



# The Economist as Plumber

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Richard T. Ely Lecture

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## Introduction

- ▶ Increasingly, economists get the opportunity to help governments design new markets, policies and regulations: school assignment, auctions, social policies,...
- ▶ When we do so, we must get the big picture right but also the *details*
  - ▶ Because policy makers are not engaging with them enough
  - ▶ ....and because those details matter a great deal
- ▶ Example: Connection to Water Supply in Morocco, Tangiers (Devoto et al.)
  - ▶ Cities of Tangiers and its contractor, Veolia recognized the need to facilitate the poors' access to running water in their homes.
  - ▶ Large investment in water supply network to make this possible, and interest free loans
  - ▶ But take up was low: information, paperwork limited access
  - ▶ A door to door campaign with enrollment at home increased enrollment and gave people the benefit of water access.



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## Introduction

- ▶ Getting into such details requires a mindset change
- ▶ Models provides limited ex-ante guidance on what details will turn out to be important—We need to be willing to take some (more or less) educated guesses, experiment with them, and tinker as needed
- ▶ Al Roth's (2002) talks of the “economist as engineer” ; Banerjee's (2002) as economist as a craftsman
- ▶ I call this the economist as plumber.
- ▶ Plumbing: Focus not on *what* policy should be implemented but, given a broad objective, on the very practical details of its implementation.
- ▶ Today, I am not seeking to argue that all economists should become plumbers; merely that there is social, and scientific value in plumbing



# Outline

1. Scientists, Engineers, Plumbers
2. Why Policy Makers needs more Plumbers
3. Why Economists make good Plumbers
4. Plumbing and Experiments
5. The Plumbers and the Scientists



## Roth (2002): Economists as Engineers

*“Market design involves a responsibility for detail, a need to deal with all of a market’s complications, not just its principle features. Designers therefore cannot work only with the simple conceptual models used for theoretical insights into the general working of markets. Instead, market design calls for an engineering approach”*

- ▶ Scientists provide the general framework that guides the design
- ▶ Engineer takes those general frameworks and confronts them to a real situation
- ▶ If there is no elegant solution, he will get as close as possible, and then use simulations and computations to design a system that should work given the realistic assumptions.
  - ▶ School assignment: Engineering approach take theoretical literature on matching and proposes mechanisms that cities can actually implement to assign students to schools.



## The economists as plumber

- ▶ The plumber goes one step further: she fits the machine in the real world, carefully watches out what happens, and tinkers as needed.
- ▶ In doing so, she has to resolve any number of very practical questions:
  - ▶ When designing a new school assignment system, how to communicate with parents? how will they understand the system? how many schools should they rank? Will they trust a system that has a single lottery number to break ties? Should they have priority in a “walk zone”?
- ▶ The engineer knows what are the important features of the environment and tries to design the machine to address them.
- ▶ The economist-plumber does not have the safety net of a bounded set of assumptions. She must make guesses, and she is not even sure what details will turn out to be important.



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## Pathak (2016): “What really matter in school choice design”

*“What really matters for school choice market design are basic insights about straightforward incentives, transparency, avoiding inefficiency through coordination of offers and well-functioning aftermarkets, and influencing inputs to the design, including applicant decision-making and the quality of schools. Some of the issues examined in the extensive theoretical literature on school choice matching market design are less important for practical design. [...] It's worth emphasizing that it is only with the benefit of several design case studies that we're beginning to understand which issues are quantitatively important”*



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## Two large classes of plumbing issues

- ▶ Design of taps: apparently irrelevant details.
- ▶ Piping issues: Large decisions, but hidden from plain view, so not perceived as having a bearing on the effectiveness of the policy: Flow of funds, who has sign off authority on decisions.



## Banerjee, Hanna, Kyle , Olken, Sumarto: Raskin program in Indonesia

- ▶ Raskin program in Indonesia, provides eligible households with 15kg per month of heavily subsidized rice
- ▶ Program is centrally mandated and funded, but locally implemented by village heads
- ▶ Information about the program among citizens is low:
  - ▶ Only 30% of eligible households know that they are actually Raskin eligible, and beneficiaries believe the copay is 25% higher than it actually is
  - ▶ Eligible only receive 1/3 of intended subsidy
- ▶ Plumbing question: Will program transparency increase the amount of subsidy eligible households receive?



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## Project design

- ▶ Randomized trial in 572 villages working with the Indonesian government
- ▶ In 378 randomly chosen villages eligible households received Raskin identification cards, which informed them they were eligible and the amount of rice




# Sample card



**KARTU RASKIN**  
**SEPTEMBER 2012 - DESEMBER 2013**  
**KABUPATEN BANDUNG**

<b>Nama KRT:</b>	Agus Budi
<b>Nama PKRT:</b>	Siti Jasnah
<b>Nama ART:</b>	Habib
<b>Alamat:</b>	Gg. Markisa No.24 Kampung Ciwedi, Saketi

Tanda Tangan / Cap Jempol Pemegang Kartu



Kartu ini harus diperlihatkan pada saat pengambilan beras

**HAK PEMEGANG KARTU RASKIN:**

1. Pemegang kartu ini berhak untuk menerima beras Raskin sebanyak 15kg per RTS-PM per bulan selama bulan September 2012-Desember 2013
2. Harga tebus beras Raskin adalah Rp. 1.600 per kg di Titik Distribusi.

**KETENTUAN:**

1. Pembayaran Raskin dari RTS-PM kepada Pelaksana Distribusi Raskin dilakukan secara tunai
2. Kartu harus disimpan dengan baik, kehilangan atau kerusakan kartu menjadi tanggung jawab pemegang kartu
3. RTS-PM harus dapat menunjukkan kartu Raskin pada saat pengambilan beras.



## More details...

- ▶ Within treatment villages varied 4 aspects of the card program
  - ▶ Public information about eligibility and cards (in addition to private information)
  - ▶ Who received the cards (all eligible households or a subset) to test whether physical card matters
  - ▶ Whether cards contained clipoff coupons (to enhance perceived accountability)
  - ▶ What information was printed on the cards (copay price or not)





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## Price vs. no-price

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- ▶ Price vs. no-price: Designed to test precisely whether varying information on cards matters
  - ▶ Varied whether cards contained information on co-pay price or not



## Findings

- ▶ Sending out identification cards dramatically improved the subsidy
- ▶ The very specific way in which the card is produced and distributed is very important.
  - ▶ Public information doubled the impact of the cards
  - ▶ Return to increased information per se written on cards
  - ▶ Physical proof of information (through cards) important
  - ▶ Clipoff coupons did not matter
- ▶ This intervention was designed working closely with the Indonesian government
  - ▶ Designed in response to a request
  - ▶ Scaled up nationally in June 2013



## Banerjee et al: Reforming the fund flow for the MGNRES program

- ▶ MGNREGS is a demand-based workfare program providing up to 100 days of work per rural household in India. 182 Million beneficiaries.
- ▶ Federally funded program which transfers funds to state on basis of projected demand. Beneficiary selection and work provision undertaken at village (Gram Panchayat)
- ▶ It has suffered from massive corruption.
  - ▶ Niehaus and Sukhtankar (2013) search for 1499 reported MGNREGS workers in the state of Orissa. 50% were ghost workers; those that received work typically received less than reported amount payments.
- ▶ In this context, in collaboration with MORD, we implemented and evaluated on a large scale a reform of state fund flow.



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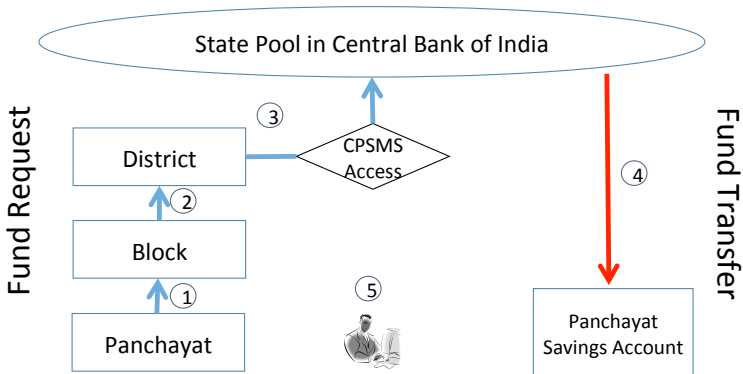


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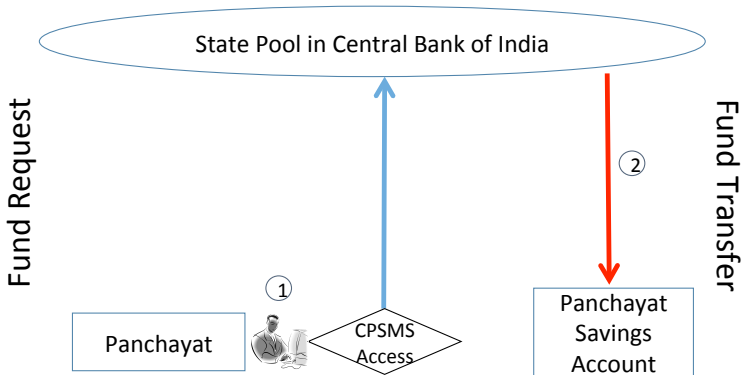
## Fund Flow of Expenditures in Control







## Fund Flow of Expenditures in Treatment (Labor Payments only)



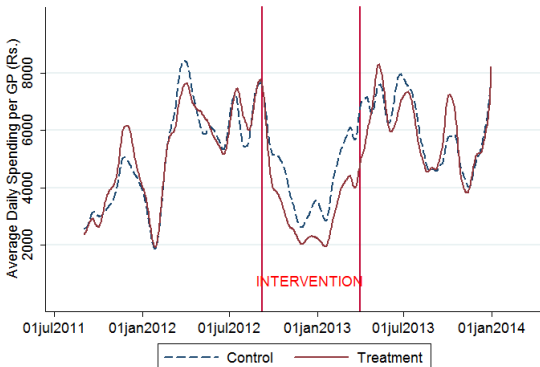


## Possible benefits?

1. Administrative simplicity: Should have increased predictability of transfers.
2. Public finance benefits: reduce idle balances.
3. Change the incentives: increase the ability of government to detect and punish fraud.



## Decrease in Spending



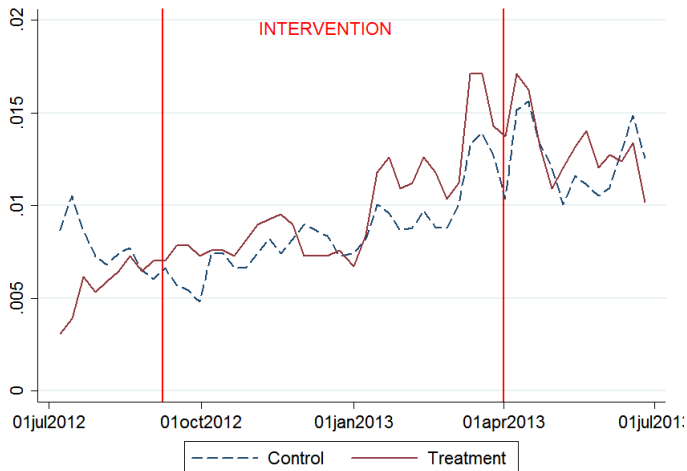
Source: CPSMS Credit and Debit data.

Estimated effect = Rs 230,000 per GP for total of 4.1 million USD  
 Using nrega.nic.in we see slightly higher number: Rs. 330,000 per GP



Layout of pipes

## No change in employment (Household Survey)



Source: Household survey (May- July 2013)



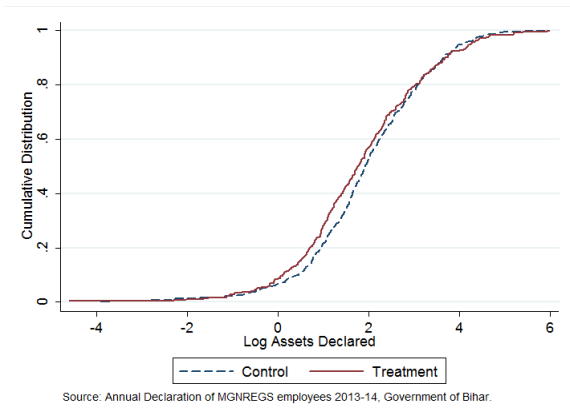
## Ghost Busters?

Matching the census and the NREGA data base

- ▶ NREGA Job Cards Data: 6 million names in 18k villages
- ▶ SECC Census Data : 33 milion names in 16k villages
- ▶ Goal is to determine for each household in the job cards data whether there is a matching household in the census data (person with the same name in the same village)
- ▶ Overall we match a bit over 50% of working households during the intervention period.
- ▶ Program reduce fraction of ghost working household by 5%.



## Decline in assets of block and GP officials in the middle of the distribution



Kolmogorov smirnov test of stochastic dominance =  $p=0.057$



## Epilogue

- ▶ Local officials successfully lobbied for removal of the reform before evaluation results came out
- ▶ After evaluation results came out
  - ▶ Scale up to all of MGNREGS
  - ▶ Effort to scale up to all of decentralized government programs



## Policy Makers don't think Plumbing matters

- ▶ India's demonetization.
  - ▶ November 8: 86% of the currency in circulation was made invalid tender with a month notice.
  - ▶ Logistical issues: No bills, more than 100 rules issued in 3 weeks on what people could do with the money





## Why is it the case?

- ▶ All economic agents fail to experiment and get things wrong (Banerjee, 2002)
- ▶ They fail to notice important things: Hanna, Mullainathan and Schwartzstein (2015)
- ▶ Problem is worst for bureaucrats
- ▶ Illusion of "high Modernism" - (James Scott *Seeing like the State*): bureaucrats tend to think they can *will* all complexities away.
- ▶ Banerjee-Duflo (2012). Government policy is generally characterized by 3I "Ideology, Ignorance, Inertia"



## Third Party Auditing and Environmental regulation (Duflo, Greenstone, Pande, Ryan)

- ▶ Gujarat is one of the most polluted place in India.
- ▶ To complement standard “command and control” inspections, Supreme court ordered a third party audit system: each plant with high pollution potential must hire a private auditor and receive a private audit.
  - ▶ Potential advantages of capacity/expertise, flexibility and cost.
  - ▶ Support environmental standards like ISO 14001 and carbon offsets (Potoski and Prakash, 2005; Bhattacharyya, 2011).

Figure : Audit Readings for Suspended Particulate Matter (SPM)

## Suspended particulate matter, mg/Nm<sup>3</sup>

A. Control, midline

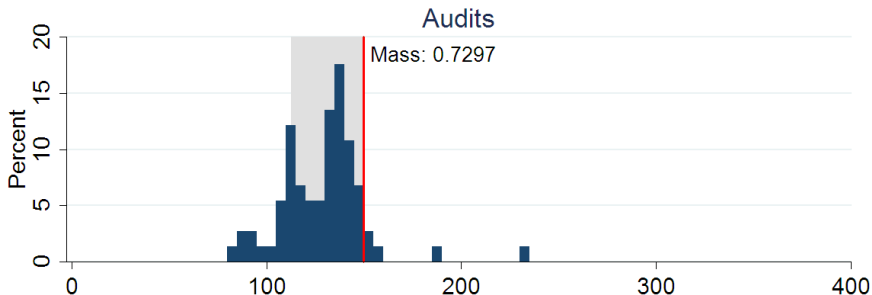
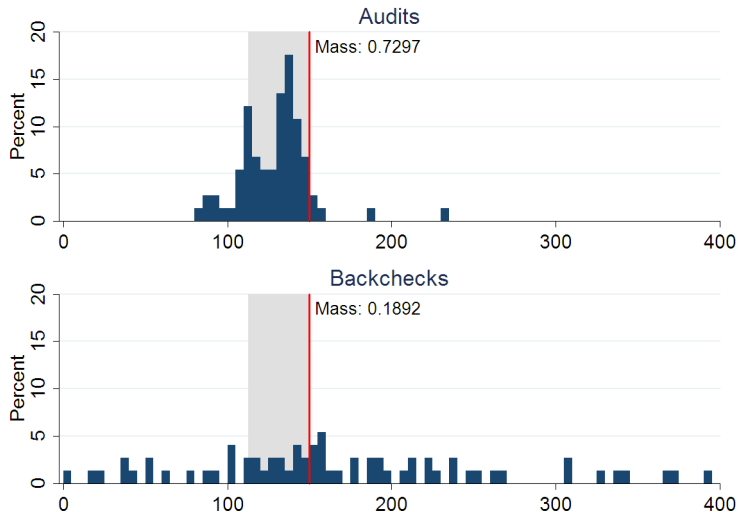


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#### A. Control, midline





## Consequence 2: Scope for Action even in Bad Environments

# Scope for action in bad environments

## Direct free lunch certification

- ▶ Free Lunch certification: in 2012-2013 12.3 millions of children were certified for free lunch through tinkering in the rules for automatic certification for children enrolled in other programs
- ▶ Direct certification was mandated in 2004
- ▶ Healthy, Hunger-Free Kids Act of 2010 was a set of “plumbing” steps to increase direct certification
  - ▶ Authorizing name matching of different data bases,
  - ▶ Removing the option of “letter certification”, where a letter was sent to the parents who had to forward it to the school
  - ▶ Institute State Award for best performers
- ▶ Large increase in direct certification, and in overall certification, without any acrimonious debate on entitlement and budgets.



## Why Economists (can) make good Plumbers

Many of plumbing challenges are related to fundamental issues of economics.

- ▶ Behavioral issues
- ▶ Incentives issues
- ▶ Market equilibrium



## Policies for Humans

- ▶ Limited information, limited willpower, limited attention, bargaining within families, ...: details on how policies are packaged to citizens matter a lot.
- ▶ The success of the “nudge” agenda has given some salience to these types of issues both in economics (Behavioral public finance) and in policy making: “nudge” units.
- ▶ The need for a careful economic analysis remains.
- ▶ Handel and Koldstad’s work: “health insurance for humans”. Need to thread very carefully. Solving one problem (inertia in plan choice) activates another problem (adverse selection).



## Incentives for Government workers

- ▶ “Personnel economics of the state” (Finnan, Olken, Pande, 2016)
- ▶ Some are quite salient (Salary, Bonuses, retention)
- ▶ Other are more plumbing-like—Examples:
  - ▶ Should hiring of frontline workers emphasize career, or public service?
  - ▶ What is the impact of transfers policies on incentives?



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## Incentive architecture

- ▶ More generally, when designing a new policy, we tend to ignore that the government is an organization (Gibbons)
- ▶ The way a particular policy fits into this organization power structure and its culture, will create the “incentive architecture” that will influence the behavior of the agents and hence how the policy will be implemented
- ▶ Importance of piping issues, which are particularly neglected.



## Understanding governments as organizations

Banerjee et al, 2017: Mainstreaming an effective education intervention

- ▶ “Proof of concept” experiments in India and elsewhere have shown the value of remedial education and “teaching at the right level” (Banerjee et al)
- ▶ Logical next step is to train the teachers to do the same thing themselves
- ▶ Series of RCT conducted in collaboration with Pratham (and NGO, implementers) and the Government, as Pratham was scaling up within the government program (training of thousand of teachers in Bihar and Uttarakhand)



## Banerjee et al, 2017: Mainstreaming an effective education intervention

- ▶ First RCT : the program was not adopted by teachers (even though replication by Pratham staff confirmed effectiveness in that context)
- ▶ Qualitative work: nothing change in the incentives of teacher to "complete the curriculum"
- ▶ Second RCT:
  - ▶ Protected time in the day
  - ▶ Support from teacher supervisor (trained and given "ownership").
- ▶ Program was carried out properly, led to increased test scores.



## Firms maximize profit

- ▶ And hence will find every loophole to game regulation: plumbing is an economic game.
- ▶ Duflo, Greenstone, Pande, Ryan (2013)



## Changing a market: Audit reform

- ▶ Worked with regulator to evaluate audit reform at scale
- ▶ Audit treatment reforms three aspects of existing system on a pilot basis for 233 of 473 plants, mostly textile processing
  1. Random assignment of auditors and fixed payment from central pool (independence).
  2. Backcheck auditors on performance (monitoring).
  3. In year 2 of the experiment, additionally, auditors paid for accuracy relative to backchecks (accuracy incentives).

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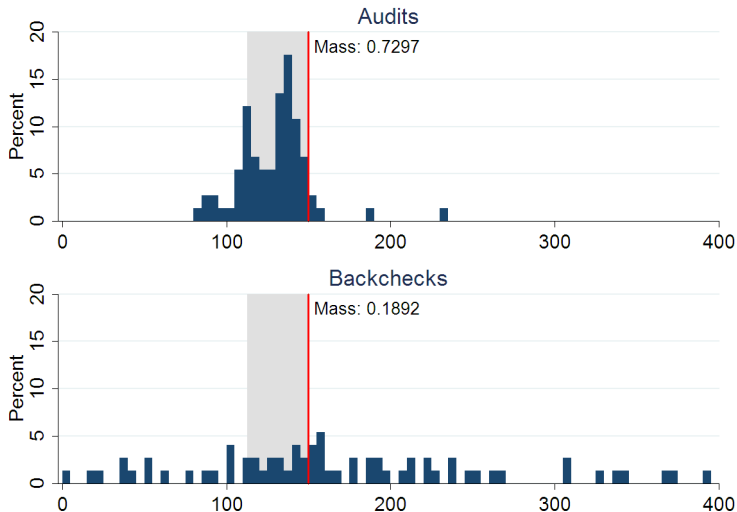


Figure : Audit Readings for Suspended Particulate Matter (SPM)

### Suspended particulate matter, mg/Nm<sup>3</sup>

#### B. Treatment, midline

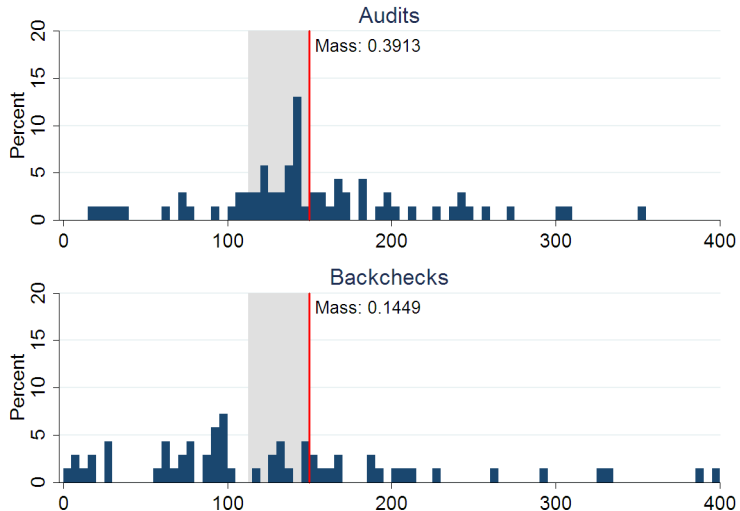
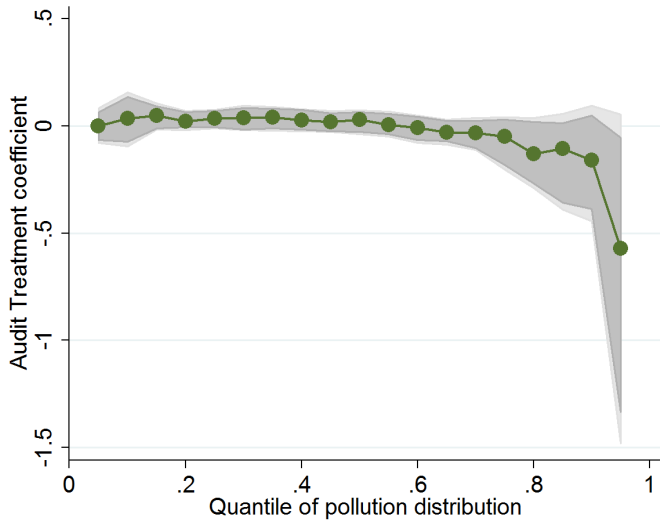


Figure : Quantile Regression Effects of Treatment on Endline Pollution







## Plumbing and Field Experiments are Natural Complements

- ▶ The fundamental uncertainty created by our ignorance has consequences for the engineering of public policy: “Robust” policy will take model uncertainty into account (Hansen and Sargent, 2007, Chetty 2016).
- ▶ We need to propose the best pipe layout and tap design given what we know
- ▶ We need to take seriously questions and suggestions from the field that would be irrelevant in our models
- ▶ But it mainly means that we need to *know* we are guessing, and we need to be very open to course correction: an economist plumber *will* get it wrong.
- ▶ Her responsibility is to persistently experiment: Cycle: try out–observe–tinker.



## Example: Nudges don't always work

- ▶ Keesler and Roth: Active choice for organ donations.
- ▶ “Obvious” policy to do given what we know (Thaler, 2009)
- ▶ But in practice Keesler and Roth find that it fails in California, and it fails in the lab.
- ▶ Not a comment on nudges in general: good ideas often fail.



## Why Randomize?

- ▶ Randomization not always necessary for experimentation and observation but there are good arguments for it:
  - ▶ Usual arguments for identification
  - ▶ When evaluating non randomized, natural intervention, too many details are changed at once: impossible to know what is going on precisely, and thus extract more general lessons.



## Why Randomize?

- ▶ Formal experimentation, with a research design and a review process, creates a natural space for trying out things and changing them if they don't work. This creates automatic sunset and expansion clauses (Greenstone 2009).
- ▶ Designing an experiment disciplines policy makers to be precise about what they don't control and what they do control and articulate what is their view of what will happen when they push a lever.
  - ▶ Even failure is instructive: they may realize they had less control than they thought.
  - ▶ Example: Banerjee, Duflo, Keniston, Singh : Reforming police in Rajasthan.



## Is Plumbing science?

Since the details are often context and organization specific, are these plumbing projects science? Should other economists care?



## Plumbing experiments generates useful variation

- ▶ Often, evaluating the impact of a nationwide program is not easy: there is no counterfactual
- ▶ But since take up of national policy depends a lot on "design of taps" issues, plumbing experiments can help generate counterfactuals (encouragement designs).
- ▶ Devoto, Duflo, Dupas and Pons : Fixing the plumbing generates a first stage, which allows us to measure the impact of water connection.



## Special case: Equilibrium effects

- ▶ Something plumbing experiments are uniquely good at: equilibrium impacts of policies
- ▶ Plumbing experiments are often run by governments and can be run at scale
- ▶ The randomization unit can be the market
- ▶ Muralidharan, Niehaus and Sukhtankar (2015): introduce a smart card for payment of the MGNREGS wages.
  - ▶ Generates larger take up and larger benefits of the program
  - ▶ Randomization at subdistrict level, over a population of 20 Million.
  - ▶ Can look at impacts on MGNREGS on wages in the private sector



## Using the Plumbing to test Theories

- ▶ Some times the collaboration between a researchers and a policy makers allow to design plumbing experiments to be designed to test theories
  - ▶ Raskin experiment: unique test of the impact of the importance of common knowledge
- ▶ Not all plumbing experiments are that controlled, but my guess is that they will be more and more.





## Shining the spotlight

- ▶ Economics is fundamentally an applied science and needs problems to work on...
- ▶ Plumbing experiments uncover things and shine the spotlight on issues that theorists had previously ignored, and this may motivate new problems to work on.
- ▶ Examples from school assignment plumbing literature (Pathak, 2016):
  - ▶ Breaking ties in lottery: single or multiple lotteries?
  - ▶ The walk zone issue: how to handle precedence?
  - ▶ People's (and officials) perception that some scheme are easier to manipulate than other: Li (2016) and the "obviously strategy proof" mechanisms.



## Does plumbing have a comparative advantage or disadvantage?

- ▶ Plumbing is not the only way to learn about the world for scientists
- ▶ Some important plumbing issues are very basic economics, or hard to theorize
- ▶ But the problems are important: spotlight may shine brighter.
- ▶ Example of retirement savings:
  - ▶ Madrian and Shea uncover the important role of default
  - ▶ This is followed by a slew of replications of this basic facts
  - ▶ And theoretical work on the fundamental welfare issues that this pose: can/should default be avoided ?(Caroll et al, 2009). Should savings be mandated (Amador, Angeletos, Werning)? If default are important, how to set the optimal default (Bernheim et al, 2017)?



## And may be this is not what we should worry about?

- ▶ Ultimately, we need to remember that plumbing experiments are not just data
- ▶ High stakes experiments: Millions of dollars spent, lives of many people is affected, and hopefully improved by careful attention to detail
- ▶ The ACA is quite a unique institutions, not at all generalizable. Yet working on getting the details right was (rightly) considered to be really important.
- ▶ Getting a school choice system right influences the lives of millions of children
- ▶ Raskin: more than 60 million cards distributed
- ▶ Gujarat pollution: regulation change in the state, a population of 66 million
- ▶ Reform of payment in MGNREGS: directly affects 182 million beneficiaries.



## Conclusion

- ▶ Economists get the opportunity to help design actual policies and institutions.
- ▶ They must get the science right, the engineering right, and the plumbing right.
- ▶ Plumbing issues often involve core economics problems on which we have expertise and experience, and have large consequences: we should not be shy to engage with them.
- ▶ Even if this requires a very pragmatic and experimental mindset: make decisions without the full backing of science; experiment; be willing to backtrack.
- ▶ With with mindset we will do some good, here and now.
- ▶ And some times novel and interesting insights and problems emerge.