Bounded rationality in markets

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- Nobel prize in economics: Kahnemann (2002), Thaler (2017), Shiller (2013)

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    - Apple (Jobs vs. Cook)
    - Tesla

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  - Once Black Friday is over, price back up to $99
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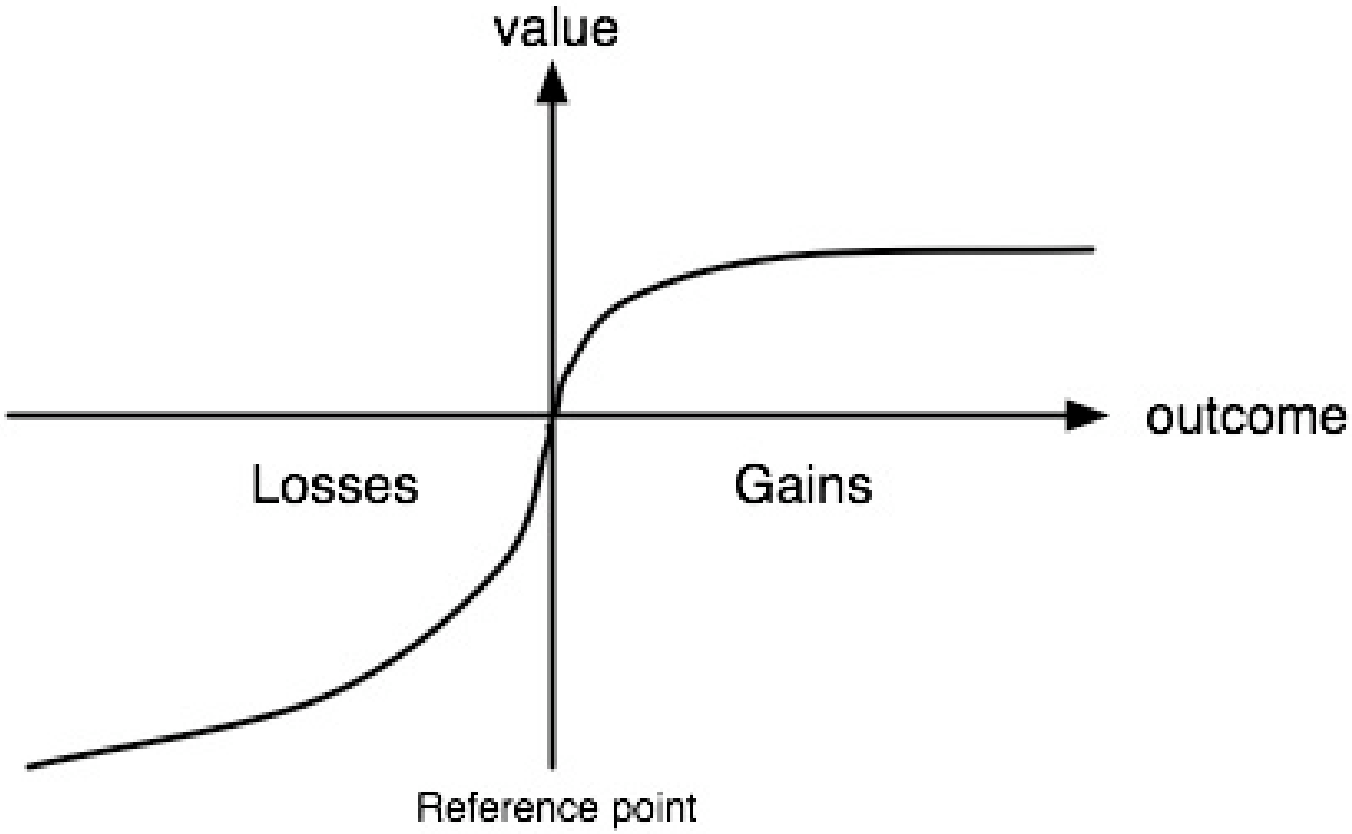
  - Might even prefer to buy GalaxyTab (competing product) for $99, to avoid regret with paying full-price for Kindle

Prospect theory preferences



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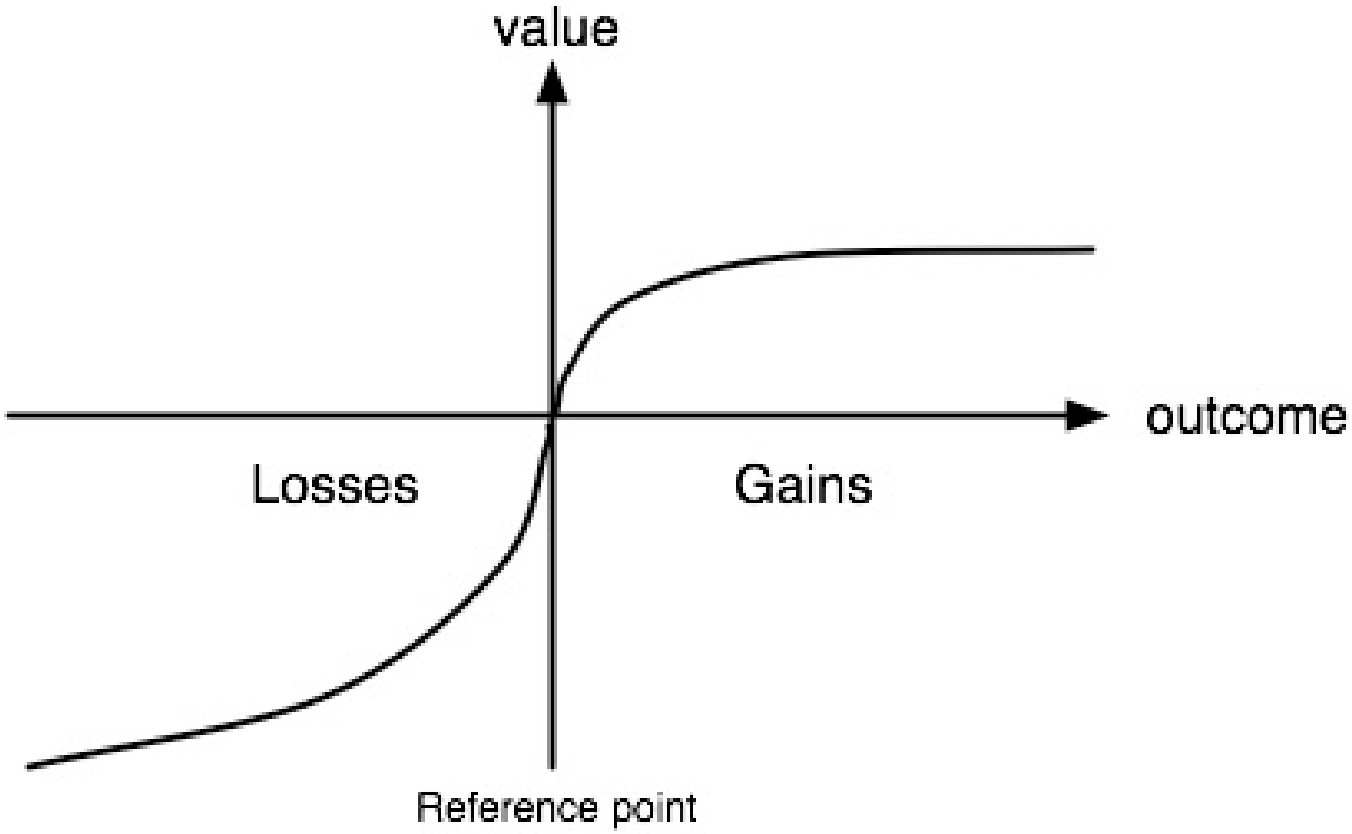

- In loss region, (even small) gains are very attractive
- In gain region, (even large) gains are not very attractive

Applications of reference dependence

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- Consider one specific example:

Hardware Store Pricing

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- Hardware items are durable goods: stock up during a sale, buy less after the sale.

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  - Under stockpiling: demand for discounted item as well as its substitutes fall after sale
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- Let's look at some data.

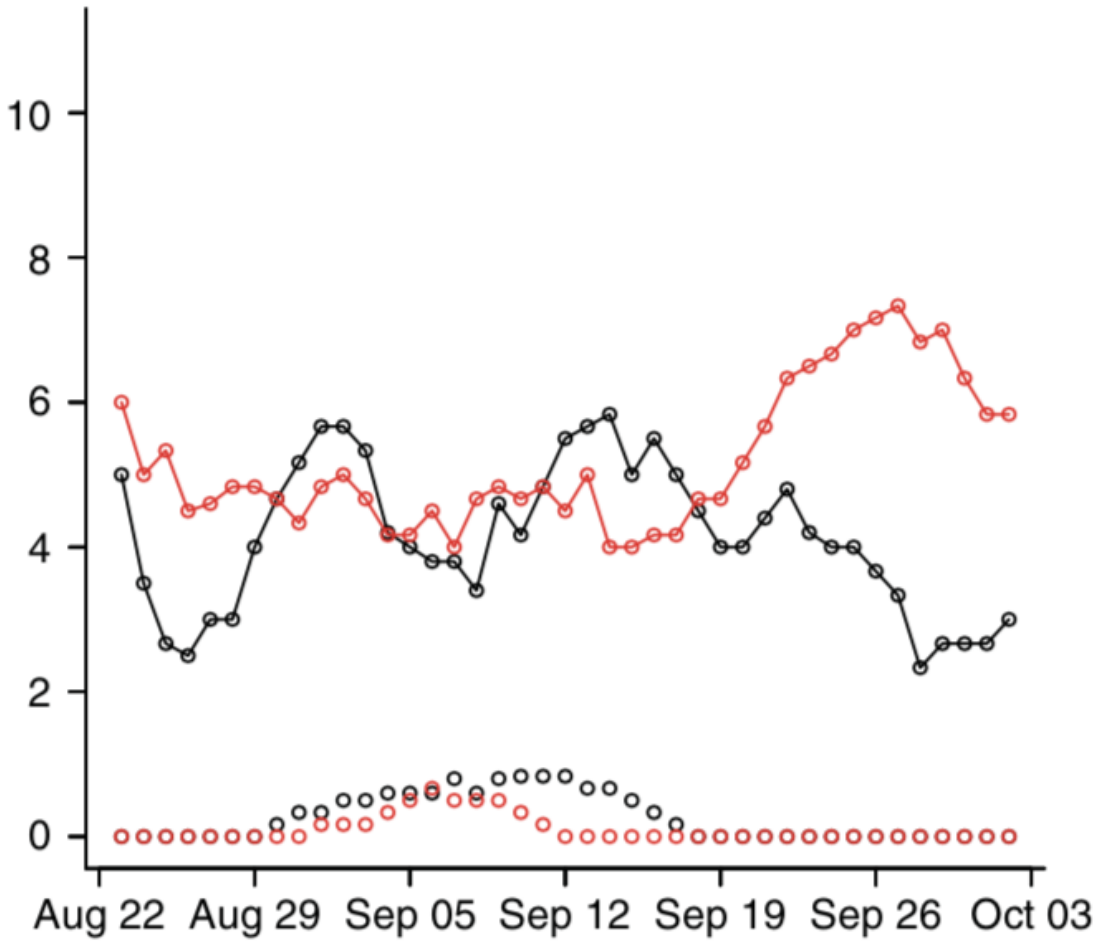

FIGURE 1. EXAMPLE OF SUBSTITUTION EFFECT: SALES OF $50 GIFT CARDS INCREASE AFTER DISCOUNT PERIOD FOR $100 GIFT CARDS ENDS

Table 2—Estimates of log-Share Equation for Product A: Top versus Bottom 50 Percent in Sales Volume (*Experience*)

Variable	Coefficient (1)	Coefficient (2)
top50	0.13648	0.11492
	(0.03497)***	(0.03615)**
$p_A - p_B$	−0.01204	−0.01052
	(0.00158)***	(0.00164)***
top50 × $(p_A - p_B)$	0.00980	0.00888
	(0.00156)***	(0.00162)***
$\lambda - 1$	0.00444	0.01635
	(0.00542)	(0.00696)**
top50 × $(\lambda - 1)$	−0.00362	−0.01200
	(0.00543)	(0.00698)*
cons $= v_A - v_B$	0.22385	0.23513
	(0.03499)***	(0.03612)***
Observations	21,492	21,053
Subst.-pair FX	Yes	Yes

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Taxicab labor supply

- "Reference income": drivers quit after reference income is reached (strong anecdotal evidence from interviews with drivers)
- Negative wage elasticities of labor supply: on (unexpectedly) high wage days, drivers work fewer hours.
- In usual neoclassical economics model: higher wage would imply that people work more.
- One problem: definition of "wage" (problem is that taxi drivers face a wage which is not only stochastic across days, but also stochastic within the day)

Regress Log(shift duration) on wage + controls.
Define: Wage=total shift income/ hours worked.

	(1) OLS	(2) OLS	(3) IV	(4) IV
Log Wage	-0.106**	-1.160**	-0.485**	-0.135**
	(0.008)	(0.007)	(0.026)	(.023)
Weekday Dummy	-0.121**	-0.115**	-0.102**	-0.079**
	(0.002)	(0.001)	(0.002)	(0.002)
Rain $> 1/10''$	0.093**	0.090**	0.065**	0.041**
	(0.002)	(0.002)	(0.002)	(0.002)
Day shift	-0.127**	-0.355	-0.045**	-0.265**
	(0.002)	(0.006)	(0.004)	(0.008)
Driver FE	x	✓	x	✓
N	623,482	623,482	623,482	623,482

February 2012 data. Data record the final cumulative hours and average wage earned as of the last trip of each driver-shift. IV's are: the 25th, 50th and 75th percentile across all driver wages each day, as well as a dummy for day-of-week. Standard Errors clustered at the driver-shift level.

Prices and social norms

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- Putting prices on these activities can have adverse consequences.
- Ex: Gneezy/Rustichini (2000)
  - Childcare centers in Israel
  - Although not expliictly stated, parents expected to pick up kids on time (out of politeness to teachers)
  - What happens when you fine late parents?

Experimental design

- 10 childcare centers in Israel
- #7-10: "control". Never impose fine on late parents.
- #1-6: four regimes
  - weeks 1-4: no fine
  - weeks 5-16: fine (10 NIS per child)
  - weeks 17-20: no fine

Results

TABLE 2

AVERAGE NUMBER OF LATE-COMING PARENTS, ACCORDING TO FOUR PERIODS OF THE STUDY

Center	No. of Children	Weeks 1–4	Weeks 5–8	Weeks 5–16	Weeks 17–20
1	37	7.25	9.5	12.5	15.25
2	35	5.25	9	12.2	13.25
3	35	8.5	10.25	16.8	22
4	34	9	15	19.1	20.25
5	33	11.75	20	24.6	29.5
6	28	6.25	10	13.1	12
7	35	8.75	8	7.2	6.75
8	34	13.25	10.5	10.9	9.25
9	34	4.75	5.5	5.5	4.75
10	32	13.25	12.25	13.1	12.25

NOTE.—The four periods of the study are as follows: before the fine (weeks 1–4), the first 4 weeks with the fine (weeks 5–8), the entire period with the fine (weeks 5–16), and the postfine period (weeks 17–2).

- Notable rise in late pickups once fine imposed.
- Doesn't go down once fine removed: new social norm?

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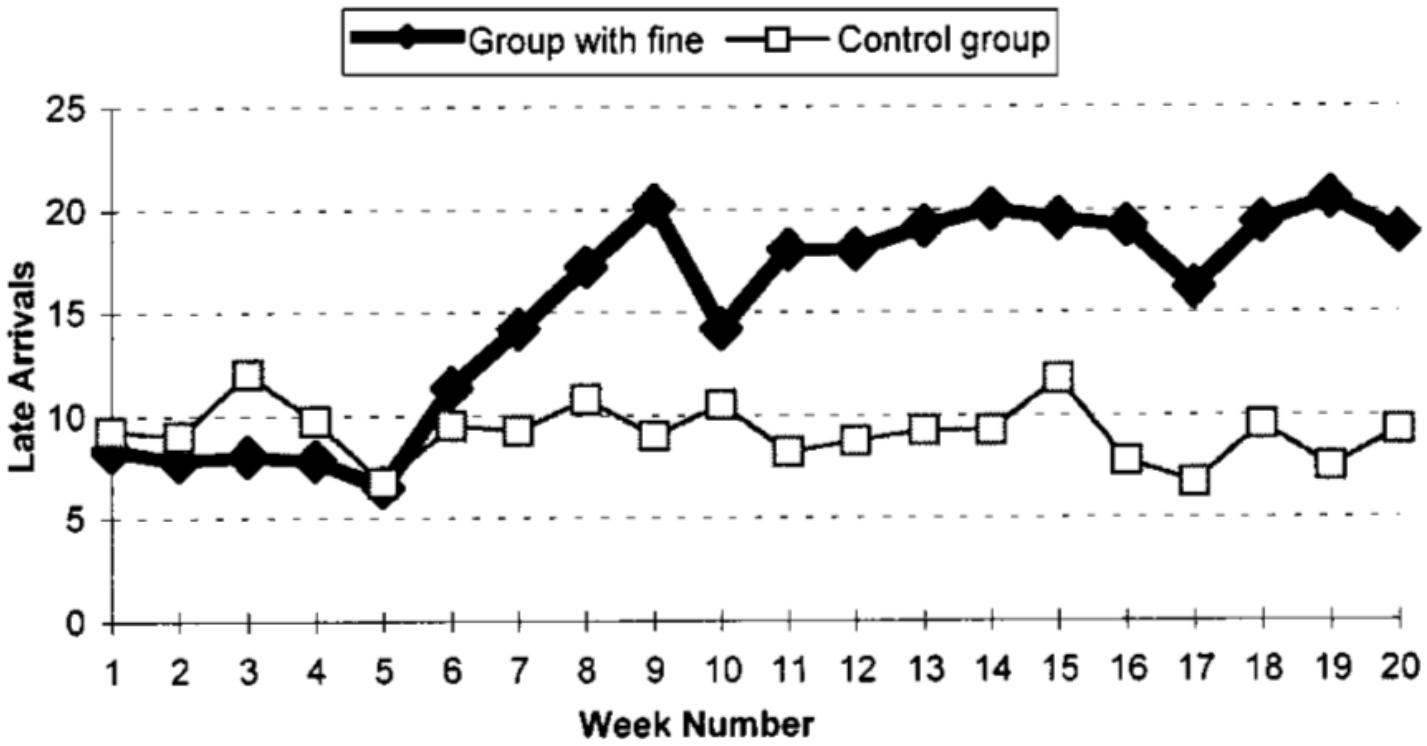

FIGURE 1.—Average number of late-coming parents, per week

Does "commodization" destroy social capital?

"Non-equilibrium" beliefs

- Ample evidence that people, firms, are "overconfident"
- They are "smarter" than the rest of the population.
- Survey: 80% of drivers state that they drive "better than the average driver"
- A model of such beliefs:

Level-k and Cognitive Hierarchy (CH)

- Motivated by idea that everyone responds optimally to beliefs of how others will play.
- k: level of rationality. Defined recursively:
- Level 0: lowest level of rationality.
  - Players may just tell the truth (auctions, matching)
  - Players may randomize (number guessing games, centipede)
- Level 1: best respond assuming all other players are Level 0

...

- Level k: best respond assuming all other players are Level $k-1$
- Cognitive hierarchy:
  - A level-k player believes that all other players are *mixture* of levels $0, \ldots, k-1$.
  - Mixture typically Poisson $(0, 1, 2 \ldots; \lambda)$
- Important: in both LK and CH, beliefs about others are "wrong"

Application of CH

- Goldfarb and Xiao: telecommunications entry with CH managers
- Examine how estimate of rationality parameter τ correlates with characteristics of manager.

Table 4—Strategic Ability and Entry Coefficients ($N = 5{,}906$)

Variables	Main (1)	No covariates in Z (2)	Only manager characteristics (3)	Alternative treatment of missing variables (4)	No random effects (5)
Coefficients on strategic ability parameter $\log(\tau)$					
(1) Log(experience)	0.161		0.180	0.147	0.235
	(0.061)***		(0.053)***	(0.057)***	(0.080)***
(2) Manager attended school with SAT score above 1400	0.069		0.041	0.062	0.117
	(0.039)*		(0.034)	(0.038)	(0.052)**
(3) Manager has degree in economics or business	0.396		0.358	0.375	0.558
	(0.215)*		(0.162)**	(0.193)*	(0.253)**
(4) Log(experience) × Manager has econ/business degree	−0.165		−0.160	−0.157	−0.234
	(0.076)**		(0.057)***	(0.068)**	(0.089)***
(5) Manager has degree in engineering or science	−0.078		−0.136	−0.075	−0.119
	(0.026)***		(0.027)***	(0.028)***	(0.038)***
(6) Manager has graduate degree	0.029		0.098	0.028	0.024
	(0.027)		(0.023)***	(0.027)	(0.034)
(7) Log (firm age)	0.045			0.042	0.066
	(0.013)***			(0.013)***	(0.018)***
(8) Subsidiary	−0.138			−0.132	−0.215
	(0.035)***			(0.035)***	(0.052)***
(9) Privately owned	−0.129			−0.130	−0.173
	(0.030)***			(0.033)***	(0.047)***
(10) Venture capital	−0.005			−0.006	−0.021
	(0.054)			(0.052)	(0.060)
(11) Constant in τ	0.601	1.066	0.592	0.648	0.351
	(0.184)***	(0.043)***	(0.1600)***	(0.175)***	(0.249)
(12) Missing data dummy				0.025	
				(0.110)	
Coefficients on entry					
(13) Expected number of competitors	−0.655	−0.652	−0.685	−0.655	−0.545
	(0.074)***	(0.067)***	(0.076)***	(0.075)***	(0.051)***
(14) Place population in millions	2.059	1.933	2.309	2.000	1.815
	(1.267)	(1.253)	(1.310)*	(1.277)	(0.868)**

(*Continued*)

TABLE 4—STRATEGIC ABILITY AND ENTRY COEFFICIENTS ($N = 5{,}906$) (*Continued*)

(15) HH income in $1,000	−0.005	−0.016	−0.013	−0.006	−0.007
	(0.027)	(0.024)	(0.025)	(0.027)	(0.018)
(16) Median age	−0.109	−0.103	−0.109	−0.114	−0.117
	(0.061)*	(0.055)*	(0.058)*	(0.060)*	(0.040)***
(17) Household size	−2.346	−2.020	−2.386	−2.363	−2.269
	(0.600)***	(0.576)***	(0.599)***	(0.598)***	(0.434)***
(18) Percent foreign born	4.115	4.071	4.115	4.279	4.208
	(1.885)**	(1.744)**	(1.781)**	(1.906)**	(1.232)***
(19) Percent African American	2.577	2.623	2.834	2.615	2.190
	(1.013)**	(0.947)***	(1.017)***	(1.016)**	(0.605)***
(20) Percent below poverty line	7.235	5.619	5.398	6.877	5.466
	(5.084)	(4.575)	(4.761)	(5.090)	(3.183)*
(21) GTE	1.964	1.945	2.035	1.962	1.806
	(0.660)***	(0.622)**	(0.636)***	(0.662)***	(0.441)***
(22) RBOC	1.196	1.239	1.366	1.176	1.193
	(0.576)**	(0.547)**	(0.577)**	(0.580)**	(0.365)***
(23) Log(number of establishments)	1.982	2.040	1.970	1.990	1.649
	(0.359)***	(0.344)***	(0.345)***	(0.359)***	(0.240)***
(24) Average number of employees per establishment	0.047	0.049	0.044	0.046	0.042
	(0.036)	(0.028)*	(0.033)	(0.036)	(0.020)**
(25) Percent establishments in manufacturing	−3.478	−3.922	−3.750	−3.512	−2.687
	(1.511)**	(1.293)***	(1.422)***	(1.504)**	(0.861)***
(26) Std. dev. of the market-specific unobservable	0.796	0.638	0.714	0.792	
	(0.194)***	(0.192)***	(0.196)***	(0.195)***	
(27) Constant	3.330	2.920	3.957	3.681	4.001
	(3.368)	(3.001)	(3.186)	(3.359)	(2.372)*
(28) Mean τ	2.59	2.90	2.83	2.59	2.36
(29) Minimum τ	1.96	2.90	2.23	1.66	1.57
(30) Maximum τ	3.41	2.90	3.38	3.41	3.48
(31) Log likelihood	−1,206.8	−1,292.9	−1,253.8	−1,202.6	−1,215.6

Note: Standard errors are reported in parentheses.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.