

Structural and Experimentalist Approaches

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Readings

- Keane (2010), Journal of Econometrics.
- Holmes (2010), Journal of Regional Science.
- Ching, Erdem and Keane (2013), Marketing Sci.
- Ching (2010a), IJIO
- Ching (2010b), IER.
- Ching and Ishihara (2012), Management Sci.

Structural Approach

- Starts with a fully specified economic model (grounded explicitly in theory).
- The goal is to estimate the underlying “deep model parameters” of preferences and technology.
- Once the model parameter are obtained, we can simulate the impact of various policy alternatives (even for policies that have never been implemented before).

Structural Approach

- It is difficult!
- You need to be good at economic theory, econometrics, and computer programming!
- It is a combination of arts (modeling part) and science (when confronting the model with data).
- A serious piece of structural estimation paper can easily take 5 years from start to finish.

Example 1

- Ching (2010a), Ching (2010b).
- I construct a dynamic equilibrium model of the prescription drug market after patent expiration.
- Patients/physicians have uncertainty about the quality of the generic drugs.
- Firms set prices to maximize their total discounted profits.
- Generic firms decide whether to submit ANDA to seek approval to enter the market.

Example 1 (cont'd)

- The approval process is somewhat random.
- Like we submit our papers to a journal!
- I estimate the demand model.
- I estimate the entry cost.
- In a policy experiment, I assume FDA gives more resource the generic drug office, and speed up the approval process.

Example 1 (cont'd)

- Policy experiment outcome.
- The number of entrants drops.
- Reason:
 - With some uncertainty about entry timing, each firm knows there is some chance that it can be the first entrant to enter the market. Being the first allows you to get a lot more profits!
 - But when the approval time is shortened, every entrant enters the market almost at the same time. The expected profits for any given number of entrants, can turn out to be much lower!

Experimentalist Approach

- The goal is to identify the causal impact of a policy treatment.
- The approach relies on finding “natural experiments” or clever instruments to tease out the impacts of policies that have already taken place.

Example 2

- Ching and Ishihara (2012).
- Try to disentangle informative and persuasive effects of detailing.
- Important policy question.
- This is a difficult problem because in most situations both explanations generate very similar qualitative predictions in sales.

Example 2 (cont'd)

- Look at drugs that are co-marketed by two firms under two different brand names.
- Identification assumptions:
 - Informative effect is chemical specific.
 - Persuasive effect is brand specific.
- The basic idea is that if detailing is purely informative, the market share of these two drugs would be equally split. The extent to which the market shares deviate from 50-50, and can be explained by the detailing done by each firm, it shows evidence that persuasive effect is present.
- But to measure the importance of informative and persuasive detailing, we still need to set up the structural learning model and make functional form assumptions.

Another example (Holmes, 2010)

- Consider a university that awards scholarships to students who score 95 or above on a test.
- A study of the effects of the scholarships that compares students scoring 95.1 on the test (and being awarded the scholarship) with students scoring 94.9 (those essentially as smart as the students in the other group but missing the scholarship) allows us to draw such an inference.

Common View

- Experimentalists approach makes fewer assumptions to draw inference – some people even argue that this is a “model-free” or “assumption-free” approach.
- But natural experiments are limited – that restricts the questions that one can ask.
- Can only identify “local” changes.
- Structural approach makes a lot more assumptions: functional form, distributional, etc.

Misconception

- Can we draw really “model-free” inference?
- Keane (2009) and Ching, Erdem and Keane (2013) argue that reduced form approach still relies on strong assumptions.
- But often times, those assumptions are not explicitly spelled out!

Example 3

- Chintagunta, Goettler and Kim (2012) present “model-free” evidence of forward-looking behavior by physicians.
- When a new drug is introduced, they focus on a set of physicians who have not yet been exposed to detailing.
- They run a logit model to predict whether a physician will prescribe a new drug to a patient.
- The key point is that they include *future detailing* as a regressor.

Example 3 (cont'd)

- Suppose that there is risk involved, and future detailing is informative. Then if physicians are forward-looking, they will be more likely to respond to future detailing and less likely to prescribe the drug now.
- So a –ve coefficient on future detailing suggests that physicians are forward-looking.

Example 3's caveat

- They implicitly assume that there is no physician heterogeneity in receptivity to detailing.
- Some physicians are more skeptical about sales rep presentations, so they require more detailing to be convinced.
- This could cause sales reps to spend more time with less receptive physicians.
- The coefficient on future detailing may be negative even if physicians are myopic.

Example 4

- Dube, Hitsch and Rossi (2010) attempt to distinguish learning from other sources of state dependence.
- They focus on one regressor: lagged choice * no. of cumulative use experience.
- They argue that if learning is present, this coefficient should be negative (N).
- So if it is zero, this is evidence against consumer learning.

Example 4's caveat

- One can write down a formal bayesian learning model to show that the sign of this interaction term is ambiguous when N is small (because experience can be idiosyncratic).
- When N is large, a bayesian learning model would imply that the magnitude of the interaction should be very close to zero.