Week 12: Search Costs

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Overview

Hortacsu & Syverson (2004)

- Search costs can be an important source of market power for firms:
  - High search costs imply that once a consumer considers your product, you are almost a monopolist
  - Product differentiation by product knowledge
- What are potential sources of search costs?
  - Information about products difficult to find
  - Information about products difficult to understand
  - Unawareness
  - Time and effort are valuable
  - Can be component of switching costs if there is a 'default' product or you always have to buy a given product
- What are beliefs about product you haven't searched for yet?
  - Rational expectations seems strange in context of search cost model

Overview

Hortacsu & Syverson (2004)

- Mutual funds, especially index funds, great context to study search costs in:
  - Pretty close to a homogeneous product, otherwise difficult to separate product tastes from search costs (especially with aggregate data)
  - S & P index funds have essentially same risk and return, prices should not be very different without search costs
- Authors study mutual fund fees from 1995-2000, show that index funs have high fee dispersion
- Non-portfolio attributes and search costs are key determinants they find
- Authors set up and estimate a model with product differentiation and search costs
- Competitive responses from firms helps identify vertical differentiation and search costs separately with agg. data

Overview of Results

Hortacsu & Syverson (2004)

- Differentiation important in seemingly homogenous industry
  - Investors value non-portfolio attributes like fund age, funds in fund family, and tax exposure
- Conditional on vertical differentiation, small search costs rationalizes people choosing variety of products
- Results imply distribution of search costs shifts over time:
  - Search costs fall in lower three quartiles of distribution during sample (by really small amount!)
  - Search costs at high end of distribution rising throughout sample (selection in)
  - Influx of new investors during the period
  - Aggregate data, market climate?
- Welfare calculations: Restricting entry to single fund might yield reduced search costs, returns to scale (a la Mankiw-Whinston). View vs. market power.

Preliminary Questions

Hortacsu & Syverson (2004)

- What are they measuring as ‘search costs’?
  - Identification from differentiation
  - Unexplained residual value
- How do links between products impact the model?
  - Reduced form inclusion in their setting
- Difference between search costs and switching costs?

Preliminary Questions

Hortacsu & Syverson (2004)

- Now, people pick funds through employer often. Are they taking this into account or is this not even in the data? How would this matter?
  - Institutional investors ruled out, role of intermediaries?
- What was this industry like in the late 90s? Do we care that it may have been very different?

Basic Motivation

Hortacsu & Syverson (2004)

TABLE I
PRICE DISPERSION WITHIN FUND SECTORS

Sector	N	Mean price	Coefficient of variation	75th to 25th Percentile ratio	90th to 10th Percentile ratio
Aggressive growth	1278	191.0	0.485	2.0	3.1
Balanced growth	472	164.2	0.439	2.2	3.7
High-quality bonds	862	118.1	0.566	2.5	4.9
High-yield bonds	337	167.3	0.387	2.1	3.2
Global bonds	358	182.3	0.402	2.0	3.5
Global equities	452	228.3	0.374	1.6	2.8
Growth and income	978	158.4	0.830	2.5	5.5
Ginnie Mae	182	144.0	0.460	2.4	4.0
Gov't securities	450	131.9	0.549	2.5	4.7
International equities	1267	225.5	0.432	1.9	3.2
Income	218	170.8	0.415	2.2	3.4
Long-term growth	1812	179.4	0.421	2.0	3.1
Tax-free money market	455	62.7	0.440	1.6	3.2
Gov't securities money market	437	59.5	0.611	1.8	4.8
High-quality muni bond	541	137.2	0.624	2.4	4.1
Single-state muni bond	1326	150.3	0.384	1.7	3.6
Taxable money market	541	79.2	0.726	2.0	7.1
High-yield money market	62	160.4	0.408	1.7	3.3
Precious metals	35	256.1	0.399	1.6	3.3
Sector funds	511	200.8	0.364	1.8	2.9
Total return	323	178.2	0.415	1.9	3.3
Utilities	94	182.8	0.359	1.7	3.2
Retail S&P 500 index funds	**82**	**97.1**	**0.677**	**3.1**	**8.2**

Data and Environment

Hortacsu & Syverson (2004)

- S & P index funds most popular type of mutual funds
  - Index funds, though constructed differently, have very little return dispersion
  - Fund proliferation / price dispersion industry traits
- Relative market share of lower price funds is declining over sample period. Higher price funds gaining market share. Why?
- Increased price dispersion over time coincidant with increased entry
- What about load fees, tied products, bundled investment advice?
  - Switching costs
- If what you're studying is the residual, it can be difficult to control for all other aspects through modeled differentiation

Aggregate Data

Hortacsu & Syverson (2004)

- Aggregate data on all S & P retail funds operating in any year between 1995 and 2000
- Data include prices, assets, flows into funds, age, returns, other fund characteristics
- Prices from no-load funds are asset based annual fees
- Ignore load fees (e.g. penalties for early asset redemptions), which is optimistic lower bound on prices (no data on how long consumers leave assets in funds
- Drawbacks of aggregate data:
  - Micro-foundations for search costs, separating search and switching costs
  - Measuring horizontal product differentiation

S&P Index Fund Raw Data

Hortacsu & Syverson (2004)

TABLE II
EVOLUTION OF RETAIL S&P 500 INDEX FUND SECTOR

Variable	Statistic	1995	1996	1997	1998	1999	2000
	N (return data)	23	24	36	54	65	76
Annual gross return (percent)	Mean	37.43	22.67	33.24	28.95	20.95	−8.63
	Standard deviation	0.25	1.29	0.19	0.84	0.40	1.23
	Interquartile range	0.31	0.30	0.20	0.26	0.21	0.32
Standard deviation of monthly returns (percent)	Mean	1.492	3.133	4.574	6.199	3.808	4.932
	Standard deviation	0.025	0.038	0.050	0.051	0.115	0.219
	Interquartile range	0.016	0.023	0.029	0.028	0.024	0.037
	N (price data)	24	33	45	57	68	82
	Minimum	19	18.0	16.0	17.0	17.0	9.45
	25th percentile	43.8	45.0	40.0	46.0	47.1	47.0
	Median	77.5	60.0	70.0	82.0	80.9	72.1
Price	75th percentile	120.5	123.1	136.3	136.3	152.9	144.8
(basis points)	Maximum	206.4	206.4	231.4	231.4	235.4	268.4
	Mean	82.4	80.6	89.8	94.2	104.2	97.1
	Asset-weighted mean	26.8	26.6	26.0	28.9	31.9	32.2
	Standard deviation	50.5	53.1	61.6	60.5	67.1	65.7
	C_1	78.9	77.0	69.9	62.9	59.9	53.9
	C_4	89.0	88.4	85.9	82.1	80.1	77.8
Market shares	Herfindahl	6281	5992	5003	4127	3776	3208
	Low-price decile	86.0	84.9	80.8	77.6	75.5	74.9
	High-price quartile	1.4	1.6	1.7	2.5	3.4	4.1

S&P Index Fund Raw Data

Hortacsu & Syverson (2004)

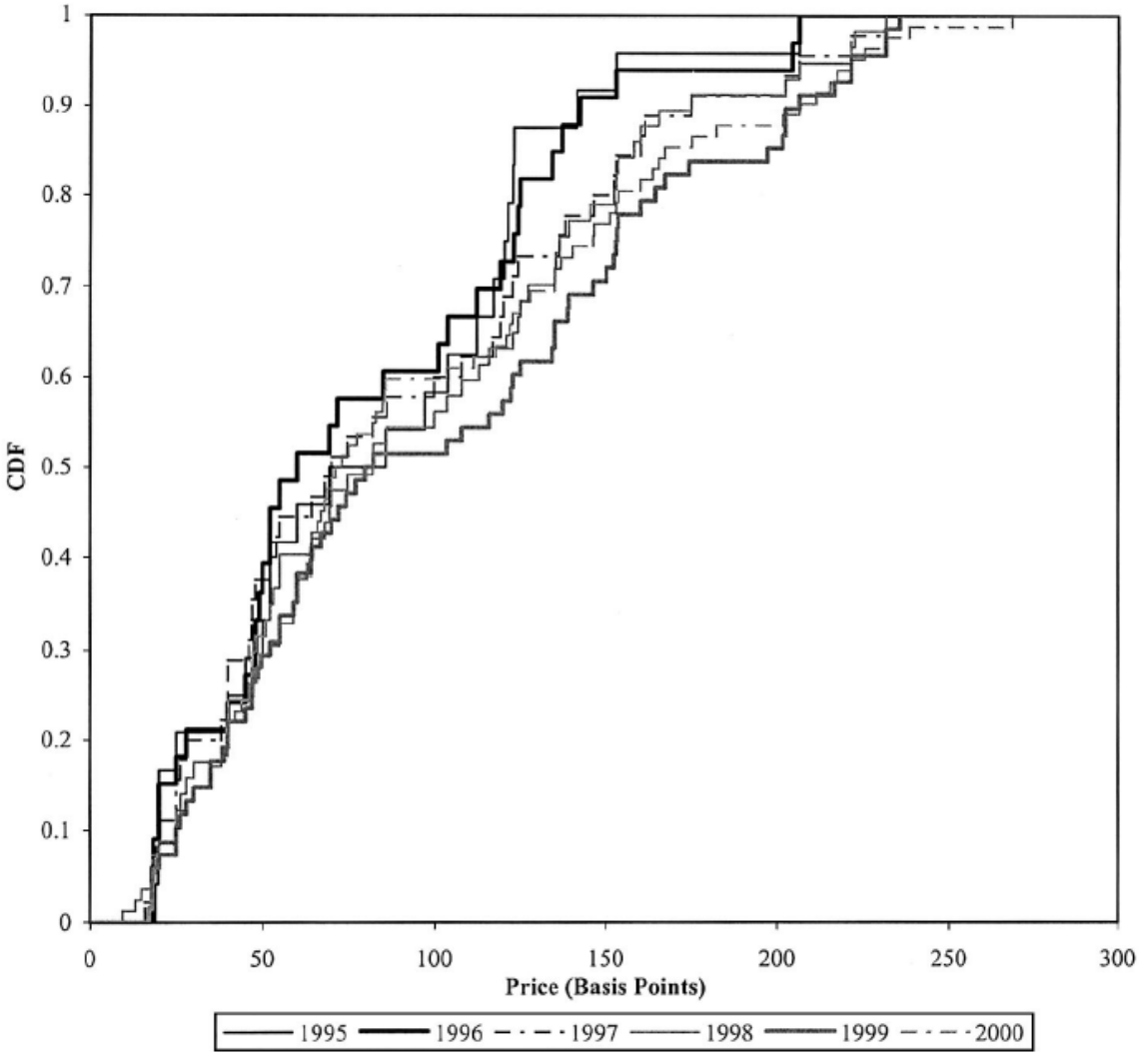

FIGURE I
Price Cumulative Distribution Functions

Sources of Price Dispersion

Hortacsu & Syverson (2004)

- This is a really good section for this paper. They try to address exactly what could lead to price dispersion intuitively, before model.
- Portfolio differentiation not an issue here
- First Mechanism: Non-Portfolio Differentiation
  - Bundled services with actual S& P fund
  - Third and fourth most important things in survey: Other funds / customer service
  - Financial advice (bundled with load funds) (60%)
  - ETF, manager tenure
  - Model is pure vertical differentiation, though horizontal (heterogeneity) could really matter (how does this impact search cost estimates?)
  - Horizontal differentiation can't be separately identified (unobserved)

Sources of Price Dispersion

Hortacsu & Syverson (2004)

- Search Costs / Information Frictions:
  - Information gathering investments likely to be necessary and potentially substantial
  - Ranking and information aggregators starting to exist
  - Definition: Time and money costs from information processing and acquisition
  - Institutional funds have lower means but also much lower price dispersion. They say this is direct evidence of search costs. Do you agree?
- Switching Costs moving across fund families:
  - Formal: Load fees
  - Informal: Drafting letter to approve withdrawls
  - Inertia / Unawareness / Biased beliefs
  - Define switching costs as distinct: you know value of switching, but don't want to because of costs
  - Does this lead to price dispersion? Search costs different?

Sources of Price Dispersion

Hortacsu & Syverson (2004)

- Explicit switching costs: load fund holders must pay about 5% if remove assets in pre-specified time frame
  - Much more likely to switch to S&P in same firm
  - Potential key demand driver for higher fee funds
- Testing for performance externalities is one ‘test’: how does performance of other family funds impact S& P share?
  - Positive spillovers
  - ‘Parking’
  - Regress S& P assets on performance of other funds
  - Performane spillovers, no statistically significant difference between load and no-load funds however. Is this a test?
  - Say effects might not be as large as one thinks, not evidence of no switching costs!
- In the end, they don’t include switching costs, but say they may enter into search costs estimates ’investor costs’

Model Setup

Hortacsu & Syverson (2004)

- Some basic components:
  - Funds described by search costs
  - Heterogeneous attributes
  - Heterogeneous sampling probabilities

$$u_j = W_j\beta - p_j + \xi_j$$

- W_j attributes, unobservable component ξ_j, utilities in terms of price unit measurement
- Utility per dollar of assets held
- G(c) describes distribution of search costs, learn utility of given fund from search. One fund purchase, search with replacement

Model Setup

Hortacsu & Syverson (2004)

- Optimal search rule is to search if:

$$c_i \leq \int_{u^*}^{\overline{u}} (u - u^*) dH(u)$$

- H(u) are beliefs about distribution of funds indirect utilities
- u^* highest utility of searched fund up to this point (order all utilities $u_1..u_n$)
- *They assume rational expectations as most search models do:*

$$H(u) = \frac{1}{N} \Sigma_{j=1}^{N} I[u_j \leq u]$$

- This link always strikes me as very strange, what do you think are ways to resolve this issue?

Model Setup

Hortacsu & Syverson (2004)

- Critical cutoff points in search problem:

$$c_j = \Sigma_{k=j}^{N} \rho_k (u_k - u_j)$$

- ρ_k is probability that fund k is sampled (known to investors, and heterogeneous in some specifications)
- c_j lowest search cost of someone who buys j in equilibrium
- $c_N < ..... < c_1$
- Market share of lowest utility fund is:

$$q_1 = \rho_1 (1 - G(c_1))$$

Model Setup

Hortacsu & Syverson (2004)

- Market share of second-lowest utility product:

$$(6) \quad q_2 = \rho_2(1 - G(c_1)) + \frac{\rho_2}{1 - \rho_1}[G(c_1) - G(c_2)]$$
$$= \rho_2\left[1 + \frac{\rho_1 G(c_1)}{1 - \rho_1} - \frac{G(c_2)}{1 - \rho_1}\right].$$

- Market share of product *N*:

$$(7) \quad q_j = \rho_j\left[1 + \frac{\rho_1 G(c_1)}{1 - \rho_1} + \frac{\rho_2 G(c_2)}{(1 - \rho_1)(1 - \rho_1 - \rho_2)}\right.$$
$$+ \sum_{k=3}^{j-1} \frac{\rho_k G(c_k)}{(1 - \rho_1 - \ldots - \rho_{k-1})(1 - \rho_1 - \ldots - \rho_k)}$$
$$\left. - \frac{G(c_j)}{(1 - \rho_1 - \ldots - \rho_{j-1})}\right].$$

- Search with replacement here is kind of a weird thing. Tractability?

Model Setup

Hortacsu & Syverson (2004)

- Linear equations linking distribution critical values with search costs, $G(c_N) = 0$
- Profits of fund j are:

$$\Pi_k = Sq_j(p, W)(p_j - mc_j)$$

- Profit maximization implies standard FOC:

$$q_j(p, W) + (p_j - mc_j)\frac{\partial q_j(p, W)}{\partial p_j} = 0$$

- Elasticities faced by fund determind by derivatives of market share equations

$$\frac{\partial q_j}{\partial p_j} = -\frac{\rho_1\rho_j^2 g(c_1)}{1-\rho_1} - \frac{\rho_2\rho_j^2 g(c_2)}{(1-\rho_1)(1-\rho_1-\rho_2)} - \sum_{k=3}^{j-1} \frac{\rho_k\rho_j^2 g(c_k)}{(1-\rho_1-\ldots-\rho_{k-1})(1-\rho_1-\ldots-\rho_k)} - \frac{\rho_j(\Sigma_{k=j+1}^{N}\rho_k)g(c_j)}{1-\rho_1-\ldots-\rho_{j-1}}. \quad (10)$$

Model Setup

Hortacsu & Syverson (2004)

$$\frac{\partial q_j}{\partial p_j} = -\frac{\rho_1 \rho_j^2 g(c_1)}{1-\rho_1} - \frac{\rho_2 \rho_j^2 g(c_2)}{(1-\rho_1)(1-\rho_1-\rho_2)} - \sum_{k=3}^{j-1} \frac{\rho_k \rho_j^2 g(c_k)}{(1-\rho_1-\ldots-\rho_{k-1})(1-\rho_1-\ldots-\rho_k)} - \frac{\rho_j(\Sigma_{k=j+1}^{N}\rho_k) g(c_j)}{1-\rho_1-\ldots-\rho_{j-1}}. \quad (10)$$

- Link between pdf g(c) and elasticities: consider increase in p_j:
  - For $k < j$, c_k decreases (people less likely to keep searching)
  - Directly related to density of investor population at higher search costs
  - Second, there is increase in c_j when p_j increases
  - Continued search becomes more beneficial for people who would have purchased j ($g(c_j)$)

Identification

Hortacsu & Syverson (2004)

- Links between pdf and prices [through FOC], and cdf and market share important for identification
- With knowledge of ρ, market share equations identify search cost distribution cdf critical values (NOT actual levels!)
- With paramaterization of G and ρ this is possible for unobserved ρ
- Market shares alone do not generically identify level of critical search costs values

Identification

Hortacsu & Syverson (2004)

- Shares do identify search cost levels with homogeneous products:

$$c_j = \Sigma_{k=j}^{N} \rho_k (p_k - p_j)$$

- Indirect utilities apart from price cancel out, since the same

- With more general cases of product differentiation, identiification of levels comes from companies' optimal pricing decisions

- Bertrand Nash FOC:

$$\frac{\partial q_j(p)}{\partial p_j} = \frac{q_j(p)}{p_j - mc_j}$$

Identification

Hortacsu & Syverson (2004)

- With FOC, they observe prices and market shares in data. Therefore given a guess they make for *mc* they can compute the market share derivative
- $g(c)$ can then be recovered from the elasticity equation.With unknown *mc* need parametric assumptions
- With knowledge of $G(c)$ and $g(c)$ they recover search cost levels in general differentiated case

$$\begin{aligned} G(c_{j-1}) - G(c_j) &= 0.5[g(c_{j-1}) + g(c_j)](c_{j-1} - c_j) \rightarrow \\ c_{j-1} - c_j &= \frac{2[G(c_{j-1}) - G(c_j)]}{g(c_{j-1}) + g(c_j)} \end{aligned}$$

- Given critical distribution values obtained, they solve for c_j
- In non-parametric specification, $g(c_N)$ must be normalized

Identification

Hortacsu & Syverson (2004)

- They can also use critical values of G and g to estimate attribute loading β in utility function
- Optimal search cost equation can be used to solve for indirect utilities once c_j known
- Then estimate β with regression:

$$u_j + p_j = X_j\beta + \beta_{age} ln(age_j) + \eta_j$$

- X fund attributes other than age, ξ included in η
- Since unobservable part likely correlated with age, treat fund age as endogenous and estimate using BLP IVs
  - Current year summary measures of two other sets of funds other funds managed by same company and those managed by other companies
  - Capture impact of attributes on exit, independent of quality

Identification

Hortacsu & Syverson (2004)

- Links between what they do and tradionally estimated demand systems are interesting
- Model pure vertical differentiation, no horizontal tastes!
  - Search costs generate non-degenerate market shares, type of horizontal differentiation
  - Standard logit model has almost pure vertical diff. except for error term
- Consider extension later that allows people to be differentiated by observed purchase channel.
  - Extreme differentiation across load, no-load divide
- Could in principle identify tastes with variation in market options / structure cross-sectionally
- *To empirically work, they would need to observe something that moves search costs independently of tastes, which they don't have*

Estimation / Results: Simplest

Hortacsu & Syverson (2004)

- They estimate a couple specifications, starting from simplest and building up
- First step: assume funds homogeneous. With equal sampling probabilities system of market share equations is simple, and can get distribution non-parametrically with optimal search equation
- Shuld be negative and monotonic relationship between price and market share:
  - Clear negative correlation but far from monotonic
  - They say this rejects this as a model
  - Not particularly rigorous, but makes sense
- Given that, they consider two types of differentiation in sequence:
  - Funds homogeneous, but likelihood of finding is different
  - Differentiation in non-price characteristics

Estimation / Results: Different ρ

Hortacsu & Syverson (2004)

- Allow sampling probabilities to vary:

$$\rho_j = \frac{Z_j^{\alpha}}{\Sigma_1^N Z_j^{\alpha}}$$

- Z_j characteristics that make funds more or less visible (advertising?). They only use fund age here.
- Estimate search cost distribution and sampling probabilities using market share and FOC pricing and nonlinear least squares
- Search costs assumed lognormal, marginal cost and sampling parameter estimated (constant for firm)
- Different models corresponding to money flows vs. asset stocks for q, different pricing for load and non-load, also spec. with logged number of funds

Results: Different Sampling Probabilties

Hortacsu & Syverson (2004)

TABLE III
SEARCH MODEL WITH UNEQUAL SAMPLING PROBABILITIES

Parameters	(A)	(B)	(C)	(D)	(E)
Log (mean search cost)	−6.17	−6.68	−6.58	−6.78	−6.33
	(0.06)	(0.06)	(0.13)	(0.26)	(0.11)
Variance of logged search costs	1.88	2.07	1.79	1.89	1.95
	(0.03)	(0.06)	(0.06)	(0.08)	(0.04)
Mean marginal cost, basis points	4	12	11	16	4
	(1)	(1)	(2)	(2)	(1)
α	2.62	2.43	2.58	2.44	3.06
	(0.04)	(0.03)	(0.03)	(0.09)	(0.04)
γ	—	—	—	—	0.11
					(0.03)
Time trend of mean search cost	−0.38	−0.50	−0.29	−0.51	−0.30
	(0.05)	(0.04)	(0.08)	(0.08)	(0.06)
Time trend of search cost variance	0.20	0.18	0.17	0.18	0.16
	(0.05)	(0.04)	(0.02)	(0.02)	(0.02)
R^2, prices	0.92	0.97	0.82	0.94	0.99
R^2, quantities	0.98	0.83	0.98	0.84	0.98
Median search cost (1996), b.p.	21	12	14	11	18
IQR of search cost range (1996), b.p.	5.9 to 75	3 to 50	4 to 46	3 to 41	4.7 to 67
Median search cost (2000), b.p.	5	2	4	1	5
IQR of search cost range (2000), b.p.	0.7 to 28	0.3 to 11	0.8 to 23	0.2 to 9	0.9 to 30

This table shows the results from estimating the homogeneous-product/unequal-sampling-probability specification in subsection V.B. Standard errors are in parentheses. b.p. = basis points. The sample consists of all retail S&P 500 funds operating in any year between 1995 and 2000 (inclusive), excluding ten fund-year observations for which we do not have fee or asset data. This leaves a sample of 309 fund-year observations. See text for details.

Results: Different ρ

Hortacsu & Syverson (2004)

- Mean logged search costs trending downward, variance is increasing with time
- Median search costs of 5 basis points in 2000: $5 search cost per $10,000 in assets invested in 2000
- Considerable variation in search costs (see interquartile range)
- Substantial asymmetries in sampling probabilities necessary to explain if funds are homogeneous
- MC estimate is 4 basis points
- Vanguard is dominant fund, age part comes lot from that
  - How else does this play into analysis?

Results: Heterogeneous Funds

Hortacsu & Syverson (2004)

- Assume sampling probabilities are equal here
- G and u_j non-parametrically identified assuming marginal costs of 10
- Search costs decline for people below 85th percentile over time, goes up for those above that
- Median in 1996 is 1.5 bp
- Estimate contribution of fund attributes to utility in traditional differentiated products framework:
  - Kind of load charge if any (incorporated in pricing, but indicative of financial advice)
  - ETF, number funds, age, manager tenure
- Standard deviation is positive and significant?
- Positive coefficient on rear-deferred load indicates SC

Results: Heterogeneous Funds

Hortacsu & Syverson (2004)

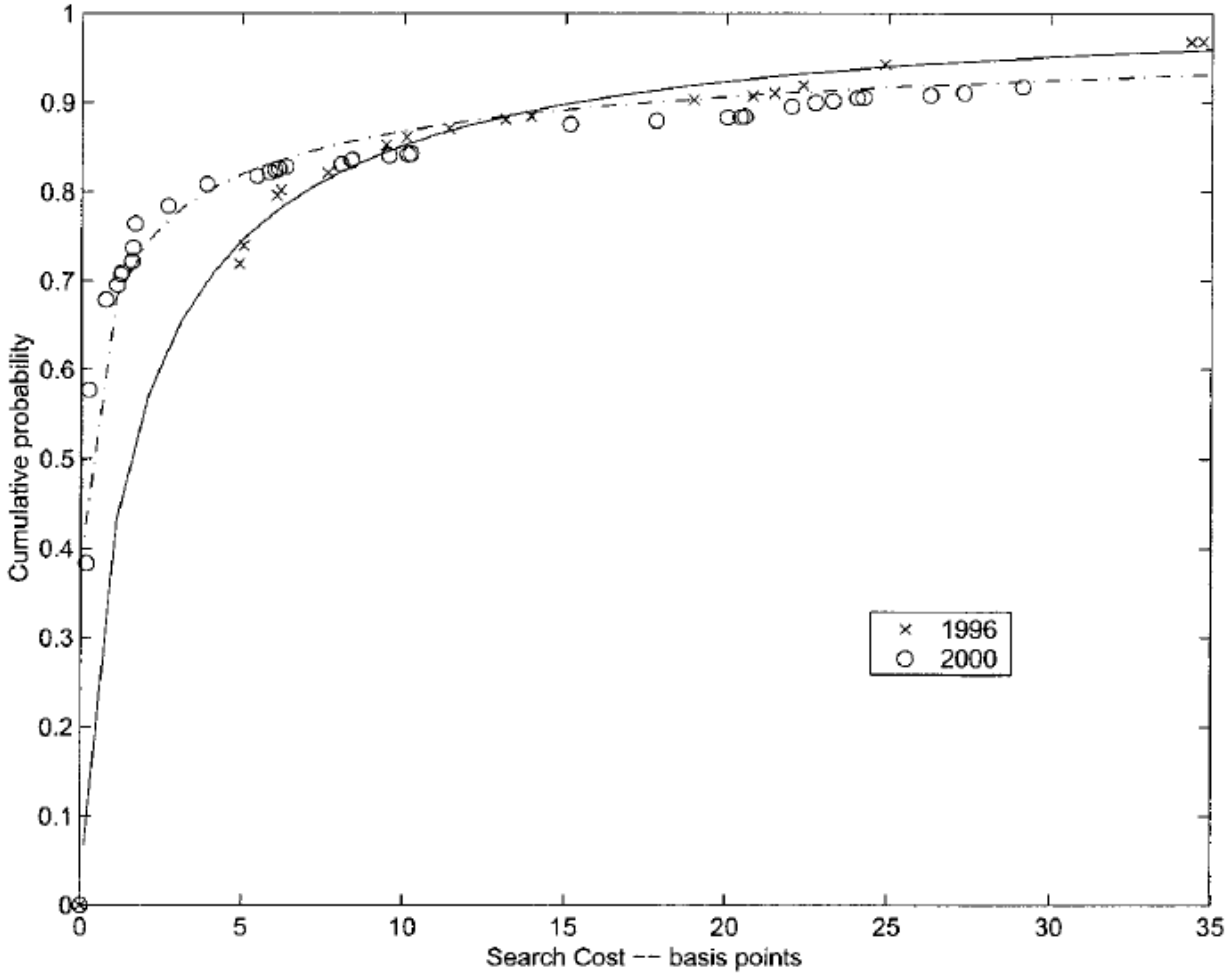

FIGURE IV
Estimated Search Cost Distributions, 1996 and 2000

Results: Heterogeneous Funds

Hortacsu & Syverson (2004)

TABLE IV
UTILITY FUNCTION ESTIMATES AND FUND ATTRIBUTE SUMMARY STATISTICS

Attribute	Utility weight, basis points (s.e.)	Mean	Standard deviation
Constant	93.53	N/A	N/A
	(69.94)		
Any load dummy	−12.11	0.547	0.499
	(33.74)		
Rear/deferred load dummy	59.57	0.272	0.446
	(37.13)		
Exchange-traded fund	199.5*	0.023	0.149
	(58.88)		
Number other share classes	2.726	1.621	1.337
	(9.722)		
log[no. funds in same mgmt. company]	30.97*	4.259	1.215
	(12.67)		
log[fund age]	99.39	1.393	0.728
	(54.81)		
Manager tenure (years)	3.578	2.922	2.776
	(11.03)		
Income + capital gains yield (percent)	−6.552*	3.248	3.363
	(3.009)		
Avg. monthly percent diff. between fund and S&P 500 returns	136.4*	−0.026	0.106
	(56.69)		
Standard deviation of monthly returns (percent)	48.22*	4.455	1.293
	(8.101)		
N	309		
R^2	0.354		
Mean of dependent variable	582.9		

Results: Explaining Search Cost Shift

Hortacsu & Syverson (2004)

- They want to explain shift in distribution of search costs (how did they get to this question?)
- Influx of novice investors clear. Hypothesize that these people will mostly pick load funds
- 14.9 million new households over period studied
- Surveys show new investors were less informed, more likely to receive load funds bundled with financial advice
- Estimate search cost distribution conditional on load vs. no-load:
  - Search costs no-load investors much lower
  - What about other horizontal selection here? Does mechanism (composition shift vs. selection) matter?
  - No increases fo no-load, increases at high end for load
  - Evidence is only suggestive

Results: Investor Composition Shift

Hortacsu & Syverson (2004)

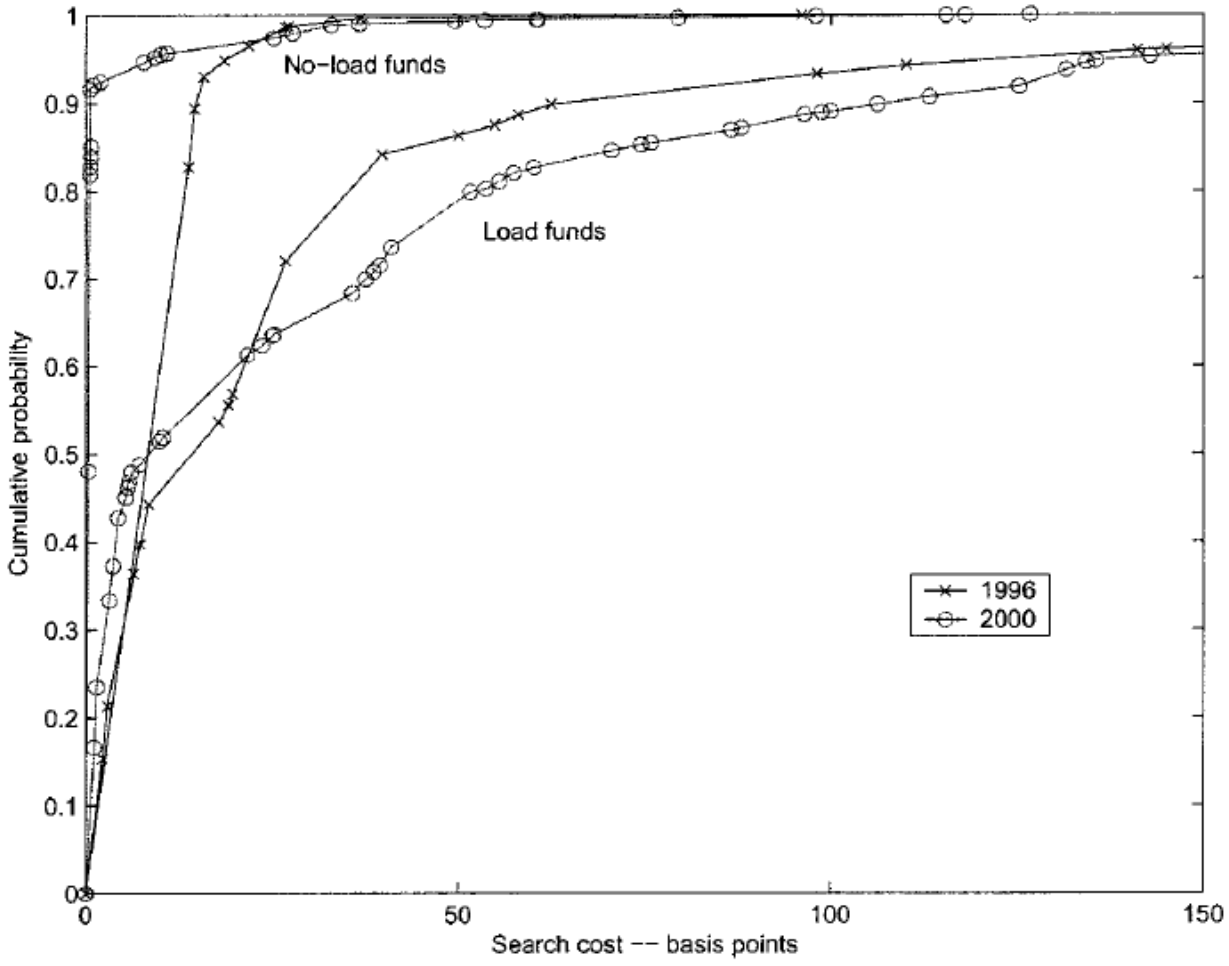

FIGURE V
Estimated Search Cost Distributions, 1996 and 2000

Welfare Implications

Hortacsu & Syverson (2004)

- What do estimates imply about welfare in equilibrium?
  - Free entry and social inefficiency
  - Are the products really delivering very different utilities here?
- Do very simplified setting: what happens if just one monpoly fund vs. market?
  - They include appropriate caveats about stylization
- Four welfare implications of large number of sector funds:
  - Investors don't purchase fund with highest utility (negative)
  - Direct expenditures for search costs (negative)
  - Variety of products (positive)
  - Effect on competition and market power (positive)
- Doing the counterfactual, tons of caveats is one way to go....

Results: Investor Composition Shift

Hortacsu & Syverson (2004)

TABLE V
SUMMARY OF WELFARE CHANGES IN VANGUARD MONOPOLY COUNTERFACTUAL

Year	(1) Funds	(2) Assets ($billion)	(3) Search savings (basis points)	(4) Product variety cost (basis points)	(5) = $1.22 m × [(1)-1] Fixed costs savings ($million)	(6) = (2) × (3) Savings from search ($million)	(7) = (2) × (4) Product variety cost ($million)	(8) = (5) + (6) + (7) Net welfare change ($million)	(9) = (8) ÷ (2) Indifference monopolist price change (basis points)
1995	24	22.0	65.1	−11.8	28.1	143.2	−26.0	145.3	66.1
1996	33	39.4	54.4	−13.0	39.0	257.7	−51.2	245.5	62.3
1997	44	70.6	44.7	−17.8	52.5	315.6	−125.7	242.4	34.3
1998	57	118.0	40.2	−23.1	68.3	474.4	−272.6	270.1	22.9
1999	68	174.8	42.5	−25.5	81.7	742.9	−445.7	378.9	21.7
2000	82	163.8	23.6	−30.8	98.8	386.6	−504.5	−19.1	−1.2

This table summarizes the welfare effects of a counterfactual industry structure where a Vanguard 500 Index Fund monopoly is imposed. Details on the calculations are found in the text and in the Computational Appendix.

Takeaways

Hortacsu & Syverson (2004)

- One of first empirical papers to study search costs and product differentiation empirically
  - Extracts a lot out of aggregate data, show limitations
  - Excellent combination of methodology and empirical application / environmental knowledge
  - Search costs / switching costs difficult to measures
- What about horizontal differantiation?
  - Handel (2013) does this with specific product structure, goes even further than limiting to funds like they do here
- How should we model search costs with good individual data?
  - Rational expectations?
  - If non-rational then what? Ambiguity? Biased beliefs
  - Bringing in beliefs data could be really interesting
- Nice model of firm competition: search costs imply elasticities is a good two step thing to keep in mind