# Econ 219B
# Psychology and Economics: Applications
# (Lecture 10)

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April 2, 2008

Outline

1. Menu Effects: Introduction
2. Menu Effects: Excess Diversification
3. Menu Effects: Choice Avoidance
4. Menu Effects: Preference for Familiar
5. Menu Effects: Preference for Salient

# 1 Menu Effects: Introduction

- Summary of Limited Attention:
  - Too little weight on opaque dimension (*Science* article, shipping cost, posted price, news to customers. indirect link, distant future)
  - Too much weight on salient dimension (*NYT* article, auction price, recent returns or volume)
- Any other examples?

- We now consider a specific context: **Choice from Menu** $N$ (typically, **with large** $N$)
  - Health insurance plans
  - Savings plans
  - Politicians on a ballot
  - Stocks or mutual funds
  - Type of Contract (Ex: no. of minutes per month for cell phones)
  - Classes
  - Charities
  - ...

- We explore 4 +1 (non-rational) heuristics
  1. Excess Diversification
  2. Choice Avoidance
  3. Preference for Familiar
  4. Preference for Salient
  5. Confusion

- Heuristics 1-4 deal with difficulty of choice in menu
  - Related to bounded rationality: Cannot process complex choice –> Find heuristic solution

- Heuristic 5 (next lecture) – Random confusion in choice from menu

# 2 Menu Effects: Excess Diversification

- First heuristic: **Excess Diversification or 1/n Heuristics**
  - Facing a menu of choices, if possible allocate
  - (Notice: Not possible for example for health insurance plan)

- Example: Experiment of Simonson (1990)
  - Subjects have to pick one snack out of six (cannot pick $>1$) in 3 different weeks
  - Sequential choice: only 9 percent picks three different snacks
  - Simultaneous choice ex ante: 64 percent chooses three different snacks

- **Benartzi-Thaler (AER, 2001)**
- Study 401(k) plan choices
- Data:
  - 1996 plan assets for 162 companies
  - Aggregate allocations, no individual data
- Average of 6.8 plan options per company
- Lacking individual data, cannot estimate if allocation is truly 1/n
- Proxy: Is there more investment in stocks where more stocks are offered?

- They estimate the relationship

$$\%Invested\ In\ Equity = \alpha + .36\ (.04) * \%Equity\ Options + \beta X$$

TABLE 7—THE RELATIVE NUMBER OF EQUITY-TYPE INVESTMENT OPTIONS AND ASSET ALLOCATION: A REGRESSION ANALYSIS
(DEPENDENT VARIABLE: THE PERCENTAGE OF PLAN ASSETS INVESTED IN EQUITIES)

| WLS regression model | Intercept | Relative number of equity options | Indicator whether the plan offers company stock | Log of the plan assets in thousands | Adjusted $R^2$ |
|---|---|---|---|---|---|
| | | Panel A: No Industry Indicators ($N$ = 162) | | | |
| 1 | 22.09 | 63.14 | | | 34.61 percent |
| | (4.94) | (9.28) | | | |
| 2 | 29.72 | 36.75 | 15.05 | | 43.45 percent |
| | (6.73) | (4.49) | (5.10) | | |
| 3 | 10.57 | 36.77 | 14.78 | 1.40 | 44.16 percent |
| | (0.89) | (4.52) | (5.03) | (1.74) | |
| | | Panel B: Including Industry Indicators Based on 2-Digit SIC Codes ($N$ = 142) | | | |
| 4 | | 58.68 | | | 55.12 percent |
| | | (8.29) | | | |
| 5 | | 43.90 | 12.93 | | 58.91 percent |
| | | (5.39) | (3.26) | | |
| 6 | | 47.07 | 9.09 | 4.13 | 61.79 percent |
| | | (5.93) | (2.25) | (2.96) | |

*Notes:* The initial sample consists of the June 1996 MMD sample of 401(k) plans. Eight plans with less than four investment options were excluded, resulting in a sample of 162 plans. When we include industry indicators, the sample is further reduced to 142 plans due to missing industry information. The table reports WLS regression estimates with plan assets as weights ($t$-statistics are in parentheses).

- For every ten percent additional offering in stocks, the percent invested in stocks increases by 3.6 percent

- Notice: availability of company stocks is a key determinant of holdings in stocks

- Issues of endogeneity:
  - Companies offer more stock when more demand for it
  - Partial response: Industry controls

- Additional evidence based on a survey
  - Ask people to allocate between Fund A and Fund B
  - Vary Fund A and B to see if people respond in allocation

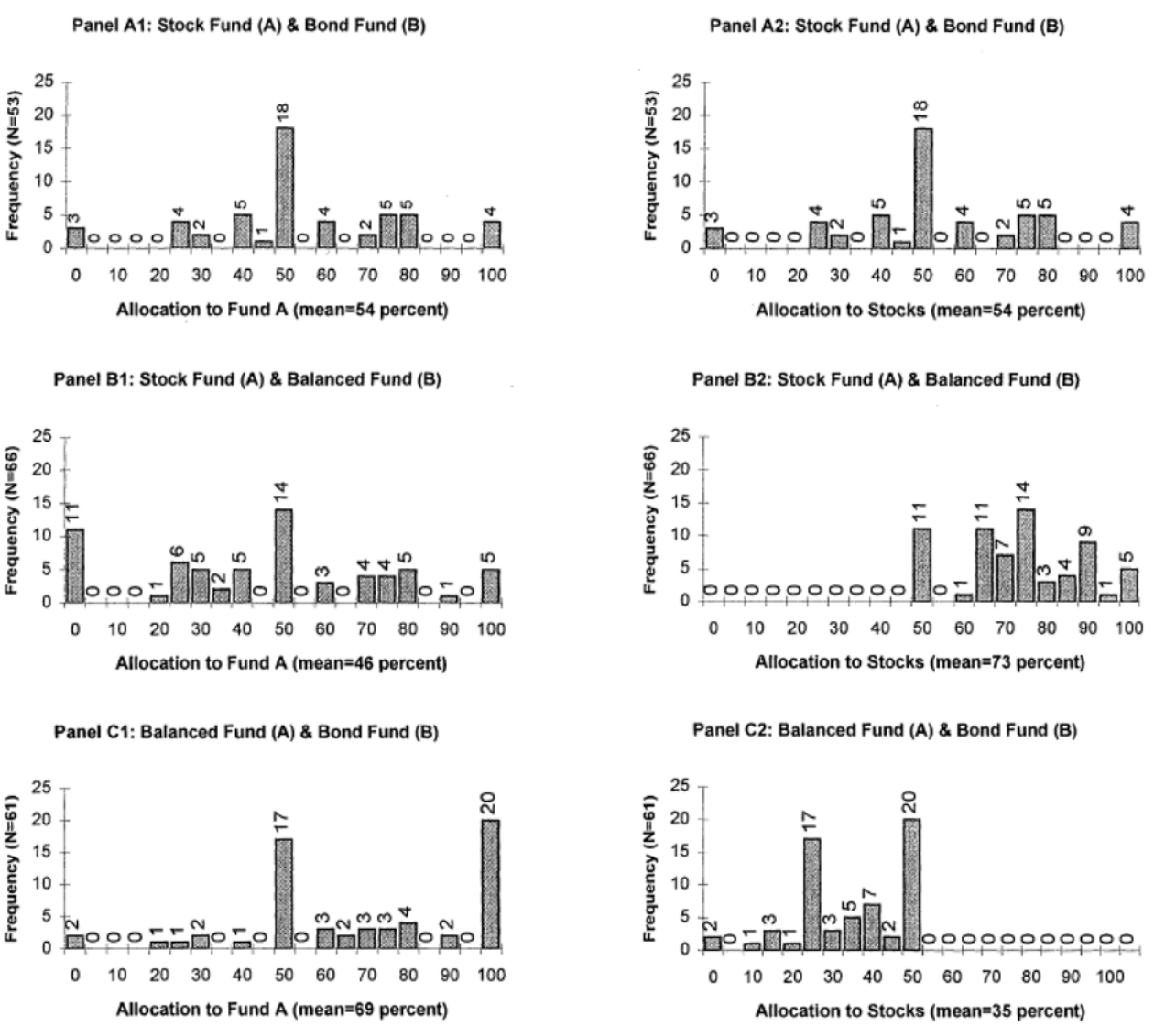



FIGURE 1. VERBAL SAVINGS QUESTIONNAIRE: HISTOGRAMS OF THE ALLOCATION TO FUND A AND THE RESULTING ALLOCATION TO STOCKS

- People respond to changes in content of Fund A and B, but incompletely

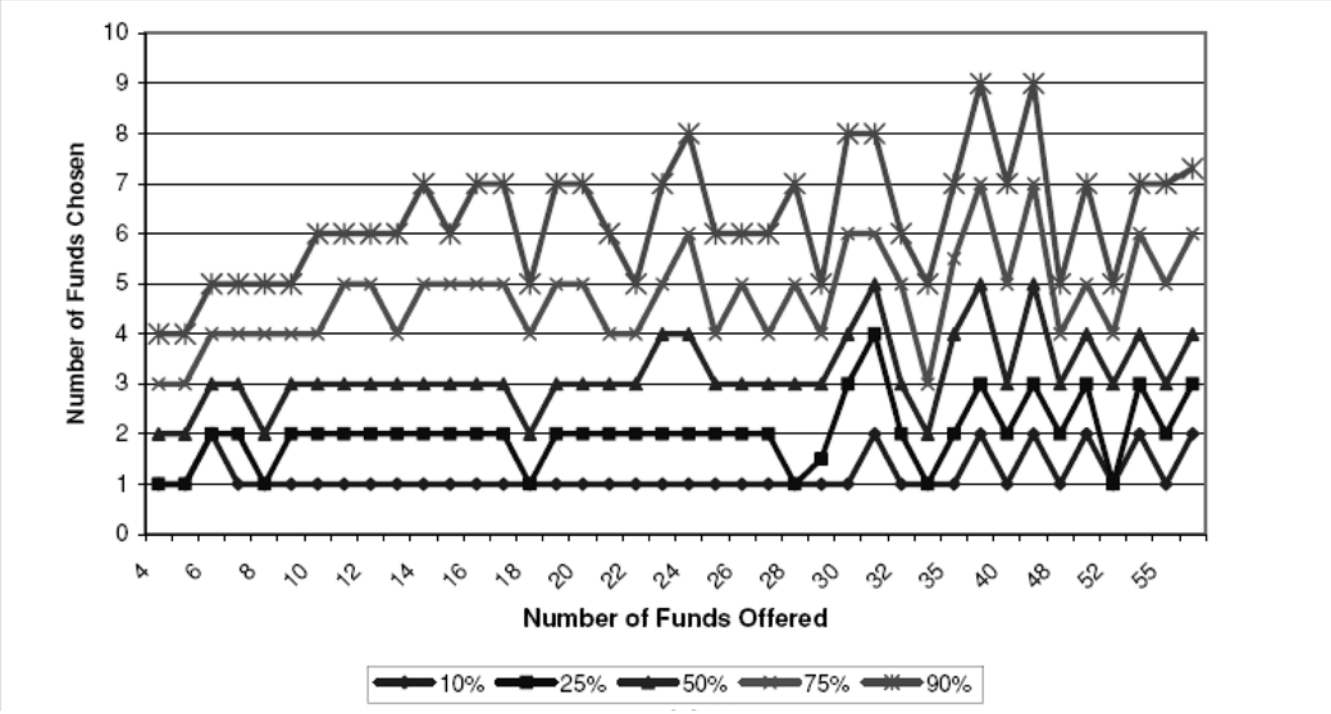
- Issues:
  - Not for real payoff
  - Low response rate (12%)
  - People dislike extreme in responses

- **Huberman-Jiang (JF, 2006)**

- Data:
  - Vanguard data to test BT (2001)
  - Data on individual choices of participants
  - Half a million 401(k) participants
  - 647 Defined Contribution plans in year 2001
  - Average participation rate 71 percent

- Summary Statistics:
  - 3.48 plans choices on average
  - 13.66 plans available on average

- **Finding 1**. People do not literally do 1/n, definitely not for n large
  - Flat relationship between $\#Chosen$ and $\#Offered$ for $\#Offered > 10$
  - BT (2001): could not estimate this + $\#Offered$ rarely above 15



- Regressions specification:

$$\#Chosen = \alpha + \beta * \#Offered + \beta X$$

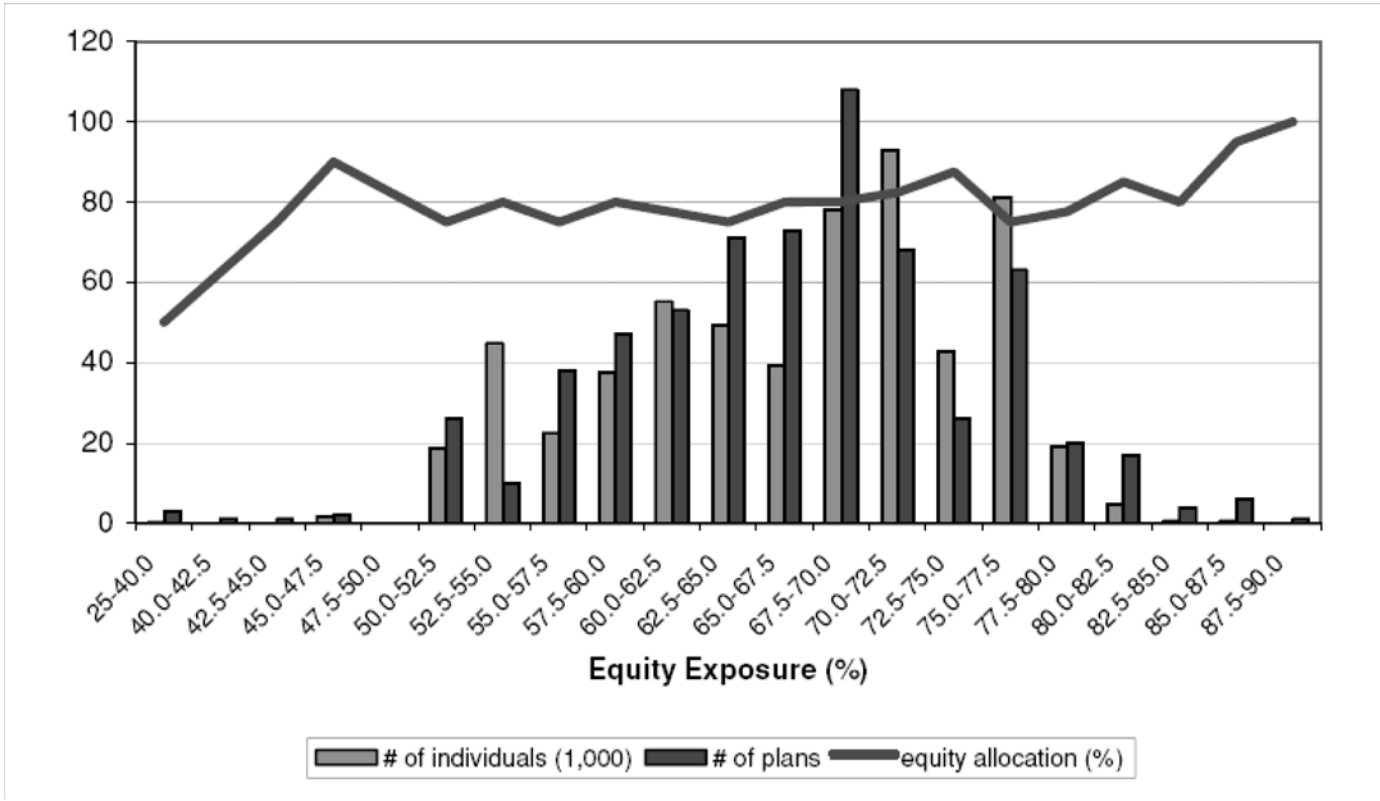
| | All Participants | | | |
|---|---|---|---|---|
| | NCHOSEN | | | |
| | (1) | | (2) | |
| | COEF × 100 | SE × 100 | COEF × 100 | SE × 100 |
| *NCHOICE* | 0.95 | 0.70 | 1.03 | 0.70 |
| *CONTRIBUTION* | 10.54* | 0.56 | — | — |
| *COMP* | −0.02 | 2.30 | 33.05* | 2.87 |
| *WEALTH* | 1.20* | 0.51 | 3.90* | 0.55 |
| *FEMALE* | 14.51* | 1.97 | 14.84* | 1.95 |
| *AGE* | −1.66* | 0.10 | −1.35* | 0.09 |
| *TENURE* | 0.88* | 0.26 | 0.95* | 0.26 |
| *MATCH* | 0.00 | 0.24 | 0.00 | 0.23 |
| *COMPSTK* | 70.67* | 12.72 | 67.16* | 12.68 |
| *DB* | −6.31 | 15.35 | −6.06 | 15.21 |
| *WEB* | 1.17 | 0.71 | 1.39 | 0.71 |
| *NEMPLOY* | −10.28* | 4.79 | −9.25* | 4.73 |
| Intercept | 1036.95 | 284.44 | 664.25 | 290.06 |
| No. of individuals and plans | 572,157 | 641 | 572,157 | 641 |
| $R^2$ | 0.075 | | 0.060 | |

- **Finding 2.** Employees do 1/n on the *chosen* funds if
  - number $n$ is small
  - $1/n$ is round number

| No. of Funds Chosen (1) | New Entrants (%) (2) | $\underline{H}$ (3) | $\bar{H}$ (4) | $Freq_1$ (%) (5) | $Freq_1/\max_{j\neq 1}(Freq_j)$ (6) |
|---|---|---|---|---|---|
| 1 | 38.6 | 1.0000 | 1.0000 | – | – |
| 2 | 17.5 | 0.5000 | 0.5050 | 64.0 | 12.81* |
| 3 | 15.6 | 0.3333 | 0.3356 | 17.9 | 1.78* |
| 4 | 13.2 | 0.2500 | 0.2513 | 37.4 | 8.89* |
| 5 | 7.3 | 0.2000 | 0.2008 | 26.6 | 8.19* |
| 6 | 3.5 | 0.1667 | 0.1672 | 1.3 | 0.25 |
| 7 | 1.8 | 0.1429 | 0.1433 | 1.0 | 0.19 |
| 8 | 1.1 | 0.1250 | 0.1253 | 3.9 | 1.14 |
| 9 | 0.6 | 0.1111 | 0.1114 | 5.1 | 1.20 |
| 10 | 0.4 | 0.1000 | 0.1002 | 53.3 | 13.50* |

- **Finding 3.** Equity choice (most similar to BT (2001))

- In aggregate very mild relationship between $\%Equity$ and $\%EquityOffered$



- Split by $\#Offered$:
  1. For $\#Offered \leq 10$, BT finding replicates:

$$\%Equity = \alpha + .292 * \%EquityOffered$$
$$(.063)$$

  2. For $\#Offered > 10$, no effect:

$$\%Equity = \alpha + .058 * \%EquityOffered$$
$$(.068)$$

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| | All *NFunds* | | | | *NFunds* $\leq 10$ | | *NFunds* $> 10$ | |
| | COEF | SE | COEF | SE | COEF | SE | COEF | SE |
| Panel A: Full Sample—Uniform Sensitivity | | | | | | | | |
| *%EQOffered* | 0.175 | 0.274 | 0.177* | 0.088 | 0.292* | 0.107 | 0.058 | 0.09 |
| $R^2$ | 0.000 | | 0.061 | | 0.063 | | 0.068 | |

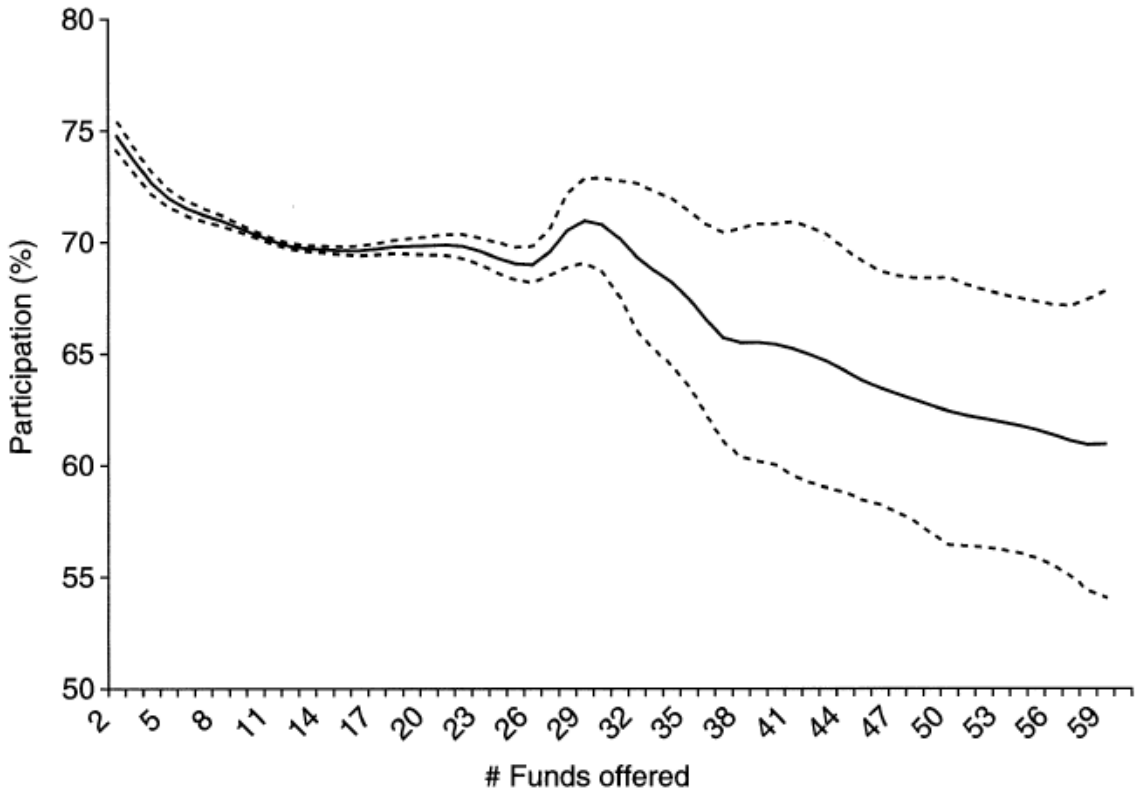
- Psychologically plausible:
  - Small menu set guides choices –> Approximate 1/n in weaker form
  - Larger menu set does not
- BT-HJ debate: Interesting case
  - Heated debate at beginning
  - At the end, reasonable convergence: we really understand better the phenomenon
  - Convergence largely due to better data

# 3 Menu Effects: Choice Avoidance

- Second heuristic: Refusal to choose with choice overload

- **Choice Avoidance.** Classical Experiment (**Yiengar-Lepper, JPSP 2000**)
  - Up-scale grocery store in Palo Alto
  - Randomization across time of day of number of jams displayed for taste
    - Small number: 6 jams
    - Large number: 24 jams
  - Results:
    - More consumers sample with Large no. of jams (145 vs. 104 customers)
    - *Fewer* consumers buy with Large no. of jams (4 vs. 31 customers)

- Field Evidence 1: **Iyengar-Huberman-Lepper (2006)**
- Data set from Fidelity on choice of 401(k) plans
- (Same as for Huberman-Jiang on 1/N)
- Comparison of plans with few options and plans with many options
- Focus on participation rate – Fractions of employees that invest



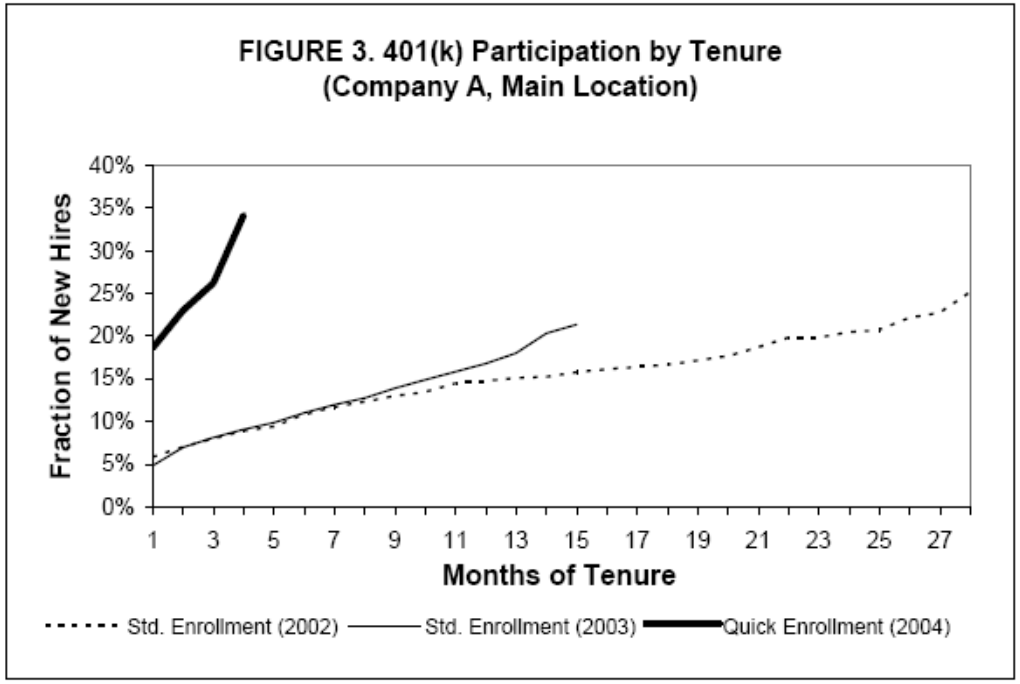

- Suggestive evidence: Participation rate is decreasing in number of funds

- However, number of funds offered is endogenous: perhaps higher where people are close to indifference –> Lower participation

- Field evidence 2: **Choi-Laibson-Madrian (2006):** Natural experiment

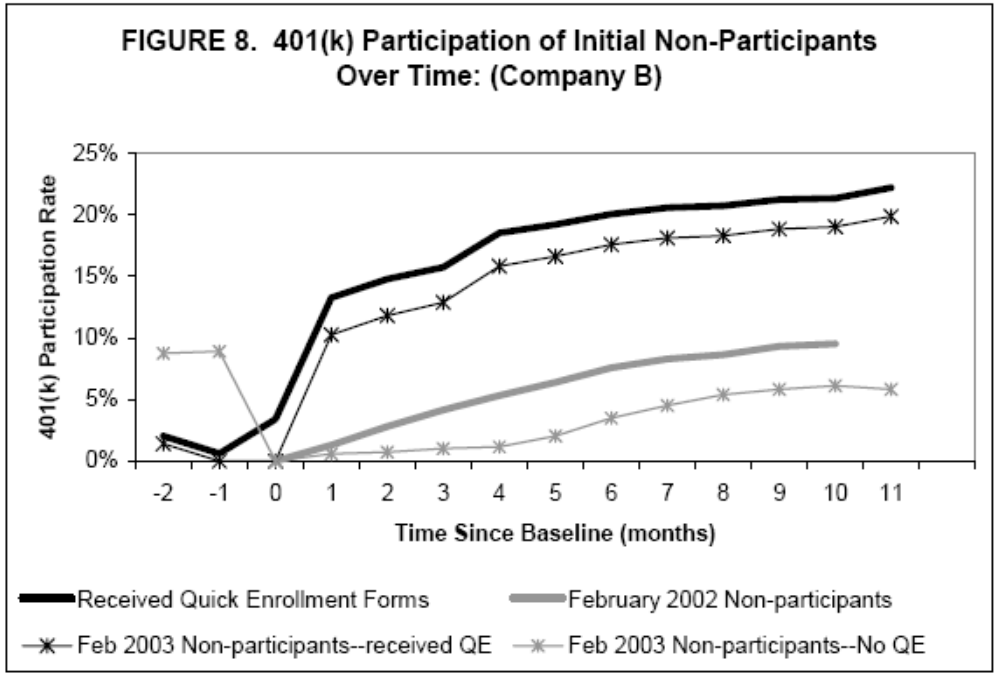
- Introduce in company A of Quick Enrollment
  - Previously: Default no savings
  - 7/2003: Quick Enrollment Card:
    * Simplified investment choice: 1 Savings Plan
    * Deadline of 2 weeks
  - In practice: Examine from 2/2004

- Company B:
  - Previously: Default no savings
  - 1/2003: Quick Enrollment Card
- Notice: This affects
  - Simplicity of choice
  - But also cost of investing + deadline (self-control)




- 15 to 20 percentage point increase in participation – Large effect

- Increase in participation all on opt-in plan




- Very similar effect for Company B

- What is the effect due to?
- Increase may be due to a reminder effect of the card
- However, in other settings, reminders are not very powerful.
- Example: Choi-Laibson-Madrian (2005):
  - Sent a survey including 5 questions on the benefits of employer match
  - Treatment group: 345 employees that were not taking advantage of the match
  - Control group: 344 employees received the same survey except for the 5 specific questions.
  - Treatment had no significant effect on the savings rate.

- Field Evidence 3: **Bertrand, Karlan, Mullainathan, Zinman (2006)**

- Field Experiment in South Africa
  - South African lender sends 50,000 letters with offers of credit
  - Randomization of interest rate (economic variable)
  - Randomization of psychological variables
  - Crossed Randomization: Randomize independently on each of the $n$ dimensions
    * Plus: Use most efficiently data
    * Minus: Can easily lose control of randomization

**Table 2**
**Summary of Randomized Interventions[a]**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Sample:** | **All** | **Customers who did not take up** | **Customers who took up** | **"High attention" customer** | **"Low attention" customer** |
| September wave | 0.395 | 0.394 | 0.401 | 0.398 | 0.393 |
| | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| October wave | 0.605 | 0.606 | 0.599 | 0.602 | 0.607 |
| | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| Offer Interest | 7.929 | 7.985 | 7.233 | 6.970 | 8.384 |
| Rate | (2.42) | (2.42) | (2.31) | (2.11) | (2.43) |
| Small option table | 0.432 | 0.438 | 0.349 | 0.250 | 0.518 |
| | (0.50) | (0.50) | (0.48) | (0.43) | (0.50) |
| No comparison to | 0.200 | 0.200 | 0.200 | 0.202 | 0.199 |
| competitor | (0.40) | (0.40) | (0.40) | (0.40) | (0.40) |
| comparison expressed | 0.401 | 0.400 | 0.408 | 0.397 | 0.403 |
| as a gain | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| No photo on mailing | 0.202 | 0.202 | 0.206 | 0.198 | 0.204 |
| | (0.40) | (0.40) | (0.40) | (0.40) | (0.40) |
| Black photo | 0.477 | 0.477 | 0.476 | 0.488 | 0.472 |
| | (0.50) | (0.50) | (0.50) | (0.50) | (0.50) |
| Coloured photo | 0.071 | 0.071 | 0.071 | 0.072 | 0.071 |
| | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) |
| Indian photo | 0.125 | 0.125 | 0.122 | 0.123 | 0.126 |
| | (0.33) | (0.33) | (0.33) | (0.33) | (0.33) |
| White photo | 0.124 | 0.124 | 0.125 | 0.120 | 0.127 |
| | (0.33) | (0.33) | (0.33) | (0.32) | (0.33) |
| Female photo | 0.399 | 0.398 | 0.411 | 0.398 | 0.399 |
| | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| Male photo | 0.399 | 0.400 | 0.383 | 0.404 | 0.397 |
| | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| Photo matches | 0.534 | 0.535 | 0.531 | 0.537 | 0.533 |
| customer's race? | (0.50) | (0.50) | (0.50) | (0.50) | (0.50) |
| Photo matches | 0.401 | 0.402 | 0.388 | 0.403 | 0.400 |
| customer's gender? | (0.49) | (0.49) | (0.49) | (0.49) | (0.49) |
| Promotional lottery | 0.250 | 0.251 | 0.246 | 0.250 | 0.251 |
| | (0.43) | (0.43) | (0.43) | (0.43) | (0.43) |
| Suggestion call | 0.003 | 0.003 | 0.005 | 0.003 | 0.003 |
| | (0.05) | (0.05) | (0.07) | (0.05) | (0.05) |
| Sample | 53194 | 49250 | 3944 | 17108 | 36086 |

- Manipulation of interest here:
  - Vary number of options of repayment presented
    - Small Table: Single Repayment option
    - Big Table 1: 4 loan sizes, 4 Repayment options, 1 interest rate
    - Big Table 2: 4 loan sizes, 4 Repayment options, 3 interest rates
    - Explicit statement that "other loan sizes and terms were available"
  - Compare Small Table to other Table sizes
  - Small Table increases Take-Up Rate by .603 percent
  - One additional point of (monthly) interest rate decreases take-up by .258

**Table 3 Effect of Simplicity of Offer Description on Take-Up**[a]

| Dependent Variable: Take-Up Dummy<br>**Sample:** | **All** | **High attention** | **Low attention** |
|---|---|---|---|
| | (1) | (2) | (3) |
| Small option table | 0.603 | 1.146 | 0.407 |
| | (0.239) | (0.674) | (0.219) |
| $\Delta$ interest rate equivalent | [2.337] | [3.570] | [1.887] |
| Interest rate | -0.258 | -0.321 | -0.215 |
| | (0.049) | (0.145) | (0.044) |
| Risk category F.E.? | yes | yes | yes |
| Experimental wave F.E.? | yes | yes | yes |
| Sample size | 53194 | 17108 | 36086 |

- Small-option Table increases take-up by equivalent of 2.33 pct. interest

- Strong effect of behavioral factor, compared with effect of interest rate

- Effect larger for 'High-Attention' group (borrow at least twice in the past, once within 8 months)

- Authors also consider effect of a number of other psychological variables:
  - Content of photo (large effect of female photo on male take-up)
  - Promotional lottery (no effect)
  - Deadline for loan (reduces take-up)

# 4 Menu Effects: Preference for Familiar

- Third Heuristic: Preference for items that are more familiar

- Choice of stocks by individual investors (**French-Poterba, AER 1991**)
  - Allocation in domestic equity: Investors in the USA: 94%
  - Explanation 1: US equity market is reasonably close to world equity market
  - BUT: Japan allocation: 98%
  - BUT: UK allocation: 82%

- Explanation 2: Preference for own-country equity may be due to costs of investments in foreign assets

- Test: Examine within-country investment: **Huberman (RFS, 2001)**
  - Geographical distribution of shareholders of Regional Bell companies
  - Companies formed by separating the Bell monopoly
  - Fraction invested in the own-state Regional Bell is 82 percent higher than the fraction invested in the next Regional Bell company

- Third, extreme case: Preference for own-company stock
  - On average, employees invest 20-30 percent of their discretionary funds in employer stocks (**Benartzi JF, 2001**)

| Panel C: Company Stock Allocation as a Percentage of the Employee Contributions | | | |
|---|---|---|---|
| Number of plans | 78 | 58 | 136 |
| Mean: equally weighted | 18 | 29 | 23 |
| Mean: weighted by employee contributions | 21 | 33 | 24 |
| Mean: weighted by the number of active participants | 21 | 31 | 24 |

- – Notice: This occurs despite the fact that the employees' human capital is already invested in their company
  - Also: This choice does not reflect private information about future performance

– Companies where a higher proportion of employees invest in employer stock have lower subsequent one-year returns, compared to companies with a lower proportion of employee investment

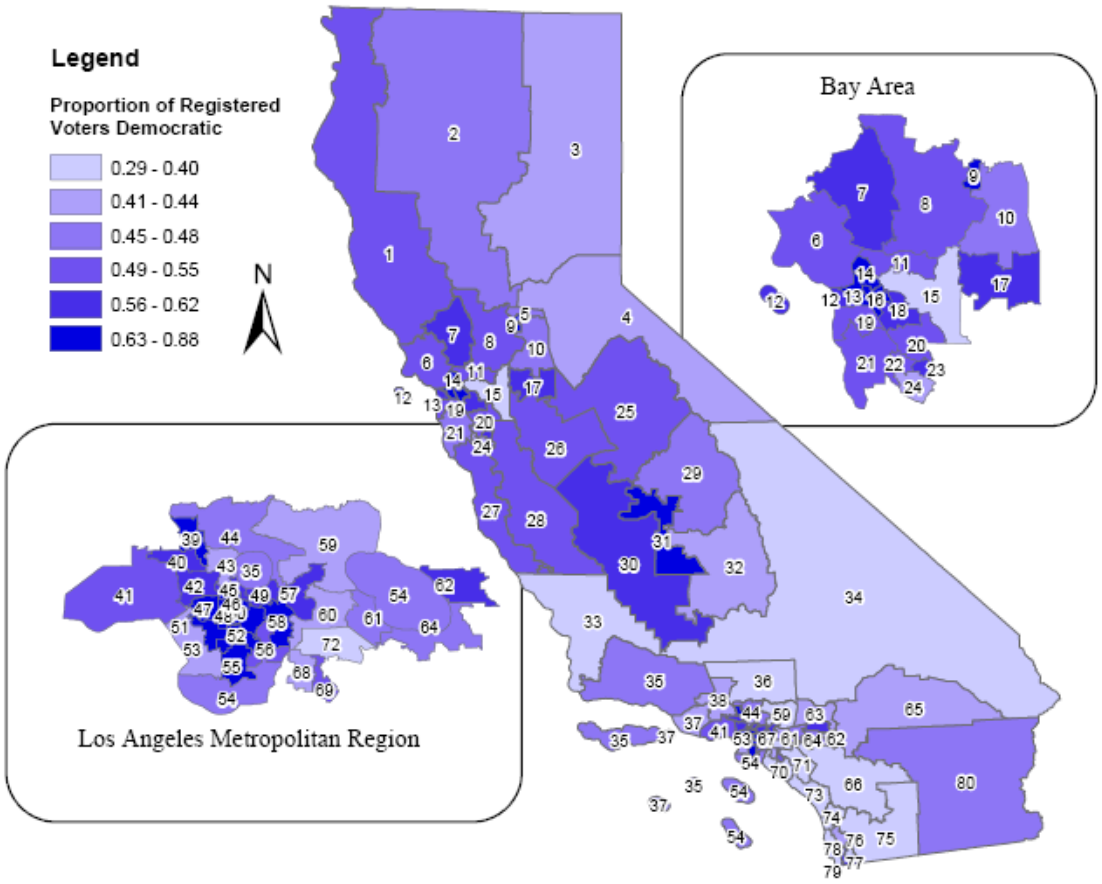
| | Allocation to Company Stock | | | | | Observed Difference |
|---|---|---|---|---|---|---|
| | (Low) 1 | 2 | 3 | 4 | 5 (High) | (5 − 1) |
| Allocation to company stock as a percentage of discretionary contributions | 4.59% | 12.19% | 19.34% | 31.85% | 53.90% | 49.41% |
| One-year returns | 6.64 | 6.55 | 1.27 | −1.03 | 0.13 | −6.77 |
| Two-year returns | 43.69 | 40.78 | 38.24 | 43.33 | 31.92 | −11.77 |

- Possible Explanation? Ambiguity aversion
  - **Ellsberg (1961)** paradox:
  - Investors that are ambiguity-averse prefer:
    * Investment with known distribution of returns
    * To investment with unknown distribution
  - This occurs even if the average returns are the same for the two investments, and despite the benefits of diversification.

# 5 Menu Effects: Preference for Salient

- What happens with large set of options if decision-maker uninformed?
- Possibly use of irrelevant, but salient, information to choose
- **Ho-Imai (2004).** Order of candidates on a ballot
  - Exploit randomization of ballot order in California
  - Years: 1978-2002, Data: 80 Assembly Districts
- Notice: Similar studies go back to **Bain-Hecock** (1957)

- Areas of randomization



- Use of randomized alphabet to determine first candidate on ballot

| Year | Election | Randomized Alphabet |
|---|---|---|
| 1982 | Primary | S C X D Q G W R V Y U A N H L P B K J I E T O M F Z |
| | General | L S N D X A M W V T O F I B K Y U P E Q C J Z H R G |
| 1983 | Consolidated | L C P K I A U G Z O N B X D W H E M F V R S T Y Q J |
| 1984 | Primary | W M F B Q Y T D J U O V I K R H S N P C A E L Z G X |
| | General | V W I H R Q G J O M T S Y C A F U X K B P E Z N D L |
| 1986 | General | Q N H U B J E G M V L W X C K O F D Z R Y I T S P A |
| 1988 | Primary | W O K N Q A V T H J F Z L B U D Y M I R G C E S X P |
| | General | S W F M K J U Y A T V G O N Q B D E P L Z C I X R H |
| 1990 | Primary | E J B Y Q F K M O V X L N Z C W A P R D G T H I S U |
| | General | W F C L D I N J H V K O S A R E Q B T M Y U G Z X P |
| 1992 | Primary | U R F A J C D N M K P Z Y X G W O H E B I S V L Q T |
| | General | F Y U A J S B Z G O E Q R L I M H V N T P D K X C W |
| 1994 | Primary | K J H G A M I Q U N C Z S W V R P Y B L O T D F E X |
| | General | V I A E M S O K L B G N W Y D P U F Z Q J X C R H T |
| 1996 | Primary | G E F C Y P D B Z I V A U S M L H K N T O J Q R X W |
| | General | J Y E P A U S Q B H T R K N L X F D O G M W I Z C V |
| 1998 | Primary | L W U J X K C N D O Q A P T Z R Y F E V B H G I M S |
| | General | W K D N V A G P Y C Z I S T L J X Q O F H R B U M E |
| 2000 | Primary | O P C Y I H X Z V R S Q E K L G D W J U T M B F A N |
| | General | I T F G J S W R N M K U Y L D C Q A H X O E B V P Z |
| 2002 | Primary | W I Z C O M A Q U K X E B Y N P T R L V S J H D F G |
| | General | H M V P E B Q U G N D K X Z J A W Y C O S F I T R L |
| 2003 | Recall | R W Q O J M V A H B S G Z X N T C I E K U P D Y F L |

Table 1: Randomized Alphabets Used for the California Statewide Elections Since 1982.

- Observe each candidate in different orders in different districts

- Compute absolute vote $(Y)$ gain

$$E\left[Y\left(i=1\right)-Y\left(i\neq 1\right)\right]$$

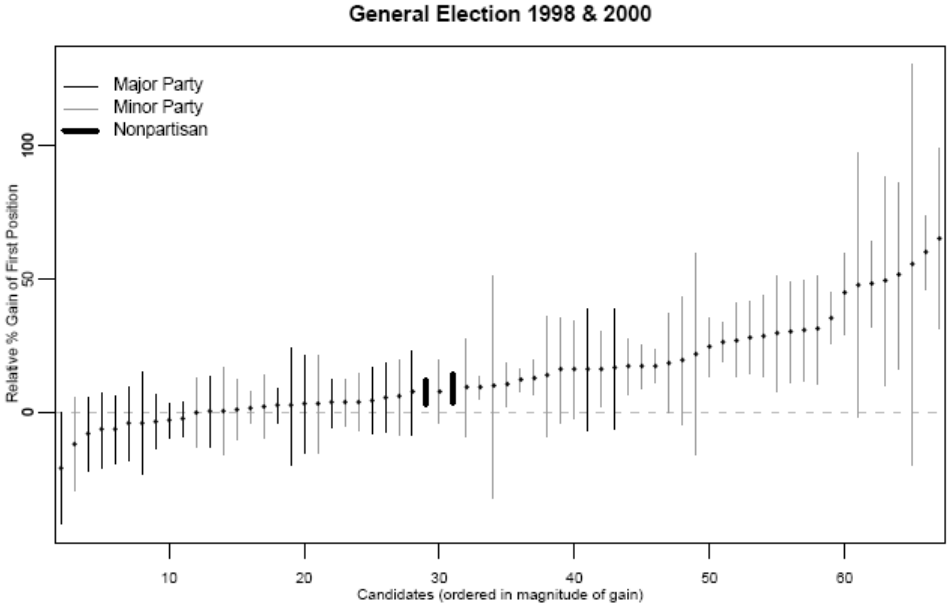
  and percentage vote gain

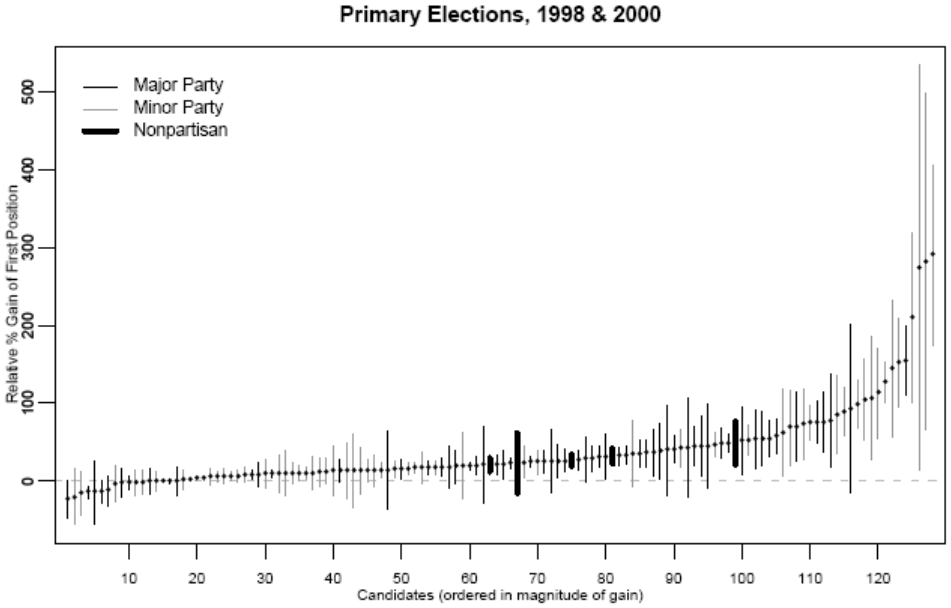
$$E\left[Y\left(i=1\right)-Y\left(i\neq 1\right)\right]/E\left[Y\left(i\neq 1\right)\right]$$

- Result:

  - Small to no effect for major candidates

  - Large effects on minor candidates


General Election 1998 & 2000
Major Party
Minor Party
Nonpartisan
Relative % Gain of First Position
0
50
100
10
20
30
40
50
60
Candidates (ordered in magnitude of gain)


Primary Elections, 1998 & 2000
Major Party
Minor Party
Nonpartisan
Relative % Gain of First Position
0
100
200
300
400
500
10
20
30
40
50
60
70
80
90
100
110
120
Candidates (ordered in magnitude of gain)

| | General | | | | Primary | | | |
|---|---|---|---|---|---|---|---|---|
| | Absolute | | Relative | | Absolute | | Relative | |
| | ATE | SE | ATE | SE | ATE | SE | ATE | SE |
| Democratic | 0.05 | 0.46 | 0.25 | 0.90 | 1.89 | 0.32 | 43.58 | 5.53 |
| Republican | -0.06 | 0.53 | -0.43 | 1.29 | 2.16 | 0.46 | 33.62 | 5.91 |
| American Independent | 0.16 | 0.02 | 20.83 | 1.39 | 2.33 | 0.15 | 26.76 | 3.55 |
| Green | 0.56 | 0.17 | 21.18 | 5.82 | 3.15 | 1.16 | 6.24 | 3.54 |
| Libertarian | 0.23 | 0.02 | 14.56 | 1.03 | 6.59 | 1.42 | 71.92 | 13.55 |
| Natural Law | 0.31 | 0.06 | 26.13 | 2.85 | 0.40 | 0.08 | 44.78 | 5.45 |
| Peace and Freedom | 0.28 | 0.03 | 25.49 | 2.15 | 6.31 | 0.53 | 14.75 | 1.43 |
| Reform | 0.26 | 0.07 | 19.57 | 2.23 | 4.11 | 1.56 | 48.45 | 9.66 |
| Nonpartisan | 1.95 | 0.30 | 9.21 | 3.31 | 3.44 | 0.78 | 19.42 | 4.05 |

Table 3: Party-Specific Average Causal Effects of Being Listed in First Position on Ballots Using All Races from 1978 to 2002. ATE and SE represent the average causal effects and their standard errors, respectively. For general and primary elections, the left two columns present the estimates of average absolute gains in terms of the total or party vote, respectively, while the right two columns show those of average relative gains. Each candidate-specific effect is averaged over different races to obtain the overall average effect for each party. In general elections, only minor party and nonpartisan candidates are affected by the ballot order. In primaries, however, the candidates of all parties are affected. The largest effects are found for nonpartisan candidates.

- **Barber-Odean (2004).** Investor with limited attention
  - Stocks in portfolio: Monitor continuously
  - Other stocks: Monitor extreme deviations (*salience*)

- Which stocks to purchase? High-attention (salient) stocks. On days of high attention, stocks have
  - Demand increase
  - No supply increase
  - Increase in net demand

- Heterogeneity:
  - Small investors with limited attention attracted to salient stocks
  - Institutional investors less prone to limited attention
- Market interaction: Small investors are:
  - Net buyers of high-attention stocks
  - Net sellers of low-attention stocks.
- Measure of net buying is Buy-Sell Imbalance:

$$BSI_t = 100 * \frac{\sum_i NetBuy_{i,t} - \sum_i NetSell_{i,t}}{\sum_i NetBuy_{i,t} + \sum_i NetSell_{i,t}}$$

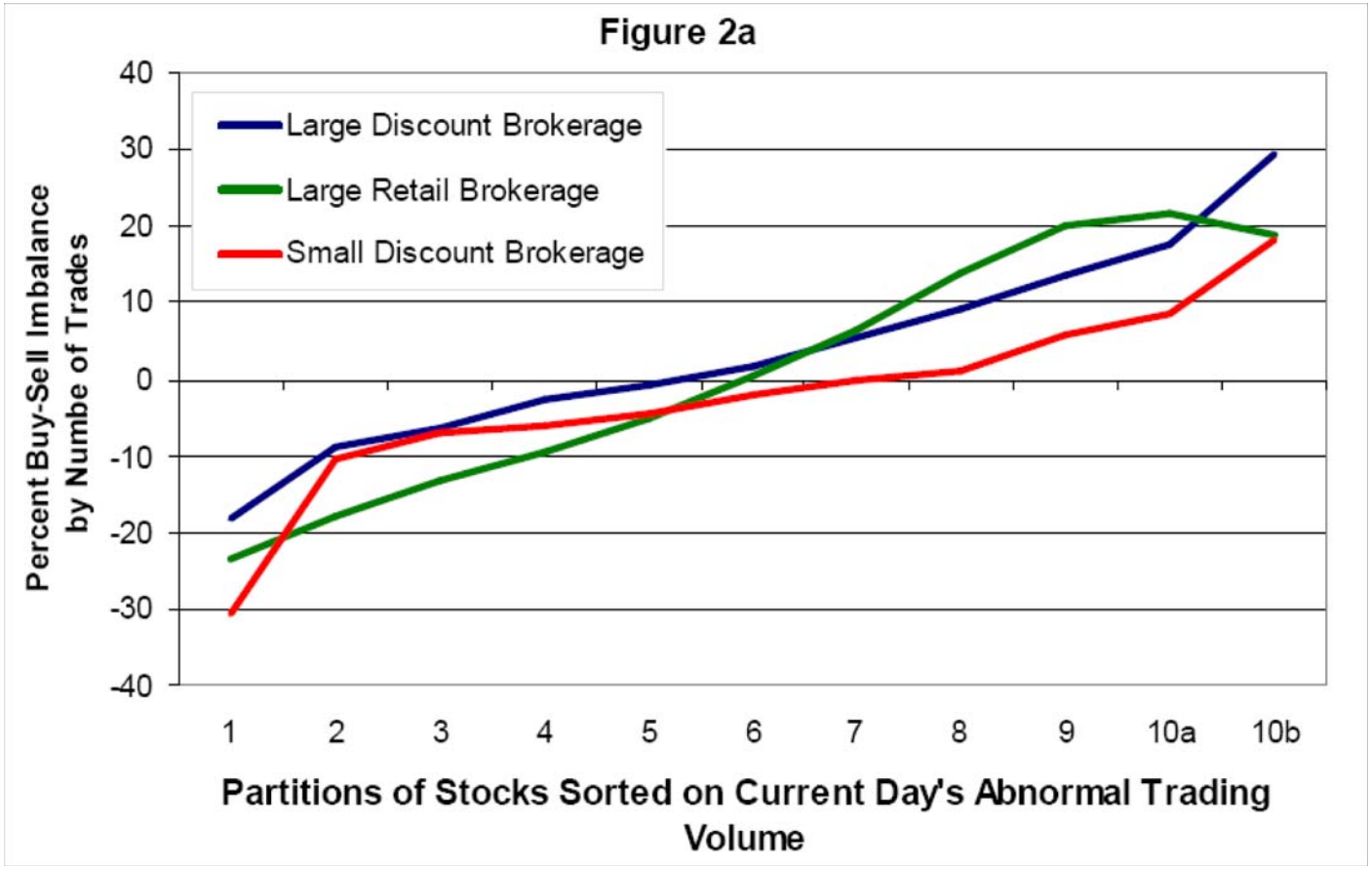
- Notice: Unlike in most financial data sets, here use of individual trading data

- In fact: No obvious prediction on prices

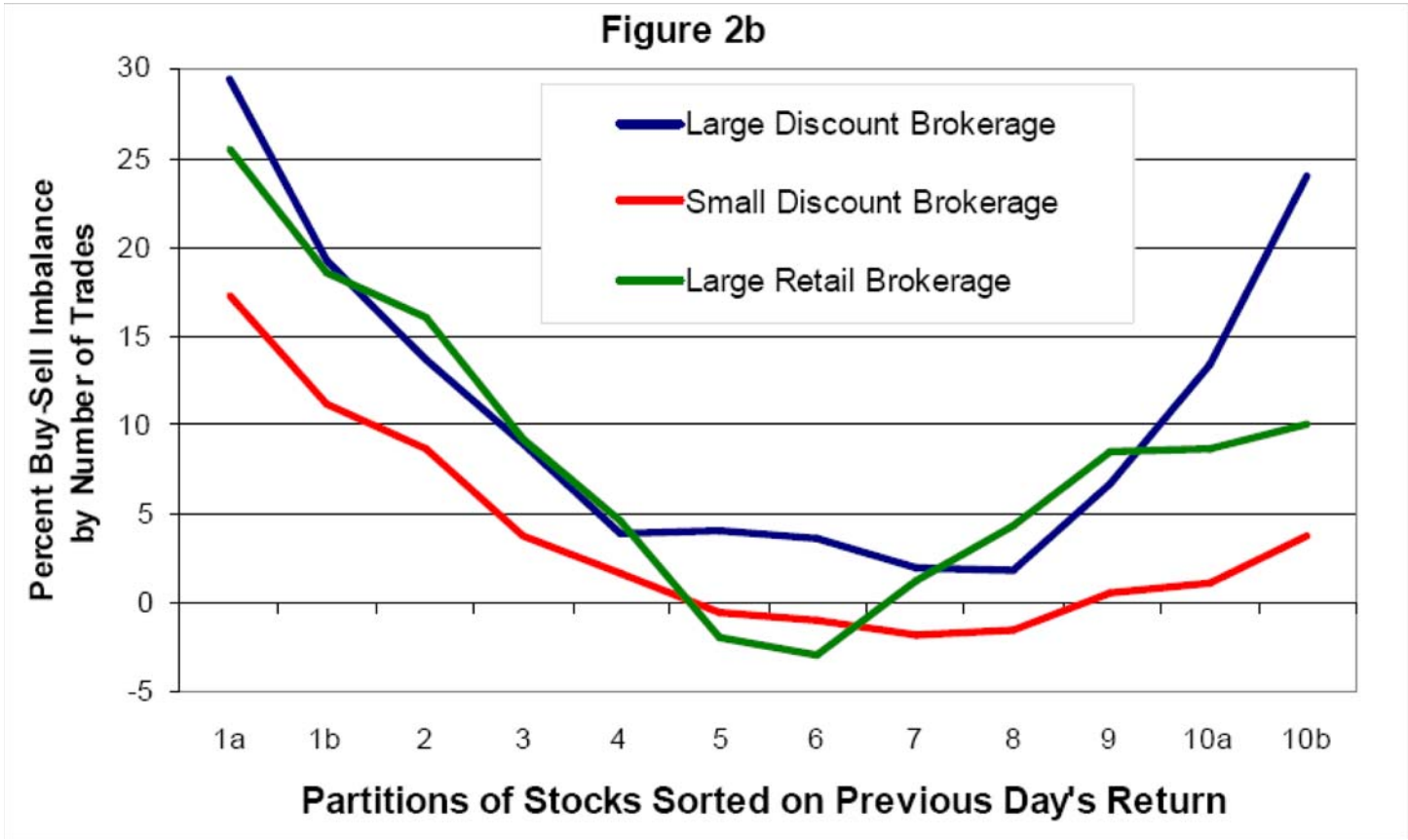
- Measures of attention:
  - same-day (abnormal) volume $V_t$
  - previous-day return $r_{t-1}$
  - stock in the news (Using Dow Jones news service)

- Use of sorting methodology
  - Sort variable ($V_t$, $r_{t-1}$) and separate into equal-sized bins (in this case, deciles)
    - Example: $V_t^1, V_t^2, V_t^3, ..., V_t^{10a}, V_t^{10b}$
    - (Finer sorting at the top to capture top 5 percent)
  - Classical approach in finance
  - Benefit: Measures variables in a non-parametric way
  - Cost: Loses some information and magnitude of variable

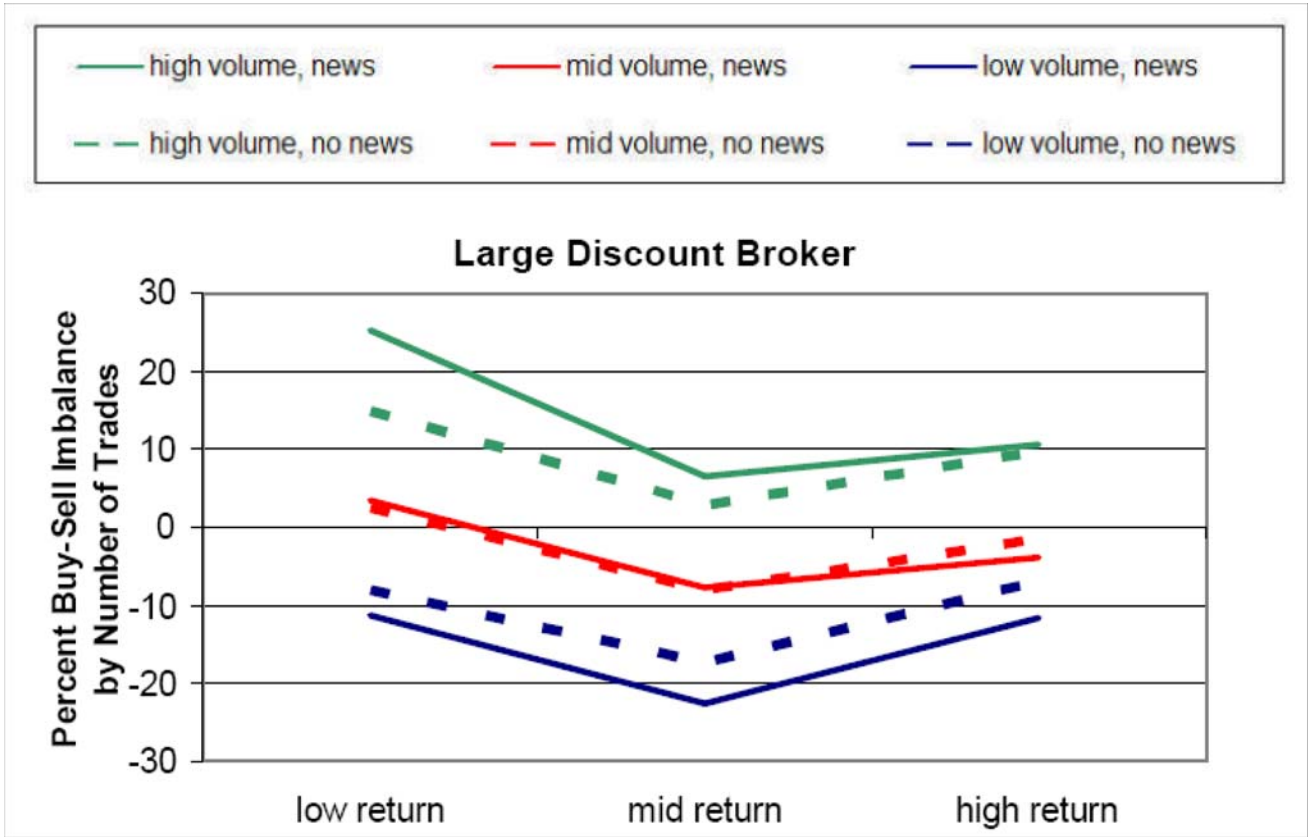
- Effect of same-day (abnormal) volume $V_t$ monotonic (Volume captures 'attention')



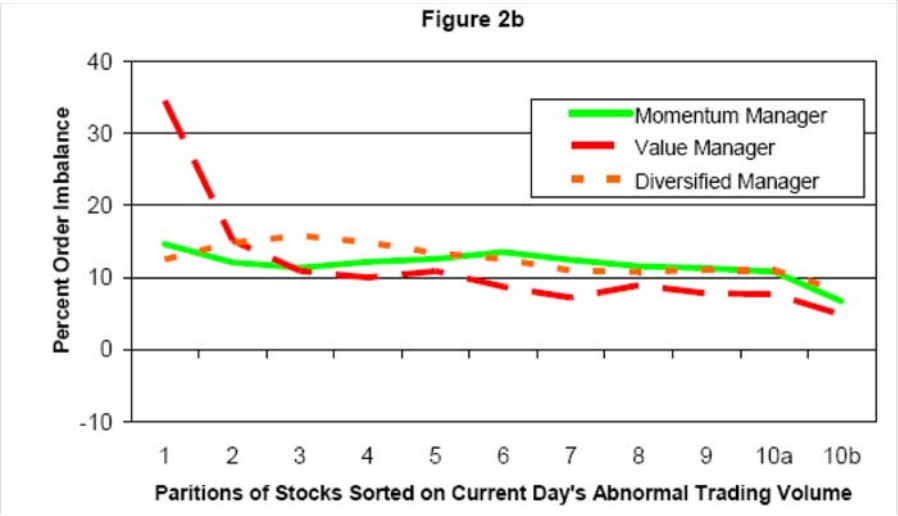
- Effect of previous-day return $r_{t-1}$ U-shaped
  (Large returns—positive or negative—attract attention)

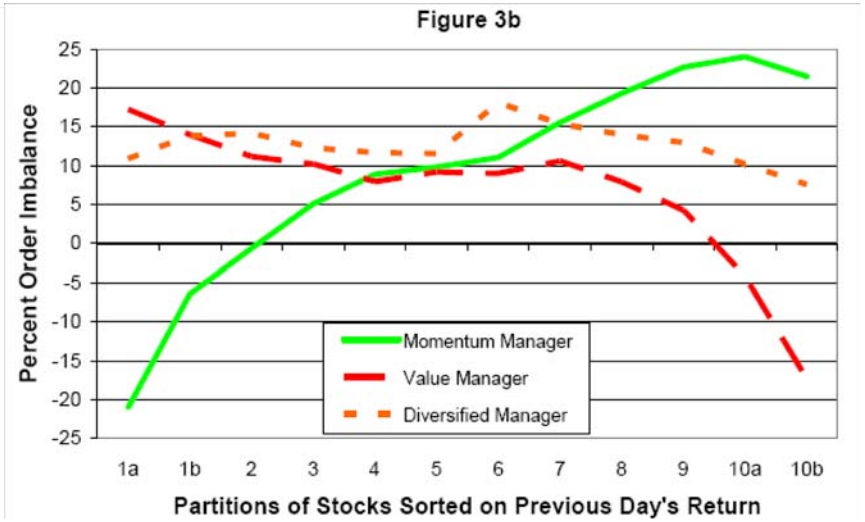


- Notice: Pattern is consistent across different data sets of investor trading
- Figures 2a and 2b are 'univariate' — Figure 3 is 'multivariate'



- Patterns are the opposite for institutional investors (Fund managers)



- Alternative interpretations of results:
- Small investors own few stocks, face short-selling constraints
- (To sell a stock you do not own you need to borrow it first, then you sell it, and then you need to buy it back at end of lending period)
- If new information about the stock:
  - buy if positive news
  - do nothing otherwise
- If no new information about the stock:
  - no trade
- Large investors are not constrained

- Study pattern for stocks that investors already own

**Panel A: Buy-sell imbalance for Stocks Already Owned Sorted on Current Day's Abnormal Trading Volume.**

| | Large Discount Brokerage | | Large Retail Brokerage | | Small Discount Brokerage | |
|---|---|---|---|---|---|---|
| **Decile** | Number Imbalance | Value Imbalance | Number Imbalance | Value Imbalance | Number Imbalance | Value Imbalance |
| 1 (lowest volume) | -54.22 | -55.64 | -28.74 | -33.99 | -24.25 | -33.22 |
| | (1.43) | (1.89) | (1.42) | (1.84) | (6.28) | (7.58) |
| 2 | -51.13 | -53.20 | -29.46 | -34.09 | -33.80 | -29.67 |
| | (0.78) | (1.07) | (1.09) | (1.36) | (3.18) | (4.47) |
| 3 | -48.27 | -49.69 | -29.54 | -31.25 | -31.76 | -30.05 |
| | (0.64) | (0.95) | (1.04) | (1.31) | (1.71) | (2.44) |
| 4 | -47.19 | -49.51 | -28.69 | -32.96 | -35.65 | -33.93 |
| | (0.56) | (0.88) | (0.94) | (1.11) | (1.26) | (1.96) |
| 5 | -45.95 | -47.59 | -26.71 | -31.04 | -32.34 | -30.01 |
| | (0.53) | (0.81) | (0.90) | (1.07) | (1.12) | (1.63) |
| 6 | -45.01 | -48.65 | -24.32 | -29.71 | -30.00 | -26.50 |
| | (0.49) | (0.71) | (0.90) | (1.04) | (0.97) | (1.42) |
| 7 | -42.36 | -45.85 | -21.83 | -30.29 | -29.85 | -26.21 |
| | (0.50) | (0.71) | (0.84) | (0.89) | (0.95) | (1.33) |
| 8 | -39.43 | -43.75 | -18.72 | -27.21 | -28.20 | -26.23 |
| | (0.51) | (0.71) | (0.81) | (0.87) | (0.87) | (1.22) |
| 9 | -35.64 | -40.68 | -15.45 | -21.79 | -27.07 | -24.99 |
| | (0.52) | (0.70) | (0.78) | (0.91) | (0.85) | (1.21) |
| 10a | -33.03 | -39.31 | -12.27 | -19.97 | -26.81 | -27.99 |
| | (0.63) | (0.85) | (0.97) | (1.12) | (1.06) | (1.42) |
| 10b (highest volume) | -24.97 | -32.82 | -15.01 | -20.04 | -17.32 | -19.38 |
| | (0.69) | (0.92) | (1.04) | (1.19) | (0.98) | (1.42) |

# 6 Next Lecture

- Confusion
- Persuasion
- Social Pressure
- Methodology: Human Subjects Approval