

## **General Issue: Empirical Work in Economics**

In this course we will talk and discuss some empirical papers. Some are structural some are more reduced form. I want to give you some general comments on these different approaches. Not just applicable to IO, off course...

### Structural vs. reduced form

A structural econometric model is a stochastic model of behavior of economic agents. It gives rise to a reduced form model which is a conditional distribution of endogenous variables given the exogenous variables.

The data give us the reduced form, can we go back to structure?

Some Assumptions have to be made to build a structure, to go back to the structural parameters.

Why do we care about structural Form?

- To estimate parameters not directly observable from data
- Welfare analysis
- Simulate policy changes
- Compare different theories (sometimes can be done with reduced form)

What can we learn from Reduced form?

- Distribution of  $y_t/X_t$  ( $y_t$  given  $X_t$ ), correlation of variables
- Correlation or causality
- Best linear predictor
- Test (although careful/suspicious) different theories given a parameter of reduced form

Where more applied work lies, the differences are on

- How much you specify of the structure
- How serious to take the econometrics
- What to take away from results

Specification and Estimation of Structural Form:

1. Have a model: primitives, behavioral assumptions
2. add the error: where does the variation come from, timing
3. data, functional form, distribution assumption
4. Estimation method
5. specification testing, such that inference is credible

When reading a paper, keep in mind the following questions:

1. What is(are) the research question(s) ?
  2. What are the goals of the paper?
  3. Why should we care about the questions?
  4. What testable theoretical implications?
  5. How linked theoretical and empirical models?
    - What data are used?
    - What variables are used in the model?
    - What are the endogenous variables?
    - What are the exogenous variables? sources of identification?
    - How is endogeneity addressed? Credible?
    - What variation in the data identifies the elements of the model?
  6. Why author chooses that empirical model?
  7. Could one impose a structure and gain in terms of estimation of parameters of interest that one otherwise cannot?
  8. Are the parameter interpretations clear?
  9. Are the hypothesis test implications clear?
  10. Does the author test for specification of the model?
  11. What to take away from paper.
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## Information: Empirical Paper

(Reduced form paper)

Read the paper “EFFECT OF INFORMATION ON PRODUCT QUALITY: EVIDENCE FROM RESTAURANT HYGIENE” (published QJE)

### Details:

1. What is(are) the research question(s) ?

- Does (do grade cards) an  $\uparrow$  in information available to consumers (affect) cause  $\uparrow$  quality of product (hygiene scores)
- What is the effect of the grade cards on restaurant’s revenues

2. What are the goals of the paper?

- Find a causal effect: Does  $\downarrow$  in asym info  $\uparrow$  quality ?

3. Why should we care about the questions?

- Policy: voluntary vs. Mandatory

The theoretical literature on voluntary disclosure of firms' private information highlights the possibility of “unraveling” equilibria.

Following the logic of unraveling, the effects of the grade cards should be the same in cities with voluntary posting as in cities where posting is mandatory.

Whether voluntary disclosure can perform as well as mandatory disclosure in obtaining favorable market outcomes is an important question for policy-makers.

4. What testable theoretical implications?

Hygiene grade cards (Hgc) cause increase in average hygiene quality  
decrease incidence of food related illnesses

Because :

Hgc mitigate information asymmetry  $\rightarrow \uparrow$  demand high quality ( $\uparrow p$ ) and  $\downarrow$  demand low quality ( $\downarrow p$ ). If cost of  $\uparrow$  hygiene is less than benefit from  $\uparrow$  demand then low quality restaurants will  $\uparrow$  qual  $\rightarrow$  and hence average quality  $\uparrow$ .

Effect on prices - two scenarios possible: causal effect on price is ambiguous.

- Hygiene cards imply more product differentiation. Before consumers did not know about hygiene differences → softens competition among restaurants → ↑ average prices
- Hgc=> ↓ [Search costs of consumers about quality of restaurant (\*)]=> consumers are less captive to a certain restaurant => ↑ competition => causes ↓ price

(\*) note: This search cost is higher than search cost about prices

## 5. How linked theoretical and empirical models?

Equation of interest page 9.

### 5.1. What data are used?

data: sample of 57% restaurants in LA county.

[selection problem of smaller sample]? → no only minor changes in average hygiene scores from full to smaller sample.

To use sales data matched with data → results don't vary w/ small sample/full sample.

What variables are used in the model?

What are the endogenous variables? Hygiene inspection scores, revenue

What are the exogenous variables?

mandatory dummy m

Voluntary dummy v

Inspection score criteria dummies ( with and without subjective element)

$\alpha_i$ ,  $\beta$ ,  $\gamma$  coefficients,  $\varepsilon$  residual. ( $\alpha_i$  : restaurant fixed effects or restaurant characteristics in another equation)

Observation: a restaurant inspection

All restaurants are issued a grade card → so there is no control group not affected by legislation about grade card who are inspected.

Sources of identification?

Three sources exogenous variation:

- (p.8) unanticipated introduction of grade cards to be issued to all restaurants in the next inspection regardless of mandatory/voluntary.
- The identification of the effects of grade cards is primarily due to time series variation in whether grade cards are issued.
- Identification of mandatory/voluntary disclosure effects on quality is due to cross-sectional variation (some cities were mandatory some voluntary) and adapt mandatory during different periods in time

- Individual restaurants are randomly inspected at different points in time.

How is endogeneity addressed? Credible?

- Restaurant fixed effects to control for restaurant/city specific characteristics
- Bias of inspectors( endogeneity p.17)  
The revenue analysis is a very important complement to the hygiene score analysis. A concern might be that the inspectors modified their behavior in response to the grade card, and there has been no real improvement in hygiene, only easier scoring by inspectors.

By examining the effect of grade cards on revenue, we may verify that demand is responsive to hygiene quality and the increased provision of information.

A finding of significant effects on revenue would imply there are economic incentives at play, which lends credibility to the story that hygiene is being improved for the reasons we claim, rather than because of the changed inspector behavior, and there are actual hygiene improvements, otherwise consumers are being tricked by the inspectors.

- # food related illnesses (p. 19)

6. Why author chooses that empirical model?

7. Could one impose a structure and gain in terms of estimation of parameters of interest that one otherwise cannot?

Structural versus reduced form

8. Are the parameter interpretations clear?

9. Are the hypothesis test implications clear?

10. Does the author test for specification of the model?

- specification tests: checks p.11
- ~ full, smaller sample
- ~ gradual effects?

## 11. **What to take away from paper.**

A recent change in the regulation of LA restaurants provides a nice example to look at the relationship between information available to consumers and firm behavior.

The study does not focus on prices, but rather looks at firms' choices about product quality in the face of increased information being made available to consumers.

On the one hand, we may interpret this change in information as reducing search costs : Prior to grade cards, consumers were not sure how good the hygiene would be at restaurants other than the ones they had good experiences at, so they would tend to stay with those restaurants rather than trying out other restaurants in this way consumers are "captive" to restaurants, as if there are high search costs to going to other restaurants.

On the other hand, we might interpret the change as a reduction in the adverse selection problem: Prior to grade cards, there is a shortage of credible information about the quality of the hygiene at each restaurant, so that any restaurant that happens to have good hygiene is not rewarded for doing so. Hence there is no economic incentive for restaurants to incur the costs of raising their hygiene quality.

Either way, it is interesting to see if the increased provision of information to consumers caused any significant changes in outcomes for the restaurant industry. But the author tried to look at some aspects to see which of the above stories is best supported by the data.

### **What to take away from results:**

The analysis is broken down into two main parts:

1. what is the effect of the grade cards on restaurants' hygiene scores?
2. what is the effect of the grade cards on restaurants' revenues?

#### 1.Effect of grade cards on hygiene standards:

The estimated effect from mandatory disclosure of hygiene grade cards is an average increase in hygiene quality of about 5%.

The estimated effect from voluntary disclosure of hygiene grade cards is an average increase in hygiene quality of about 4%.

The significance of the effect from voluntary disclosure provides empirical support for the claim that there is an incentive for firms' to voluntarily disclose their private information, and that firms are responsive to this.

More details, for your curiosity:

He also examined the effect of the grade cards on specific violations and found a significant decrease in building structure-related violations, indicating that some improvements may be of a long-lasting nature.

## 2. Effect of grade cards on restaurant revenue:

The revenue analysis is a very important complement to the hygiene score analysis as mentioned above to check whether there has been a real improvement in hygiene, and not only easier scoring by inspectors.

Mandatory disclosure of hygiene grade cards causes average restaurant revenue to increase by about 4%, relative to average revenue in the absence of grade cards.

For restaurants that obtain an A, revenue is about 6% higher than before.

Since average annual revenue for restaurants in our sample in 1997 is roughly \$260,000, the absolute magnitude of the effect is an increase of roughly \$15,600 in annual revenue.

The effect from voluntary disclosure for an A grade restaurant is smaller at about 2%.

## Welfare Effects:

So far the analysis leaves unanswered a couple of questions you would probably like to know the answers to.

- What happened to prices for meals in LA restaurants following the grade cards?

Evidence from aggregate price indices suggests that prices fell due to the grade cards.

- What happened to output in the industry?

Evidence from aggregate industry employment data suggests that output increased due to the grade cards.

- What about restaurant profits?

Hygiene improvements are presumably costly for firms, but by how much is unknown. Average restaurant revenue is higher, which may be due to a shifting out of the industry demand curve.

Price seems to be lower and output seems to be higher, indicating more intense competition, driving the industry down the demand curve.

We don't know the extent of any entry/exit of restaurants to the industry, but this is potentially a good indicator of changes in profitability.

Bottom line, looks like industry may possibly be less profitable now, but the analysis is not at all conclusive on this issue.

- So is it obvious that consumers are better off because of the grade cards? Better hygiene, lower prices and more output all sounds great for consumers. A caveat however, if profitability has declined it will cause some restaurants to exit the industry. The reduction in product choices (and perhaps also competition down the track) may be harmful to some consumers at least.

- Are people actually getting sick less often?

Nothing in the current analysis addresses this issue.

But preliminary analysis of patient admission data indicates around 30% reduction in number of people admitted to hospital with food-related illnesses. More work to be done on this.