment



# Revenue Collections 100% Higher in Treatment





**Why treatment effect on collections so much larger than on bill delivery?**

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# Plausible explanations

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Households have different attitudes towards payment when visited by collectors who show up with the technology

The Technology helps reduce leakages

The technology allows the collectors to learn about and focus their scarce time on households that are most likely to make tax payment

We examined these plausible explanations through Collector Surveys and Households

# Collector Surveys: Strategies for Collections

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Collectors surveyed in week 1, week 4 and week 6 of experiment

Asked about information on ratepayers / strategies for collections

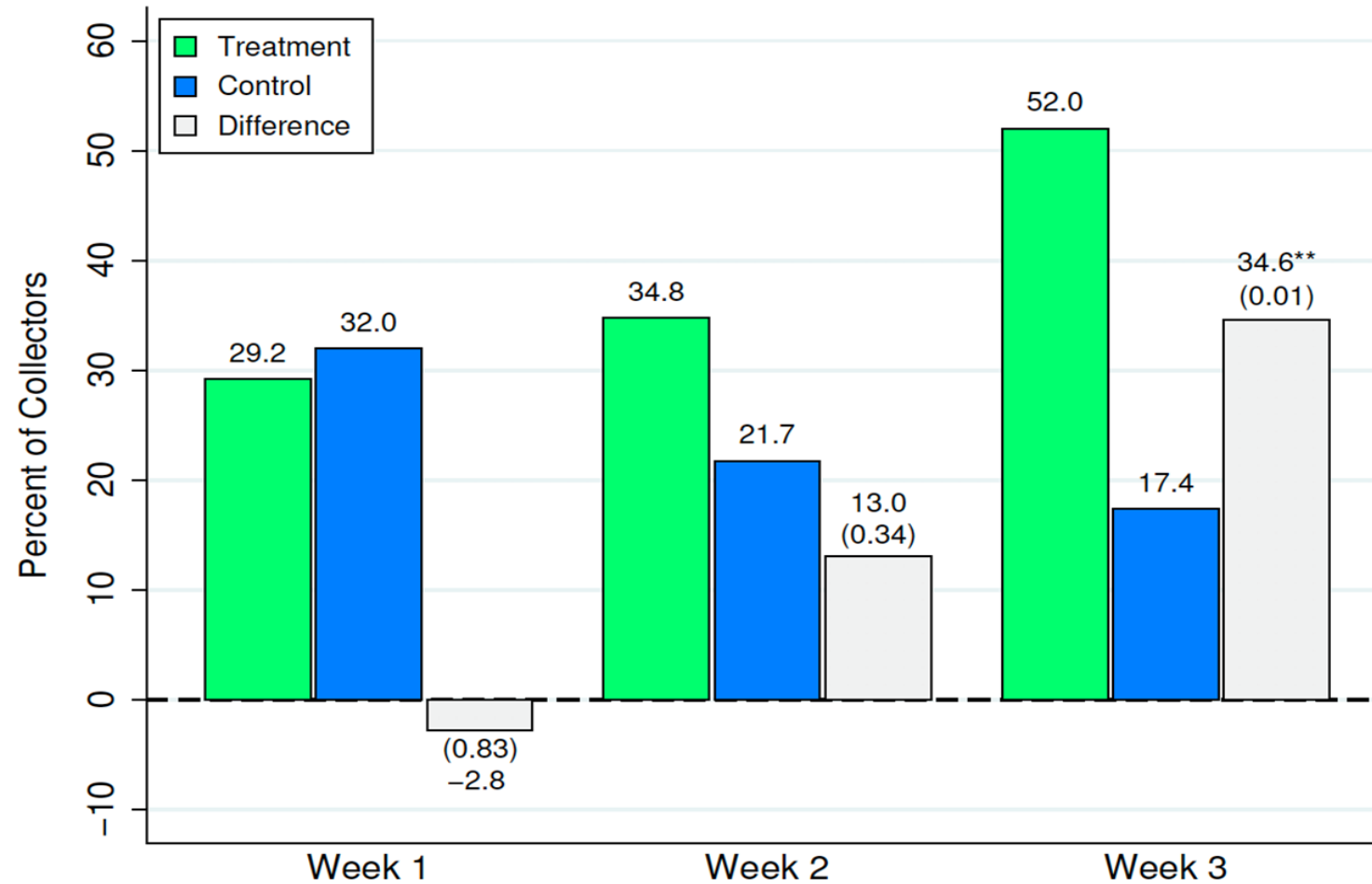
Do you have a good sense of who is willing and able to pay?

Focus on households who are aware of their taxpaying duties?

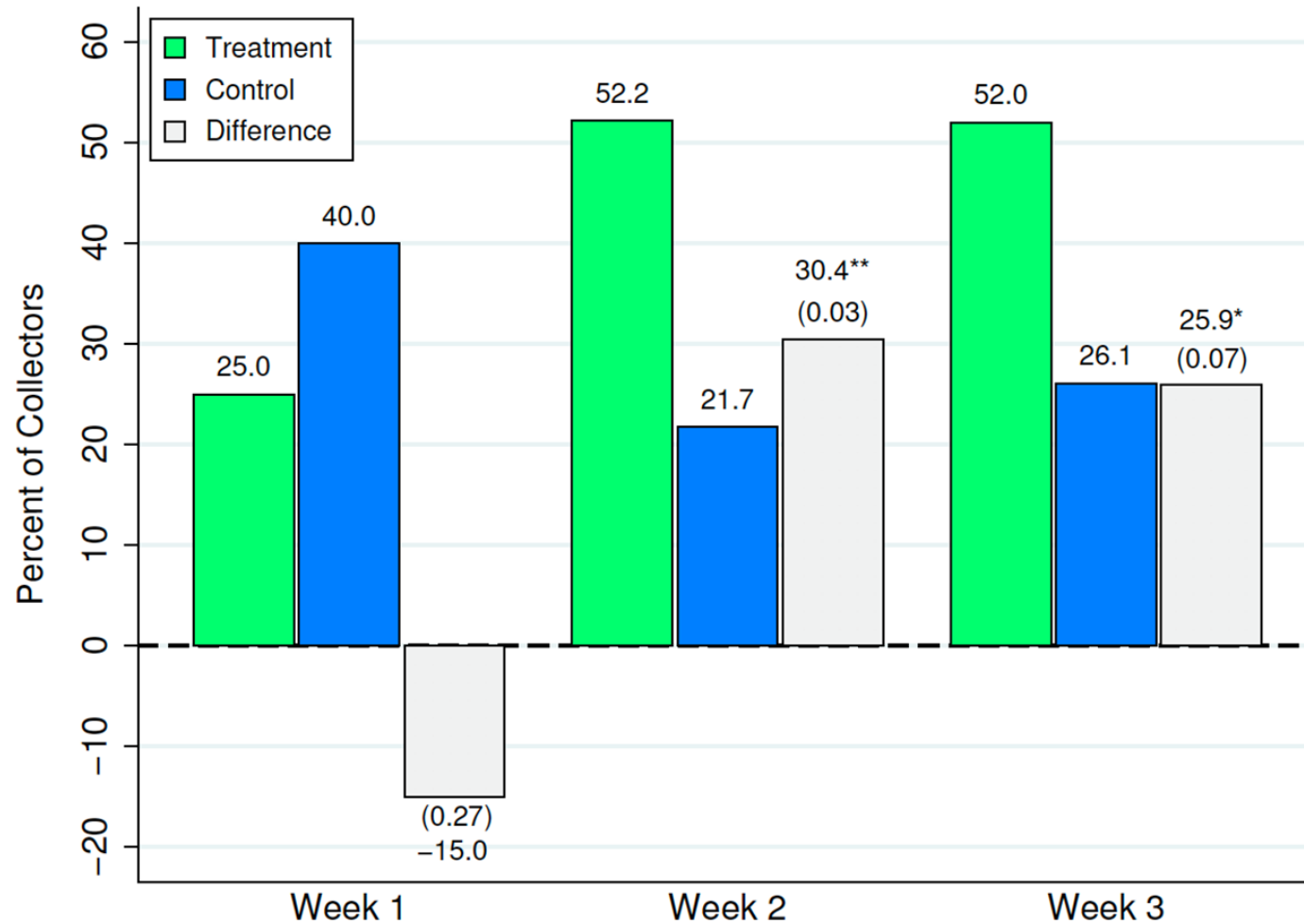
Focus on those satisfied with local public services?

Many other questions...

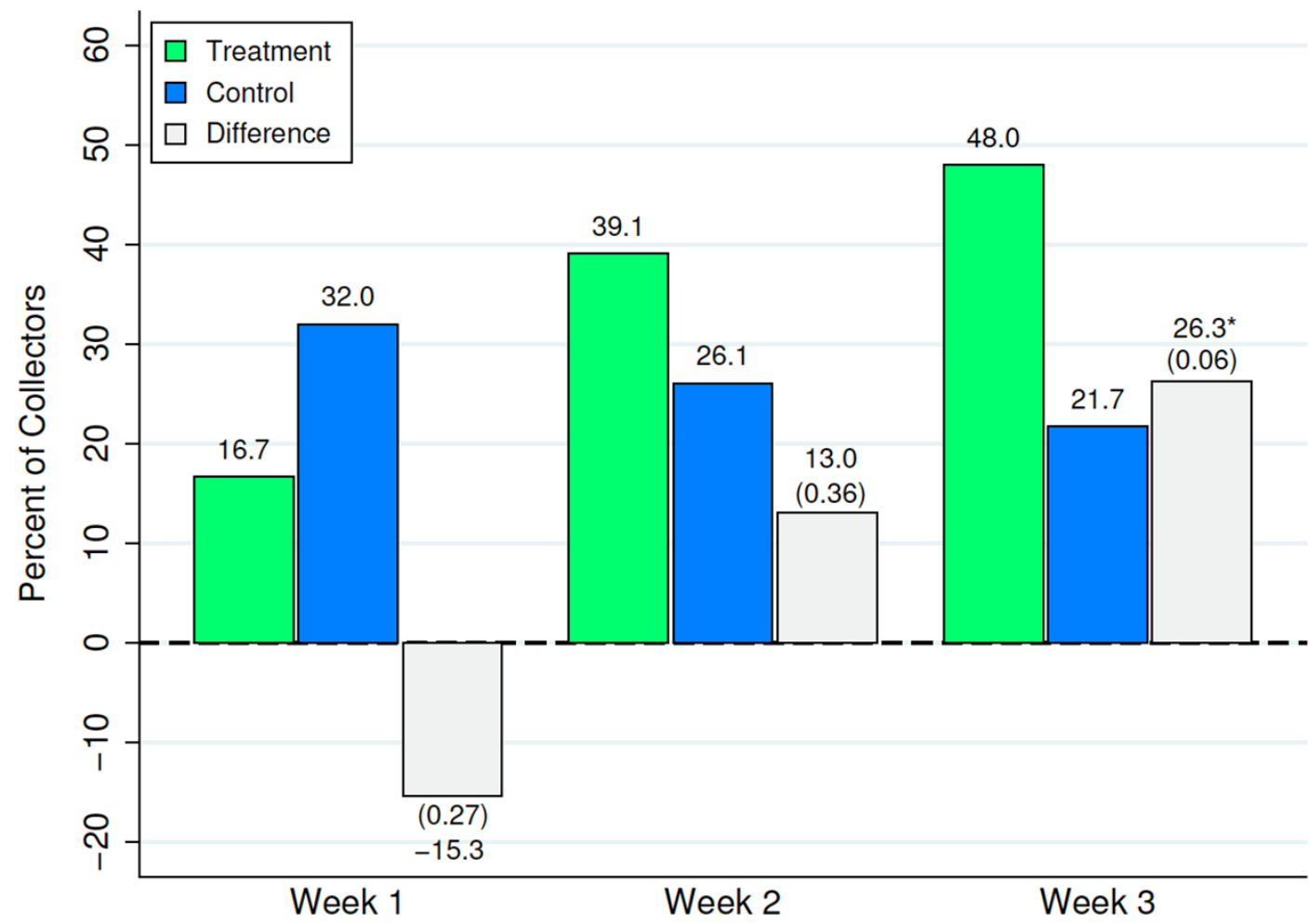
# Good Sense of Which Households are Willing and Able to Pay?



# Focus on Households Who are Aware of Their Taxpaying Duties?



# Focus on Households Who are Satisfied with Local Public Services?



# Household Surveys

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Surveyed 4353 households after experiment was over

Questions about

Amounts paid, whether bill distributed

Perceptions about revenue collections, potential leakages, satisfaction with public goods provision, etc

# Treatment Households More Likely to Be Visited by a Collector

Variable	P values of Difference						
	Control	Treatment	Diff.	Unadj.	Bonf.	Holm	R-Wolf
Received a visit from a revenue collector (%)	54.8	62.4	7.4	0.00	0.00	0.00	0.01
<i>If received a visit ...</i>							
... number of visits	1.9	1.7	-0.2	0.04	0.11	0.04	0.06
... revenue collector served you a bill (%)	92.0	88.0	-4.0	0.00	0.00	0.00	0.01
<i>If served with a bill ...</i>							
... have made payment for bill served (%)	32.6	39.8	7.2	0.00	0.00	0.00	0.01
<i>If made any bill payments ...</i>							
... amount paid after receiving bill (GHC)	248	276	28	0.35	0.70	0.35	0.31
Observations	2,155	2,198	–	–	–	–	–

Unadj. is the Unadjusted p-values, Bonf. is the Bonferroni adjusted p-values, Holm is the Holm adjusted p-values and R-Wolf is the Romano-Wolf adjusted p-values. Data Source: Household survey



## ... But LESS Likely to be Served a Bill, Conditional on a Visit

Variable	Control	Treatment	Diff.	P values of Difference			
				Unadj.	Bonf.	Holm	R-Wolf
Received a visit from a revenue collector (%)	54.8	62.4	7.4	0.00	0.00	0.00	0.01
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# More Likely to Pay Conditional on Being Served a Bill

Variable	Control	Treatment	Diff.	P values of Difference			
				Unadj.	Bonf.	Holm	R-Wolf
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# Treatment HH's More Satisfied with “Services Offered” by Collectors

Variable	Percent of respondents		Diff.	P values of Difference			
	Control	Treatment		Unadj.	Bonf.	Holm	R-Wolf
Satisfied in dealings with local govt tax collectors	57.1	61.3	4.2	0.01	0.02	0.01	0.01
Satisfied with services offered by local govt tax collectors	52.2	59.5	7.4	0.00	0.00	0.00	0.01
Satisfied with services offered by local govt tax dept	40.7	50.6	9.9	0.00	0.00	0.00	0.01
Observations	2,155	2,198	–	–	–	–	–

Note: Unadj. is the Unadjusted p-values, Bonf. is the Bonferroni adjusted p-values, Holm is the Holm adjusted p-values and R-Wolf is the Romano-Wolf adjusted p-values. Data Source: Household survey

# Treatment Households Say "Unofficial Payments" More Common

Variable	Control	Treatment	Diff.	P values of Difference			
				Unadj.	Bonf.	Holm	R-Wolf
Likely collector will ask for an unofficial payment (%)	15.0	18.0	3.0	0.04	0.16	0.12	0.06
<i>If a collector is likely to ask for an unofficial payment ...</i>							
... amount typically asked for (GHC)	72	85	13	0.14	0.58	0.29	0.22
Likely collector will offer to take an unofficial payment (%)	12.6	13.4	0.9	0.53	1.00	0.53	0.52
<i>If a collector is likely to offer to take unofficial payments ...</i>							
... amount typically offered (GHC)	234	156	-78	0.00	0.01	0.01	0.01
Revenue collectors are competent (%)	77.3	73.2	-4.0	0.00	0.00	0.01	0.01
Revenue collectors are trustworthy (%)	72.6	67.4	-5.3	0.00	0.00	0.00	0.01
Percent of collections collector is likely to pocket	16.4	21.7	5.3	0.00	–	–	–
Observations	2,155	2,198	–	–	–	–	–

Note: Unadj. is the Unadjusted p-values, Bonf. is the Bonferroni adjusted p-values, Holm is the Holm adjusted p-values and R-Wolf is the Romano-Wolf adjusted p-values. Data Source: Household survey

# Increased information as a double-edged sword

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The technology allows collectors to learn about and focus their scarce time on households that are most likely to make tax payment

However, technology also increases the incidence of bribes, with effects concentrated in the bottom quartile

# Conclusion

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# Policy Implications

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Positive effects of technology only partly due to the embedded with property and geo-spatial data.

Technology allowed collectors to overcome learning constraints in the field, which limited their ability to build information about taxpayers' propensity to pay.

Policy implications

In settings where such information sources are largely non-existent, the state can still strengthen its informational capacity by directly building information about taxpayers' propensity to pay.

Needs to balance the positive and progressive tax effects against the regressive bribe effect

Minimise the unintended consequences

# Thank You

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