How Do We Learn About Substitution Patterns from Data?

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Demand

Since Wright (1929), we understand that learning about demand requires instruments for price, like cost shifters.

But in differentiated products, how do we simultaneously learn about "substitution patterns"

- in the space of observed product characteristics, x_j
- in a vertical, partially unobserved, dimension (involving the product-specific demand error, ξ_j)

Many claim that you can read, say, BLP (1995) and still not be sure.

For a general overview of nonparametric arguments, see Berry and Haile (2016a).

More Instruments

A general intuition is that we need observed exogenous changes in the choice set.

In the case of market level data and nonparametric demand, Berry and Haile (2014) argue that we need:

- Cost instruments for price effects
- Exogenous shifters of own and rival-product demand ("BLP instruments") to handle vertical substitution.

The latter "instrument for" the vector of market shares in inverse demand.

Approximations to the optimal instruments: Berry et al. (1999), Reynaert and Verboven (2014), Houde and Gandhi (2019), Conlon and Gortmaker (2019).

Not Enough/Not Strong Enough IVs

- Stronger functional form
- Adding a cost side adds many over-identifying restrictions
- Micro data that matches consumer attributes to product choices
- Ranked choices, panel data

Micro Data

Intuition: holding products fixed, "move consumers relative to the choices" via variations observable consumer attributes. Classic idea from McFadden et al. (1977) onwards, using product/consumer interactions in utility.

Berry and Haile (2016b): in an nonparametric context, micro data allows us to

- learn about substitution from the micro data alone
- do without the "BLP instruments"
- but still need instruments for price

How to Do It in Practice

Conlon and Gortmaker (2019), pyblp

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