## Online Product Search

Michael R. Baye

Keynote for the

Fifth Annual Federal Trade Commission Microeconomics Conference

Washington DC, November 16, 2012





## Joint Work with Babur De los Santos & Matthijs R. Wildenbeest

- "The Evolution of Product Search"
- "What's in a Name? The Effects of Prominence on Retailer Traffic from Search Engines"
- "Estimating the Effects of Brand Equity on Consumer Behavior at Search Engines"



### Recent Theoretical Work Suggests "Prominence" Impacts Competition in Search Markets

- Arbatskaya (Rand 2007)
- Armstrong, Vickers and Zhou (Rand, 2009)
- Armstrong and Zhou (*EJ*, 2011)



### This Talk

- How "prominence" impacts the organic clicks retailers get from product searches at search engines
  - Position prominence
  - Name prominence
- Example: Google the search phrase "best selling managerial economics textbook"



### **Google Search Results**

Google	best selling managerial economics textbook	Q
Search	About 1,700,000 results (0.35 seconds)	
Web	Top Selling Managerial Economics Textbooks   Find your Top www.textbooks.com/Catalog/BCX/Managerial-Economics.php	Shop for best
Images	Find Top Selling Managerial Economics Textbooks for up to 90% off. Browse the	shopping.google
Maps	largest selection of used Top Selling Managerial Economics Textbooks, new	Managerial Economics
Videos	Managerial Economics & Business Strategy: Michael Baye www.amazon.com/Managerial-Economics-Business/0073375969	A Bus
News	Baye's Managerial Economics and Business Strategy remains the best-selling	
Shopping	managerial economics textbook in which it continues to provide students with the	Managerial
More	Managerial Economics & Business Strategy + Data Google Books books.google.com > Business & Economics > Economics > General  *** Rating: 3 - 1 review	\$62.99 CengageBra
	Baye's Managerial Economics and Business Strategy has become the <b>best-selling</b> managerial economics textbook. It was the first textbook to blend tools from	

Managerial Economics & Business Strategy - 9780073375960 ... www.slugbooks.com/9780073375960-managerial-economics-amp-b...

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Show search tools

# Shop for best selling mana... on Google shopping.google.com Managerial Economics... Sponsor Managerial Economics Managerial Economics Economics

\$64.99

PriorityTextb...

\$64.99

Justtextbook...



### **Paid Results**

Google

best selling managerial economics textbook

Search

About 1,700,000 results (0.35 seconds)

Web

Images

Top Selling Managerial Economics Textbooks | Find your Top ...

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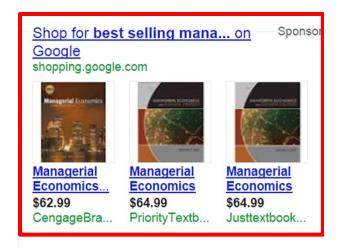
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### **Organic Results**

Google

best selling managerial economics textbook

### Search

About 1,700,000 results (0.35 seconds)

#### Web

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## **Most Prominent Organic Result?**

Google best selling manager Search About 1,700,000 results Top Selling Manage Web www.textbooks.com/Car Images Find Top Selling Manag largest selection of used Maps Managerial Econom Videos www.amazon.com/Mana News Baye's Managerial Econd managerial economics Shopping Managerial Econom More books.google.com> Busi \*\*\* Rating: 3 - 1 Baye's Managerial Econo managerial economics Managerial Econom www.slugbooks.com/978 Show search tools Baye's Managerial Econo managerial economics

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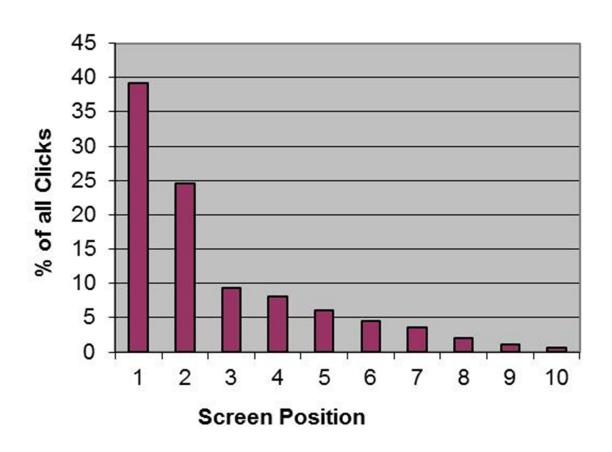


## Lots of Evidence That Position Matters

- Offline markets (yellow pages, voting, academic citations, etc.)
  - De los Santos & Koulayev (2012)
- Online markets (price comparison sites, paid ads at search engines, etc.)
  - Brynjolfsson et al., 2010; Ghose and Yang (2009); Baye et al. (2009)



# Example: Screen Position and Clicks at Kelkoo.com (Baye et al., 2009)





# Ways Retailers Influence The Prominence of Their Names

- Investments in brand awareness and name recognition
  - Traditional (TV, radio, print) and online advertising
- Build customer-centric websites and distribution networks
  - Product breadth and depth
  - Shopping experience
- Investments in reputation
  - Prices, quality, shipping, returns policy
- Blend of all these and other investments



## Why It's Hard to Measure the Prominence of a Retailer's Name

- Multi-dimensional nature of investments
- Thorny stock/flow issues
- Typically requires time-series data that are often unavailable
  - Many online retailers are not publically traded and don't disclose information
  - Publically traded retailers don't disclose all relevant information



# Our Measure: Number of "Name Searches" on a Search Engine

- Name Search: Search phrase that includes the name of the retailer, including misspellings:
  - "Buy camera at Amazon"
  - "Amazon.com"
  - "www.Amazon.com"
  - "Amazn"
- Count a name search when consumers click on results page to the named site.
- Interpret as measuring brand awareness/equity, name recognition, or "name prominence"



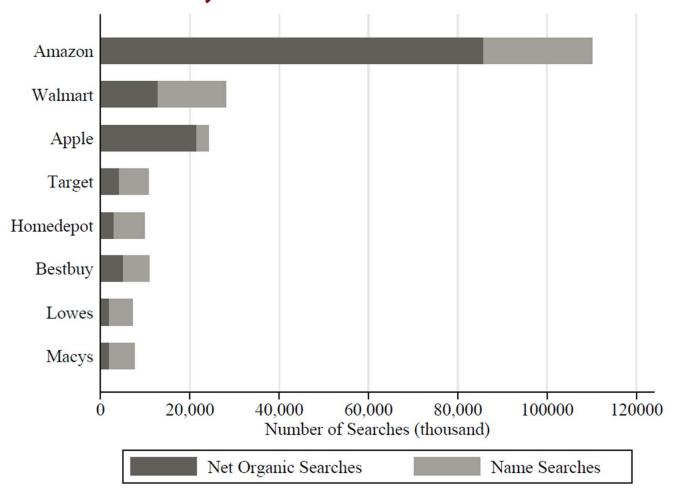
# **Example: Selected Search Terms Leading Users from Google to Amazon**

Rank	Search Phrase	# Organic Clicks
1	amazon	9,006,624
2	amazon.com	1,207,598
3	www.amazon.com	247,793
4	kindle	146,406
5	50 shades of grey	116,359
6	ebay	106,062
7	name name	105,408
8	amazon books	100,357
9	***	96,165
10	name last name	90,934
11	kindle fire	76,201
12	google	72,856
13	name name book	66,754
14	amzon	63,852
15	amazonprime	56,407

Rank	Search Phrase	# Organic Clicks
16	boss orange name	55,281
17	amazon kindle	55,272
18	amazon prime	55,259
19	kim kardashian sex tape	54,028
20	first name review	51,240
30	fifty shades of grey	29,303
40	amazo	22,909
50	bosch name	18,878
60	insanity workout	15,634
70	metal detectors	14,419
80	the night dad went to jail	13,502
90	target	12,125
100	name name books in order	11,301
All Sea	arch Terms	79,244,892



# Name Searches and Net Organic Searches, Selected Retailers





# **Advantages of Our Proposed Measure of Name Prominence**

- Measurable
- Embodies the "effective quality" of all investments by retailers to create brand awareness (consumer preferences)
- Represents the stock of name prominence

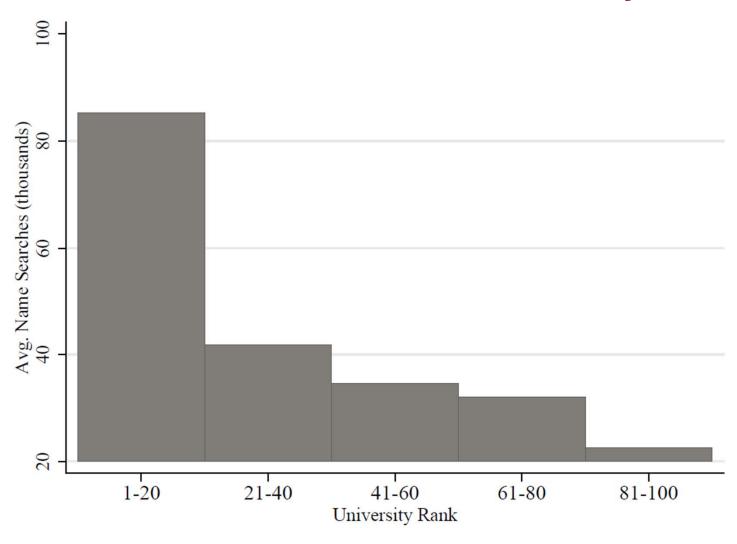


### **Smell Test: Does the Measure Work?**

- Independent measure of "prominence" of universities:
  - U.S. News and World Report rankings of top 100 universities
- Used comScore data to measure number of name searches on Google for top 20 universities, second 20 universities, and so on)



## Name Searches and University Rank





### **Three Datasets**



## Data Set 1: ComScore Search Planner

- Two million users in US, June 2012
- Search phrases leading users from search engines (Google, Bing) to different sites
- Number of organic clicks each site gets from results pages based on each search phrase



### **Data Set 2: Internet Retailer**

- Top 500 internet retailers
  - Amazon/Zappos; Sears/Kenmore, etc.
- Matched these with 759 retail sites tracked by comScore
- Identifies retailer category (15 categories such as apparel/accessories, office supplies, etc.)
- Whether site has presence on a social network site (Facebook/Twitter)
- Age of site
- Whether company is "Web Only" or also has brick-and-mortar presence



### **Data Set 3: Position Data**

- Collected using program we wrote in Java
- 5,549 distinct search phrases in comScore data led users to the 759 sites
- Queried Google and Bing with each phrase, extracted
  - Each retailer's organic results position
  - Whether retailer had a first-page ad based on each distinct search phrase



### **Key Variables**

- Net Organic Clicks
  - Retailer's total organic clicks minus its organic clicks from name searches
- Position: Bins for retailer's average screen position
- Name Recognition: Bins for total number of name searches
- Ads: Number of times a retailer's ad was on page 1 of search results
- Social Network Presence (indicator)
- Retailer Age (years)
- Web Only (indicator)



### **Summary of Baseline Results**

- Position and name prominence important
- Position effects overstated if ignore name prominence
- Ads enhance organic clicks
- Robust to including other potential controls

 $\label{eq:condition} \begin{tabular}{ll} Table 3. Baseline Model \\ Dependent Variable: ln(Net Organic Clicks on Google) \\ \end{tabular}$ 

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Position on Google	, ,						, ,
Poor	1.307	1.328	1.279	1.258	1.263	1.221	1.400
	(0.226)*	(0.235)*	(0.230)*	(0.234)*	(0.238)*	(0.204)*	(0.212)*
Below Median	2.009	1.846	1.718	1.707	1.715	1.761	1.862
	(0.220)*	(0.232)*	(0.229)*	(0.232)*	(0.237)*	(0.203)*	(0.208)*
Median	3.022	2.479	2.264	2.277	2.281	2.234	2.666
	(0.223)*	(0.246)*	(0.250)*	(0.254)*	(0.259)*	(0.226)*	(0.225)*
Above Median	3.886	2.993	2.773	2.811	2.828	2.881	3.412
	(0.223)*	(0.262)*	(0.276)*	(0.280)*	(0.287)*	(0.250)*	(0.242)*
Best	5.543	3.925	3.557	3.499	3.502	3.475	4.398
	(0.223)*	(0.300)*	(0.344)*	(0.349)*	(0.358)*	(0.311)*	(0.290)*
Name Recognition on Ge	oogle						
Poor		0.691	0.729	0.703	0.731	0.738	
		(0.224)*	(0.219)*	(0.223)*	(0.228)*	(0.201)*	
Below Median		1.094	0.957	0.942	0.967	1.042	
		(0.237)*	(0.234)*	(0.237)*	(0.242)*	(0.211)*	
Median		0.971	0.896	0.915	0.944	1.186	
		(0.239)*	(0.234)*	(0.237)*	(0.242)*	(0.220)*	
Above Median		1.045	0.810	0.894	0.928	1.183	
		(0.259)*	(0.256)*	(0.259)*	(0.264)*	(0.245)*	
Best		2.119	1.858	1.958	1.980	1.952	
		(0.299)*	(0.297)*	(0.301)*	(0.307)*	(0.282)*	
$\ln(\# \text{ Ads on Page 1})$			0.253	0.253	0.249	0.289	0.379
			(0.080)*	(0.081)*	(0.083)*	(0.072)*	(0.073)*
Social Network Presence				0.268	0.243	0.564	0.480
				(0.221)	(0.225)	(0.197)*	(0.206)*
Retailer Age					0.006	0.018	0.016
					(0.022)	(0.020)	(0.021)
Web Only Retailer						0.107	-0.206
						(0.145)	(0.144)
Constant	Yes						
Retailer Category Indica	No	No	No	No	No	Yes	Yes
Observations	759	759	759	759	759	759	759
Pseudo R2	0.35	0.38	0.39	0.39	0.39	0.43	0.40



## Potential Worries With Baseline Results

- Measure of name prominence (name clicks at Google) potentially correlated with errors
  - Show results robust to using name clicks at Bing as measure of name prominence
- Name prominence measure includes "buy camera at amazon.com" rather than pure "navigational" searches
  - Show results robust to more narrow definition of name search
- Use of bins might "mask" importance of being on page 1
  - Show results robust to using number of results on page 1 rather than bins



## Principle Worry: Endogeneity of Position and Ads

- Search engines have incentives to provide users with organic results and ads that are "relevant"
- Position & ads may depend on past clicks
  - OK if predetermined at time of actual clicks, but engines continually refine algorithms
- Position & ads on Google may be correlated with error in regression
  - Use position and ads on Bing as instruments for position and ads on Google

Table 5: Specifications Controlling for Endogenity of Position and Ads Dependent Variable:  $\ln(\text{Net Organic Clicks on Google})$ 

	(1)	(2)
	Two-Stage	Two-Stage
Variable	Ordered Probit	Least Squares
Position on Google		
Poor	-0.475	
	(0.293)	
Below Median	0.455	
	(0.274)	
Median	0.825	
	(0.256)*	
Above Median	1.129	
	(0.270)*	
Best	1.420	
	(0.252)*	
ln(Page 1)		1.115
,		(0.190)*
Name Recognition on Bing		
Poor	1.158	1.049
	(0.256)*	(0.273)*
Below Median	1.648	1.299
	$(0.227)^*$	(0.277)*
Median	1.916	1.325
	(0.212)*	(0.296)*
Above Median	2.149	1.277
	(0.221)*	(0.317)*
Best	2.832	1.801
	(0.328)*	(0.358)*
ln(# Ads on Page 1)	0.815	0.010
(" 5 )	(0.070)*	(0.188)
Social Network Presence	0.093	0.245
	(0.217)	(0.234)
Retailer Age	0.069	0.028
G	(0.026)*	(0.024)
Web Only Retailer	0.101	0.022
·	(0.183)	(0.171)
Constant	Yes	Yes
Retailer Category Indicators	Yes	Yes
Observations	759	759
Pseudo R2	0.53	0.53
Sargan Test (p-value)		0.35

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	(1)		Poor	-0.475
	(1) Two-Stage			(0.293)
Variable	Ordered Probit			(0.293)
Position on Google			Below Median	0.455
Poor	-0.475			
	(0.293)			(0.274)
Below Median	0.455		Madian	
	(0.274)		Median	0.825
Median	0.825			(0.256)*
Above Median	$(0.256)^*$ 1.129			(0.250)
Above Median	(0.270)*		Above Median	1.129
Best	1.420			
	(0.252)*			(0.270)*
ln(Page 1)	, ,		Best	1.420
			Dest	1.420
Name Recognition on Bing				(0.252)*
Poor	1.158			(0.202)
- · · · · ·	(0.256)*	(0.273)*		
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Median	$(0.227)^*$ $1.916$	$(0.277)^*$ 1.325		
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Web Only Retailer	$(0.026)^*$ $0.101$	(0.024) $0.022$		
web Only Retailer	(0.183)	(0.171)		
Constant	Yes	Yes	<del></del>	
Retailer Category Indicators	Yes	Yes		
Observations	759	759	_	
Pseudo R2	0.53	0.53		
Sargan Test (p-value)		0.35	<u></u>	

Table 5: Specifications Control	ling for Endogenity o	Davition on Coords
Dependent Variable: ln	(Net Organic Clicks	Position on Google
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	(1)	1 001
	Two-Stage	
Variable	Ordered Probit	
Position on Google		Below Median
Poor	-0.475	<del></del>
	(0.293)	
Below Median	0.455	3.5.31
	(0.274)	Median
Median	0.825	
	(0.256)*	
Above Median	1.129	A.1. 3.5.11
	(0.270)*	Above Median
Best	1.420	
	(0.252)*	
ln(Page 1)		Best
		Dest
Name Recognition on Bing		
Poor	1.158	
	(0.256)*	(0.273)*
Below Median	1.648	1.299
	(0.227)*	(0.277)*
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	(0.212)*	(0.296)*
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	(0.221)*	$(0.317)^*$
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	(0.070)*	(0.188)
Social Network Presence	0.093	0.245
	(0.217)	(0.234)
Retailer Age	0.069	0.028
	(0.026)*	(0.024)
Web Only Retailer	0.101	0.022
	(0.183)	(0.171)
Constant	Yes	Yes

Yes

759

0.53

0.35

-0.475

(0.293)

0.455

(0.274)

0.825

(0.256)\*

1.129

(0.270)\*

1.420

Notes: Standard errors in parentheses. \*significant at 5%.

Yes

759

0.53

Retailer Category Indicators

Sargan Test (p-value)

Observations

Pseudo R2

Table 5: Specifications Controlling for Endogenity of Position and Ads Dependent Variable:  $\ln(\text{Net Organic Clicks on Google})$ 

	(1)	(2)
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Variable	Ordered Probit	Least Squares
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-	(0.026)*	(0.024)
Web Only Retailer	0.101	0.022
	(0.183)	(0.171)
Constant	Yes	Yes
Retailer Category Indicators	Yes	Yes
Observations	759	759
Pseudo R2	0.53	0.53
Sargan Test (p-value)		0.35

Table 5: Specifications Controlling for Endogenity of Position and Ads Dependent Variable: ln(Net Organic Clicks on Google)

	(1)	(2)	•	
	Two-Stage	Two-Stage		
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Position on Google			-	
Poor	-0.475			
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Social Network Presence	0.093	${ m M}\epsilon$	edian	1.916
	(0.217)			(0.212)*
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	(0.026)*	Αb	ove Median	2.149
Web Only Retailer	0.101	110	ove median	
Constant	(0.183)			$(0.221)^*$
Constant Retailer Category Indicators	Yes Yes	D	- 4	,
Observations	759	Be	St	2.832
Pseudo R2	0.53			(0.328)*
Sargan Test (p-value)				(0.520)

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Below Median	0.455				
2.5. 12	(0.274)				
Median	0.825 $(0.256)*$				
Above Median	(0.250)				
Tibove Wedien	(0.270)*				
Best	1.420				
	$(0.252)^*$				
ln(Page 1)		1.115			
		$(0.190)^*$			
Name Recognition on Bing					
Poor	1.158	1.049			
	(0.256)*	(0.972\* 	D.		
Below Median	1.648 N	ame Reco	gnition on Bing		
Median	(0.227)* 1.916	Po	^ "		1.158
Median	(0.212)*	10	or		
Above Median	2.149				(0.256)*
	(0.221)*				,
Best	2.832	${ m Be}$	low Median		1.648
	(0.328)*				(0.007)*
$\ln(\# \text{ Ads on Page 1})$	0.815				(0.227)*
C IN L D	(0.070)*	Me	edian		1.916
Social Network Presence	0.093 (0.217)	IVIC	dian		
Retailer Age	0.069				(0.212)*
1180	(0.026)*	A 3	3.5.12		,
Web Only Retailer	0.101	Ab	ove Median		2.149
	(0.183)				(0.221)*
Constant	Yes				,
Retailer Category Indicators	Yes	$\mathrm{Be}$	st		2.832
Observations	759				
Pseudo R2	0.53			(	$(0.328)^*$
Sargan Test (p-value)					(0.320

Table 5: Specifications Controll  Dependent Variable: ln		Position on Google	
	(1)	Poor	-0.475
	(1) Two-Stage		(0.293)
Variable	Ordered Probit		(0.233)
Position on Google		Below Median	0.455
Poor	-0.475 (0.293)		(0.274)
Below Median	0.455	Madian	
Median	(0.274) $0.825$	Median	0.825
	(0.256)*		(0.256)*
Above Median	1.129 (0.270)*	Above Median	1.129
Best	1.420	1150 vo Modicii	
2 (2	(0.252)*		$(0.270)^*$
ln(Page 1)		Best	1.420
Name Recognition on Bing			$(0.252)^*$
Poor	1.158		$(0.232)^{*}$
	(0.256)*	// 979 ×	
Below Median	$1.648 (0.227)^*$	Vame Recognition on Bing	
Median	1.916	Poor	1.158
Above Median	$(0.212)^*$ $2.149$		(0.256)*
	(0.221)*	5.1.16.11	× ×
Best	2.832	Below Median	1.648
ln(# Ads on Page 1)	(0.328)** 0.815		(0.227)*
G 1137 ( 175	(0.070)*	Median	1.916
Social Network Presence	0.093 $(0.217)$	Wedian	
Retailer Age	0.069		$(0.212)^*$
Web Only Retailer	(0.026)* 0.101	Above Median	2.149
web Only Retailer	(0.183)		$(0.221)^*$
Constant	Yes		(0.221)
Retailer Category Indicators	Yes	Best	2.832
Observations	759		
Pseudo R2	0.53		(0.328)*
Sargan Test (p-value)			, ,

Table 5: Specifications Controll  Dependent Variable: ln		Position on Google	
	`	Poor	-0.475
	(1) Two-Stage		(0.203)
Variable	Ordered Probit		(0.293)
Position on Google		Below Median	0.455
Poor	-0.475		(0.274)
Below Median	(0.293) $0.455$		(0.274)
below Median	(0.274)	Median	0.825
Median	0.825	112001011	
	(0.256)*		(0.256)*
Above Median	1.129	Above Median	1.129
D .	(0.270)*	Above Median	1.129
Best	1.420 (0.252)*		(0.270)*
ln(Page 1)	(0.202)	Dest	
(2 3.80 2)		Best	1.420
Name Recognition on Bing			$(0.252)^*$
Poor	1.158 (0.256)*	(O +)79 \*	(*****)
Below Median		Name Recognition on Bing	
	(0.227)*	value recognition on Ding	<u> </u>
Median	1.916	Poor	1.158
	(0.212)*		(0.050)*
Above Median	2.149		(0.256)*
Best	(0.221)* 2.832	Below Median	1.648
2000	(0.328)*	Below Medicin	10.000.000.00
$\ln(\#$ Ads on Page 1)	0.815		$(0.227)^*$
	(0.070)*	Median	1.916
Social Network Presence	0.093	Median	1.910
Retailer Age	(0.217) 0.069		$(0.212)^*$
Retailer Age	(0.026)*	A1 2.5 11	
Web Only Retailer	0.101	Above Median	2.149
	(0.183)		$(0.221)^*$
Constant	Yes	-	
Retailer Category Indicators Observations	Yes 759	$\operatorname{Best}$	2.832
Pseudo R2	0.53		(0.328)*
Sargan Test (p-value)	2.33		(0.320)

Table 5: Specifications Controll		Position on Google	
Dependent Variable: ln(	Net Organic Clicks		0.475
	(1)	Poor	-0.475
	Two-Stage		(0.293)
Variable	Ordered Probit	Dolom Modion	
Position on Google  Poor	-0.475	Below Median	0.455
	(0.293)		(0.274)
Below Median	0.455	3.5.12	
	(0.274)	Median	0.825
Median	0.825 (0.256)*		(0.256)*
Above Median	1.129		<u> </u>
	(0.270)*	Above Median	1.129
Best	1.420		(0.270)*
ln(Page 1)	(0.252)*	<b>.</b>	
(8)		Best	1.420
Name Recognition on Bing			(0.252)*
Poor	1.158	(() ·)79 \*	(0.202)
Below Median	(0.256)* 1.648	Name Recognition on Bing	
	(0.227)*	value recognition on Ding	
Median	1.916	Poor	1.158
A1 21 P	(0.212)*		(0.256)*
Above Median	$2.149$ $(0.221)^*$		(0.250)
Best	2.832	Below Median	1.648
	(0.328)*		(0.227)*
$\ln(\# \text{ Ads on Page 1})$	0.815		$(0.227)^*$
Social Network Presence	(0.070)* 0.093	Median	1.916
	(0.217)		(0.212)*
Retailer Age	0.069		$(0.212)^*$
Wel. Only Date lles	(0.026)*	Above Median	2.149
Web Only Retailer	0.101 (0.183)		
Constant	Yes		$(0.221)^*$
Retailer Category Indicators	Yes	Best	2.832
Observations	759		
Pseudo R2 Sargan Test (p-value)	0.53		(0.328)*
Sargari Tost (P varue)			and the second s

T. 1.1 * G . 1.2" . 1			
Table 5: Specifications Controll Dependent Variable: ln		Position on Google	
	(1)	Poor	-0.475
	(1) Two-Stage		(0.293)
Variable	Ordered Probit		(0.233)
Position on Google		Below Median	0.455
Poor	-0.475		(0.074)
	(0.293)		(0.274)
Below Median	0.455 $(0.274)$	Median	0.825
Median	0.825	Wedian	0.020
Median	(0.256)*		(0.256)*
Above Median	1.129	A1 25 11	
	(0.270)*	Above Median	1.129
Best	1.420		(0.270)*
1 (D 1)	(0.252)*		(0.210)
ln(Page 1)		Best	1.420
Name Recognition on Bing			(0.050)*
Poor	1.158		(0.252)*
	(0.256)*	/(L-1)79\*	
Below Median	1.648	Name Recognition on Bing	<u> </u>
	(0.227)*		1 150
Median	1.916 (0.212)*	Poor	1.158
Above Median	2.149		(0.256)*
110010 111041011	(0.221)*		× × ×
Best	2.832	Below Median	1.648
	(0.328)*		(0.227)*
$\ln(\# \text{ Ads on Page 1})$	0.815		(0.227)*
Social Network Presence	(0.070)* 0.093	Median	1.916
Social Network Presence	(0.217)	1110 011011	
Retailer Age	0.069		$(0.212)^*$
<u> </u>	(0.026)*	Above Medien	2 140
Web Only Retailer	0.101	Above Median	2.149
	(0.183)		$(0.221)^*$
Constant Retailer Category Indicators	$\begin{array}{c} { m Yes} \\ { m Yes} \end{array}$	D	
Observations	759	$\operatorname{Best}$	2.832
Pseudo R2	0.53		(0.328)*
Sargan Test (p-value)			$(0.328)^{\circ}$

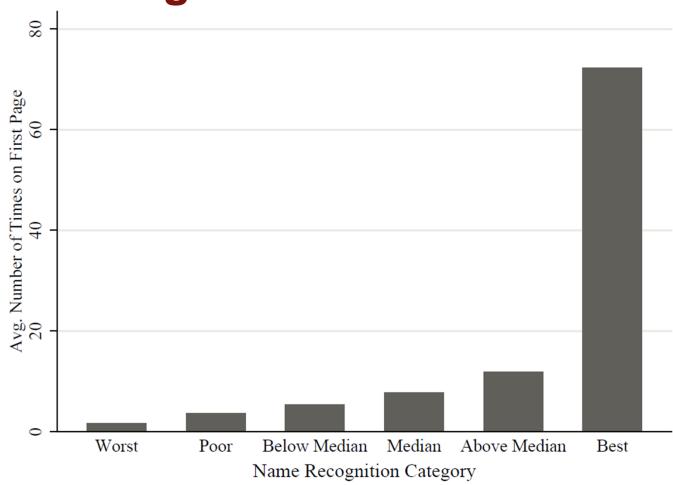


## **Total Effect of Name Prominence** on Clicks

- Firms with more prominent names get more clicks; ultimately translates into better positions
- Effects of retailer investment in name recognition:
  - Direct effect: For a given position, more prominent retailers get more clicks
  - Indirect effect: More prominent retailers get better positions, leading to an additional clicks



# Screen Position & Name Recognition



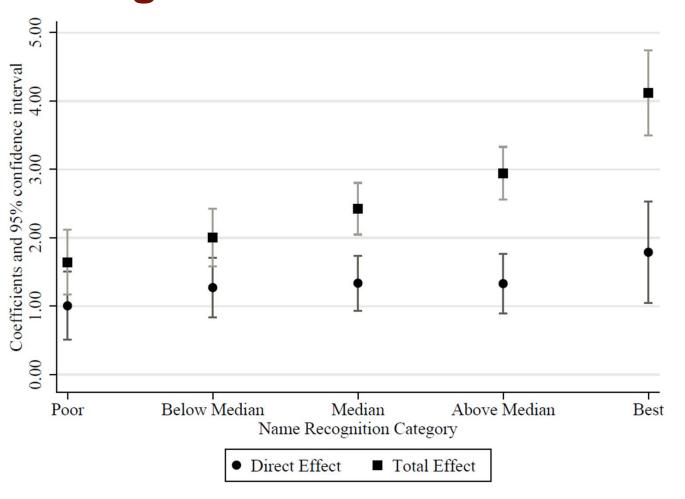


## Unpacking the Effects of Name Prominence on Clicks

- Residualized regressions
  - Step 1: Regress position on name recognition; residual captures nonname determinants of position
  - Step 2: Regress clicks on residual and other controls
- Use both OLS as well as IV to control for potential endogeneity



# Direct and Total Effects of Name Recognition





### Other Robustness Checks

- Replicated the above analysis using search results at Bing rather than Google
  - Qualitatively similar results
- Disaggregated results by search term
  - Corrections for Censoring
  - Corrections for Endogeneity

## **Summing Up**

- Name searches are a potentially useful measure of the "prominence" of retailer names
- Name and position prominence are both important determinants of clicks
- Magnitude of name effects greater than position effects when one accounts for
  - Endogeneity of positions and ads
  - Indirect effects of name prominence