Presentation from the USDA Agricultural Outlook Forum 2017

United States Department of Agriculture
93rd Annual Agricultural Outlook Forum
"A New Horizon: The Future of Agriculture"

February 23-24, 2017
Arlington, Virginia

Informing evidence-based policy with facility-level data

February 23, 2017

Tim Beatty, University of California, Davis
Jay Shimshack, University of Virginia

UC**DAVIS**

Evidence based enforcement policy in food safety

How can data be used to inform policy making so FSIS can best accomplish its mission to ensure that the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labeled?

Using data to answer these questions:
- **Which** FSIS monitoring and enforcement tools work best and maximize value?

- **When and where** do FSIS monitoring and enforcement tools work best and maximize value?

- **Can we quantify benefits** of FSIS monitoring and enforcement activities?

UCDAVIS

Monitoring and enforcement tools

Continuous Inspection

Noncompliance Reports (**NR**)s.

Notice of Intended Enforcement (**NOIE**)

Suspension / withdrawal

Civil or criminal sanctions

UCDAVIS

How are enforcement tools supposed to work?

Direct effects on harm

- Inspectors and NRs easily identify correctable issues.

Specific deterrence

General deterrence

- Interventions at one facility "spill over" to affect performance at other facilities

Inducing 'beyond-compliance' behavior

- Reduce the probabilities of unintended outcomes
- Reduce the probabilities of contamination by other pathogens

UCDAVIS

How do we know if they are working?

Data!

Measurement is critical, especially at a time where agencies are being asked to do more with less.

Using data:
- Analytics can aid internal agency management.

- Carefully linking FSIS activity to subsequent behavior allows FSIS to identify tools, industries, facility characteristics, etc. where actions generate a large 'bang per buck'.

- Quantitative deterrence measurement can allow regulatory agencies to make justifiable, data-driven statements about the impacts of their regulatory activities to external stakeholders.

UCDAVIS

What can we say with evidence based enforcement policy?

(1) "The average NOIE at a typical poultry slaughter facility reduces subsequent violations at the **same facility** by AA%."

(2) "The average NOIE at a typical poultry slaughter facility reduces subsequent violations at **similar facilities** by BB%"

(3) "An average NOIE at a **large** facility reduces subsequent violations CC times as much as at a **small** facility"

(4) "After adjusting for **cost differences**, the 'bang per buck' of an NOIE at a large facility is DD times greater than the 'bang per buck at a small facility."

(5) "The monetized **public health benefits** (via reductions in direct healthcare expenditures) are $EE,EEE per NOIE.

UC**DAVIS**

Standard measures may not offer answers to these questions

Commonly used metrics to measure performance by agencies may include:

- NR counts, NOIE counts, # fines imposed, penalty dollars assessed, recalls, suspensions, withdrawals etc.

In many cases, these common metrics are not been systematically linked to the frequency and severity of violations.

These metrics may also substantially understate the true effects of interventions by missing:

- Deterrence effects over time
- Spillovers / General deterrence
- Beyond compliance behavior

So how should we do this?

Randomized controlled trials (**RCT**s):
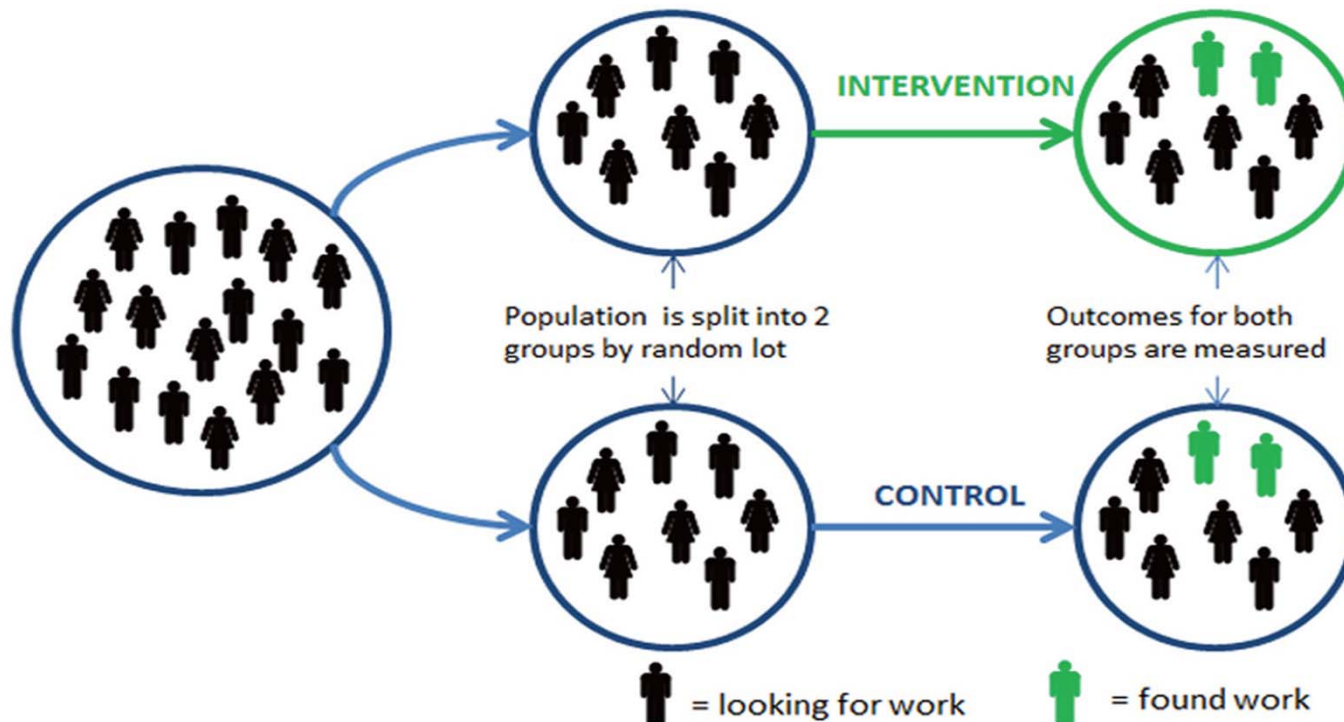
UC**DAVIS**

Why are RCTs a good idea?

Credible **causal attribution** is assured – given good design.

The analysis is **relatively easy**, and researchers are often happy to help with design and evaluation.

For example, compliance RCTs could randomize:
- Food Safety Assessments (**FSA)** or Public Health Risk Evaluation (**PHRE**)
- Enforcement tools
- Messaging about penalty magnitudes
- Messaging about social comparisons
- Approaches to "naming and shaming" poor or "naming and proclaiming" good performers
- Compliance assistance

RCTs can be designed in such a way that public health is protected.

UCDAVIS

Remember, agencies run many implicit experiments every year….

Source – McCracken, Teresa, as cited in Paul Ferraro (2017), "Evidence-based programs to improve compliance: testing ideas with experimental project designs."

UC**DAVIS**

Limits to RCTs

RCTs are the gold standard, and *relatively* cheap in the food safety context, as compliance is continuously monitored.

Despite their promise, RCTs may be:
- Absolutely expensive
- Logistically challenging
- Discouraged / prohibited by law
- Discouraged by regulatory agency culture

But there are solutions to many of these issues.

Nevertheless:
- RCTs may be difficult to implement in practice
- RCTs may examine treatments that are less important

UCDAVIS

What then? Analyze already collected data.

For example, studies can use observational data on many facilities over many periods to try and draw lessons.

The basic strategy uses regression analysis to examine relationships between performance/safety/health outcomes – AND – enforcement actions– AFTER – controlling for other factors.

Interpretating results requires some caution. For example, over time might find more violations simply because detection technology gets better.
-	Any regression analysis needs to account for these kinds of issues

UCDAVIS

Observational data makes causal attribution difficult

Credible attribution – inferring causal relationships from the correlations revealed in a regression analysis – is difficult.

Measuring effects is challenging because of:

- Omitted variable bias.
- Reverse causality.

Modern research designs try to address these issues.

Options for addressing causality concerns

Natural Experiments: Situations where inspector actions or enforcement regimes approximate randomness for institutional reasons.

Instrumental Variables: Identify factors associated with the likelihood of the intervention but that have no direct impact on the outcome

Research design: Focus on questions that are less susceptible to reverse causality and omitted variable bias in the first place.
- Exogenous rule changes
- Spillover effects
- Situations where institutional details can be exploited for credible statistical identification

UCDAVIS

Quantitative deterrence measurement is an important tool, but it is not the only tool.

Quantitative approaches:

- Are often not well suited to going inside the "black box" of decision-making.
- Are often not well suited to data poor regulatory settings like those involving small business – although RCTs are still applicable.
- Can be difficult to execute carefully with expert assistance.
- May move slowly – particularly if you involve academics!

Systematic qualitative approaches are also crucial:

- The incredible knowledge base of inspectors, for example!

Cautiously…

What have researchers found in other settings?

UC DAVIS

Prior evidence on agency activity and sanctions

Nearly all studies directly analyzing deterrence and taking causality reasonably seriously find that agency activities generate:

- A direct reduction in the penalized harm itself.
- A specific deterrence effect.
- A general deterrence effect.
- A beyond compliance effect.

A large range of enforcement activities get results.

But the details matter

Enforcement without "teeth" generally has little to no impact on outcomes.

In contrast, formal enforcement actions – especially those with fines – typically lead to greater compliance.

Enforcement spillovers really matter.

The effects of agency activity are widespread.

UCDAVIS

Behavioral economics

While enforcement is important, other factors matter.

A literature – first outside of traditional economics – asserts that other factors affect compliance:

- Non-regulatory incentives, including input market pressures, output market pressures, and activist pressures.

- Compliance assistance & reductions in regulatory complexity.

- Social norms and perceptions of "fairness."

UCDAVIS

Take away lessons

→ **Penalties should perhaps be publicized.**

Spillover effects require that firms know about enforcement actions at similar facilities.

Transparency and public disclosure that leverage non-regulatory pressures by disclosing bad performers can be effective.

→ **Publicizing good behavior as the norm – and "the right thing to do" – may also important.**

Social norms influence behavior. A perceptions that noncompliance is the norm can lead to high levels of noncompliance.

→ **Regulations and penalty determinations should be clear, consistent, supported by services, & evenly applied.**

Compliance is enhanced when facilities perceive that regulators are: (**1**) fair, (**2**) trying to promote compliance, (**3**) applying rules similarly across facilities, and (**4**) providing benefits and services for good behavior.

UCDAVIS