Capital Budgeting vs. Market Timing: An Evaluation Using Demographics

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Introduction

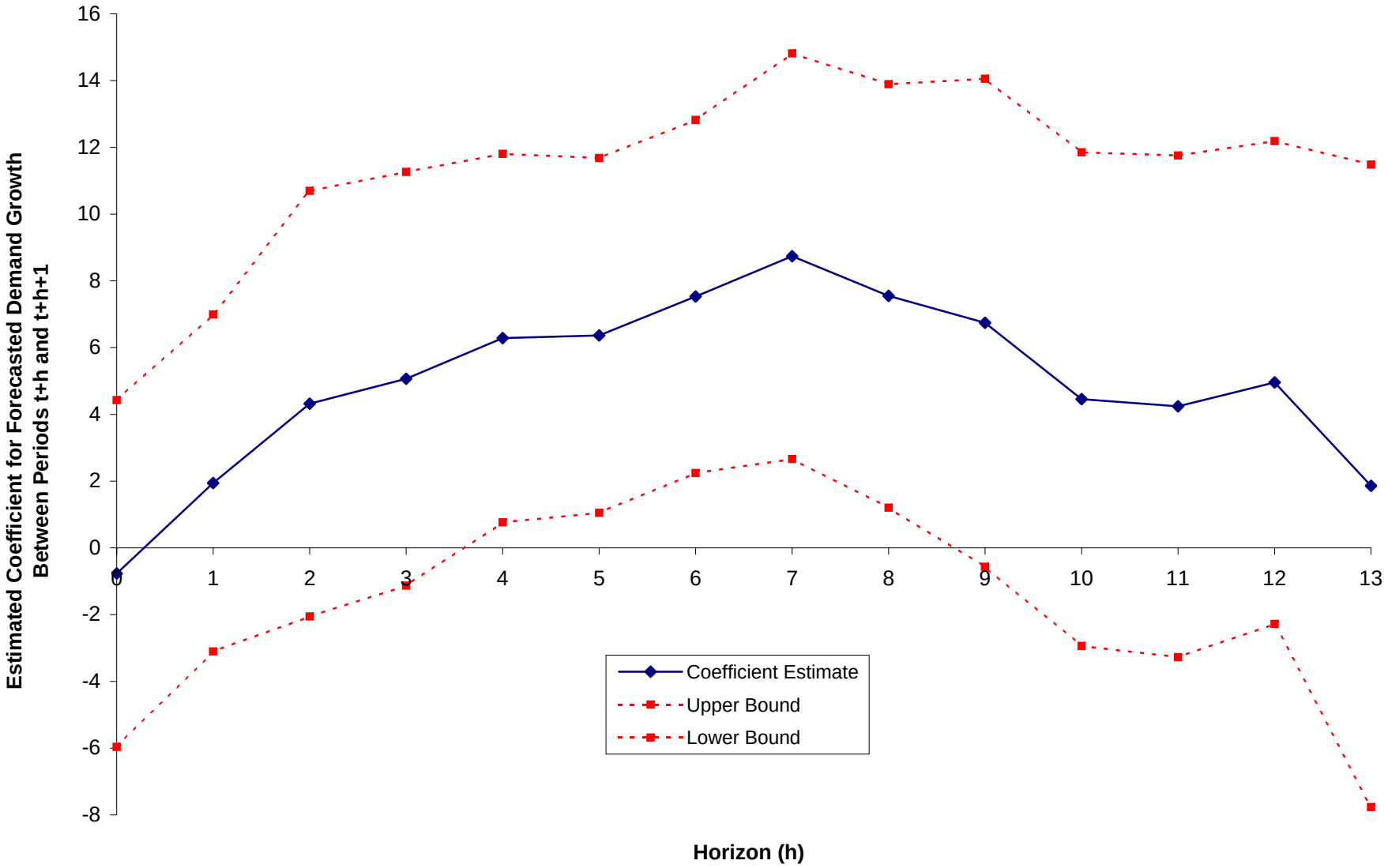
- What are the key theories of equity issuance?
  - **Capital Budgeting.** Firms issue equity (and debt) to invest in positive NPV projects (Modigliani and Miller, 1958; Myers and Majluf, 1984)
  - **Market Timing.** Firms issue equity in response to overvaluation (Baker, Ruback, and Wurgler, forthcoming; Stein, 1996)
- Theories are hard to evaluate using valuation ratios (e.g. M/B could reflect mispricing or investment opportunities). General lack of exogenous proxies.
- What information could be used by managers for market timing?

- **Example.** Large cohort born in 2004
  - Positive demand shift for school buses in 2010
  - Increase in investment around 2010
  - Capital budgeting $\Longrightarrow$ issue additional equity between 2004 and 2010
- When is demand shift incorporated in returns?
  - Assume investors have 5-year horizon $\Longrightarrow$ Stock returns increase only in 2005
  - Undervalued equity between 2004-2005
  - Market timing $\Longrightarrow$ less equity issuance between 2004 and 2005

- This paper: demographic variables provide instruments for both theories
  - Consumers at different ages purchase different goods
  - Changes in cohort size $\Longrightarrow$ predictable changes in demand (and profits)
  - Near-term shifts in demand $\Longrightarrow$ test capital budgeting
  - Demand shifts in the distant future $\Longrightarrow$ test market timing

- For market timing test we must assume:
  - Investors inattentive to demand shifts more than 5 years into future (DellaVigna and Pollet, AER 2007)
  - Corporate managers are more forward-looking than investors

Figure 2: Abnormal Return Predictability Coefficient Using Growth at Different Horizons



- Test using new listings and net equity issuance:
  - Is equity issuance *higher* when demand shift 0-5 years ahead is positive?
  - Is equity issuance *lower* when demand shift 5-10 years ahead is positive?

- Findings: support for both predictions with economically large effects

- Stronger evidence for high concentration and low time-to-build industries

- In addition, some evidence that:
  - Debt issuance is *higher* when demand shift 0-5 years ahead is positive
  - Investment is *higher* when demand shift 0-5 years ahead is positive

- Qualification: Demographics only explains a small share of the variation in investment opportunities

Related Literature

1. **Capital Budgeting vs. Market Timing** (Baker and Wurgler, 2002 and 2003; Campello and Graham, 2006; Gilchrist, Himmelberg, and Huberman 2005; Loughran and Ritter, 1995; Polk and Sapienza 2004; Stein, 1996)

2. **Limited Attention** (Barber and Odean, 2009; Cohen and Frazzini, 2009; DellaVigna and Pollet, 2007 and 2009; Hirshleifer, Lim, and Teoh, 2004; Hong and Stein, 1999; Huberman and Regev, 2001)

3. **Corporate Response to Anticipated Demand Shifts** (Acemoglu and Linn, 2005; Goolsbee and Syverson, 2004)

4. **Effect of Demographic Variables** (Abel, 2003; Mankiw and Weil, 1989; Poterba, 2001)

Research Agenda

- Empirical evidence for behavioral phenomena, DellaVigna (JEL 2009)

- Four main areas:
  1. Limited Attention among investors (see above)
  2. Self-Control among consumers (DellaVigna and Paserman, 2007; DellaVigna and Malmendier, 2004 and 2006)
  3. Persuasion among voters (DellaVigna and Kaplan, 2007; DellaVigna and Gentzkow, 2010)
  4. Social pressure among consumers and voters (DellaVigna, List, and Malmendier, 2009)

Model

- 2-period model of investment and equity issuance (interest rate $R = 0$)
- Firm has cash C and N shares
- Investment $I \in [0, \infty)$ with productivity $\alpha f\left(I_1 + g\left(I_2\right)\right)$
  - convexity of f ($f'\left(I\right) > 0$ and $f''\left(I\right) < 0$ for all $I \geq 0$) and limiting properties ($\lim_{I \to 0} f'\left(I\right) = \infty$, $\lim_{I \to \infty} f'\left(I\right) = 0$)
  - investment I_1 and I_2 selected and undertaken at $t = 1$ and $t = 2$, financed with cash C and/or equity n_i
  - Allow for time-to-build: cases $g\left(I\right) = I$ (no time-to-build) and $g(I) = 0$ (full time-to-build)
  - productivity of investment can be $\overline{\alpha}$ (high demand) or $\underline{\alpha}$ (low demand), with $\overline{\alpha} > \underline{\alpha}$

- Manager maximizes current shareholder value:

$$\max_{n_1,n_2,I} \frac{1}{N+n_1+n_2}\left(C+n_1P_1+n_2P_2+\alpha f\left(I_1+g\left(I_2\right)\right)-I_1-I_2\right)$$

$$\begin{aligned} s.t.\ I_1 &\leq C+n_1P_1, \\ I_1+I_2 &\leq C+n_1P_1+n_2P_2, \\ \underline{N} &\leq N+n_1+n_2 \leq \overline{N}, \\ \underline{N} &\leq N+n_1 \leq \overline{N}. \end{aligned}$$

- No debt, no downward sloping demand curves, no agency problems, etc

- Cash is not sufficient for first best level of investment when $\alpha = \overline{\alpha}$

- Extremely small fixed cost of issuance or repurchase in either period

- At $t = 1$, investors willing to purchase shares if

$$P_1 = \frac{1}{N + n_1}\left(C + n_1 P_1 + \hat{\alpha} f\left(I_{1,\hat{\alpha}} + g\left(I_{2,\hat{\alpha}}\right)\right) - I_{1,\hat{\alpha}} - I_{2,\hat{\alpha}}\right)$$

  - Investors do not foresee demographics correctly and expect $\hat{\alpha}$, with $\underline{\alpha} \leq \hat{\alpha} \leq \overline{\alpha}$.
  - Investors do not infer anything about α from issuance decisions

- At $t = 2$, investors see α and are willing to purchase shares if

$$P_2 = \frac{1}{N + n_1 + n_2}\left(C + n_1 P_1 + n_2 P_2 + \alpha f\left(I_{1,\alpha} + g\left(I_{2,\alpha}\right)\right) - I_{1,\alpha} - I_{2,\alpha}\right)$$

  - Investors have correct expectations at $t = 2$ (since demographic shift is imminent)

- Solve for P_i and substitute into maximization problem

- **Raising Funds at** $t = 2$.

- Optimal investment: : $\alpha f'\left(I_{1,\alpha} + g\left(I_2^*\right)\right) g'\left(I_2^*\right) - 1 = 0$

  - No time to build $\Longrightarrow \alpha f'\left(I_{1,\alpha}^* + I_2^*\right) - 1 = 0$ and I^* equals first-best I^{FB}

  - Time to build $\Longrightarrow I_2^* = 0$

- Solution independent of n_2 as long as enough money for optimal investment:

  - Raise sufficient equity $n_2^* P_2 \geq I_2^* + I_{1,\alpha} - C - n_1 P_1$

- **Raising Funds at** $t = 1$. Maximization problem:

$$\max_{n_1} \frac{C + V_{\widehat{\alpha}}}{N} + \frac{\alpha f\left(I_1 + g\left(I_2^*\right)\right) - I_1 - I_2^* - V_{\widehat{\alpha}}}{N + n_1}$$

  - first term is per share firm value initially perceived by investors
  - second term reflects the potential for market timing

- *No time-to-build* $(g(I) = I)$: can achieve first-best investment
  - Case 1 (undervaluation): Minimize n_1 $(n_1^* = \underline{N} - N)$ by repurchasing shares at $t = 1$ –> Issue shares and invest at $t = 2$
  - Case 2 (overvaluation): Maximize n_1 $(n_1^* = \bar{N} - N)$ by issuing shares and invest at $t = 1$ or 2
  - Case 3 (correct valuation): Indifferent between issuing equity in first period or second period if necessary to finance investment.

- *Time-to-build* ($g(I) = 0$):
  - Case 1 (undervaluation): Since $\alpha = \overline{\alpha} > \hat{\alpha}$,
    - want to minimize n_1 ($n_1^* = \underline{N} - N$) by repurchasing shares at $t = 1$
    - but cannot invest at $t = 2$ due to time-to-build
    - –> Trade-off between taking market-timing and capital budgeting
  - Case 2 (overvaluation): Since $\alpha = \underline{\alpha} < \hat{\alpha}$, maximize n_1 ($n_1^* = \bar{N} - N$) by issuing shares and invest at $t = 1$

Predictions

- **Proposition 1 (Inattentive investors)**
  (i) If $\alpha = \overline{\alpha} > \hat{\alpha}$ & no time-to-build, repurchase in period 1 and issue in period 2: $n^*_{1,ST} = \underline{N} - N < 0$ and $n^*_{2,ST} > 0$.
  (i) If $\alpha = \overline{\alpha} > \hat{\alpha}$ & time-to-build, fewer repurchases in period 1 and no issuance in period 2: $n^*_{1,TB} \geq n^*_{1,ST}$ and $n^*_{2,TB} = 0$.
  (ii) For $\alpha = \underline{\alpha} < \hat{\alpha}$, issue in period 1 and do not issue in period 2: : $n^*_{1,ST} = n^*_{1,TB} = \overline{N} - N > 0$ and $n^*_{2,ST} = n^*_{2,TB} = 0$.
  (iii) Total investment $I^*_1 + I^*_2$ is greater for $\alpha = \overline{\alpha}$ than for $\alpha = \underline{\alpha}$.

- **Proposition 2 (Fully attentive investors)**
  (i) For $\alpha = \overline{\alpha} = \hat{\alpha}$, issue equity in one of the two periods.
  (ii) For $\alpha = \underline{\alpha} = \hat{\alpha}$, no equity issuance in either period.
  (iii) Total investment $I^*_1 + I^*_2$ is greater for $\alpha = \overline{\alpha}$ than for $\alpha = \underline{\alpha}$.

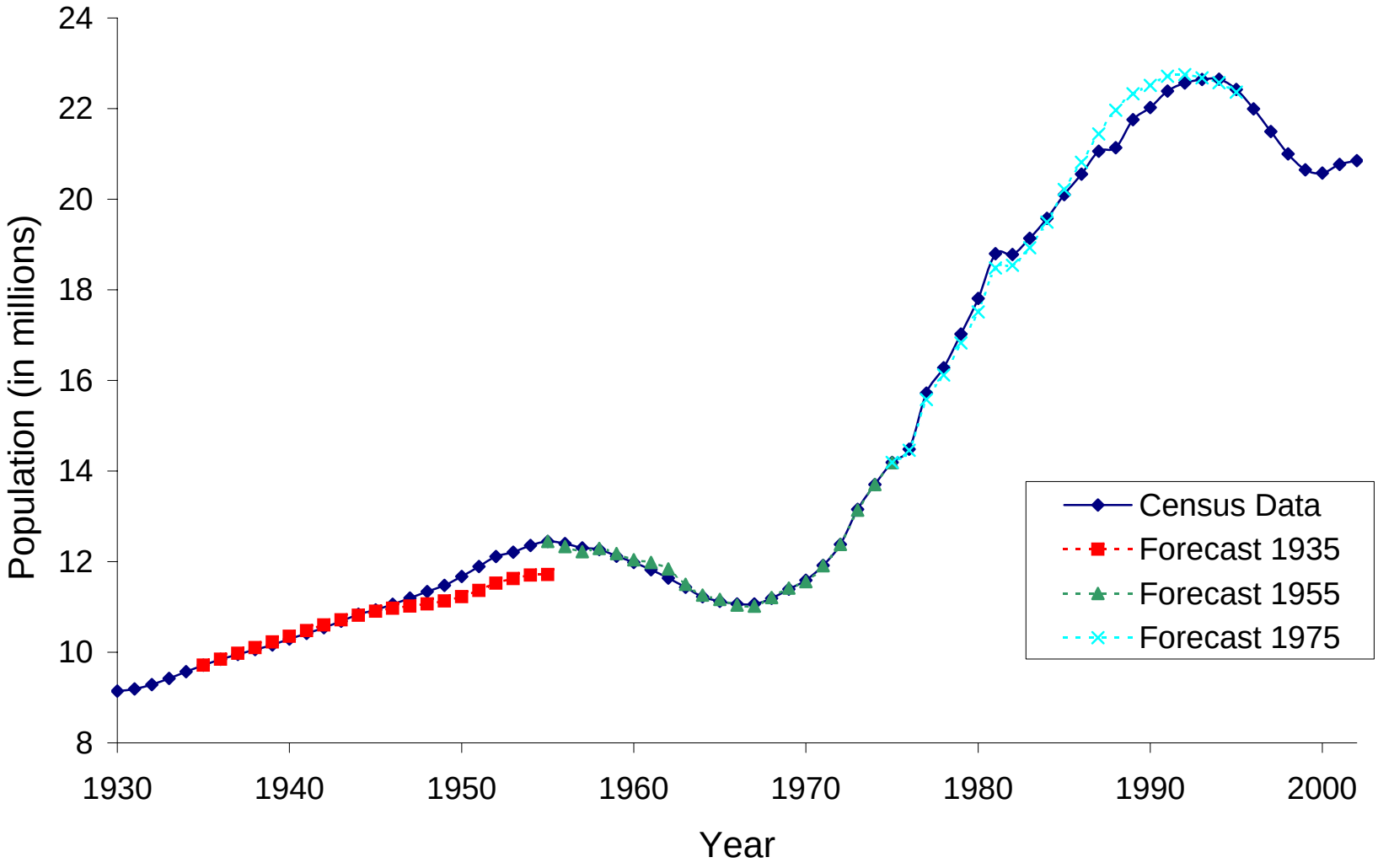
- Extensions:
  1. *Riskless Debt.*
     - Issued debt for capital budgeting reasons
     - No effect of market timing on debt since debt is not mispriced
  2. *Asymmetric information.* (Agency problems –> Downward sloping demand for equity)
     - Qualitative results remain

Demand Shifts Due to Demographics

Step I – Demographic Forecasts

- Data:
  - Cohort size data, Age-specific birth rates, Mortality tables
  - Adjust for mortality improvements and immigration using historical patterns
- Forecasts of future cohort sizes

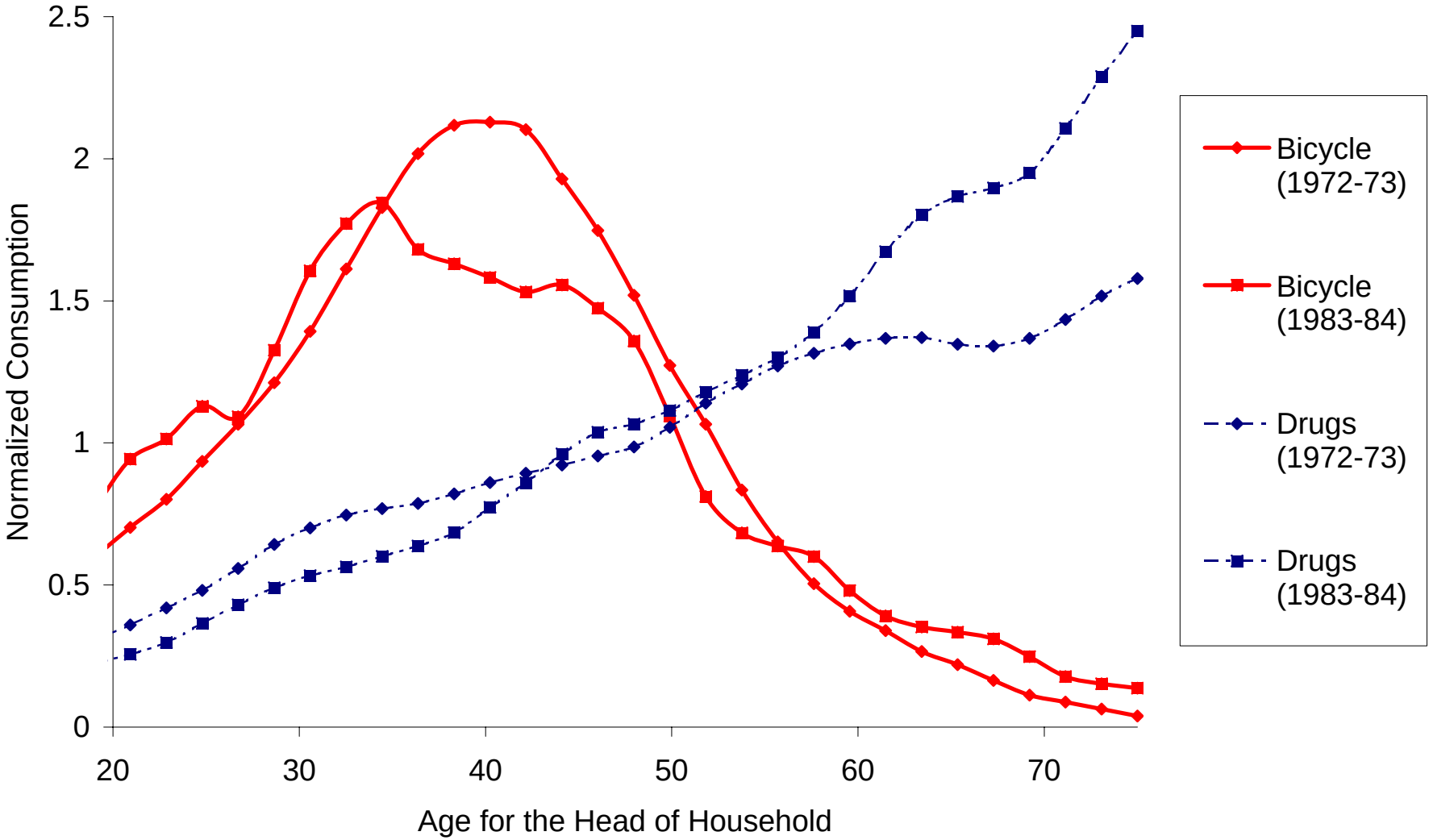
Figure 1b. Forecasted and Actual Population Ages 30-34



Step II – Age Patterns in Consumption

- Data sets on consumer expenditure (1972-73, 1983-85)
- 48 industries
- Stylized facts:
  1. Significant age patterns in consumption
  2. Age patterns vary across goods
  3. For given good, stable patterns over time

Figure 1. Age Profile of Bicycle and Drugs Consumption



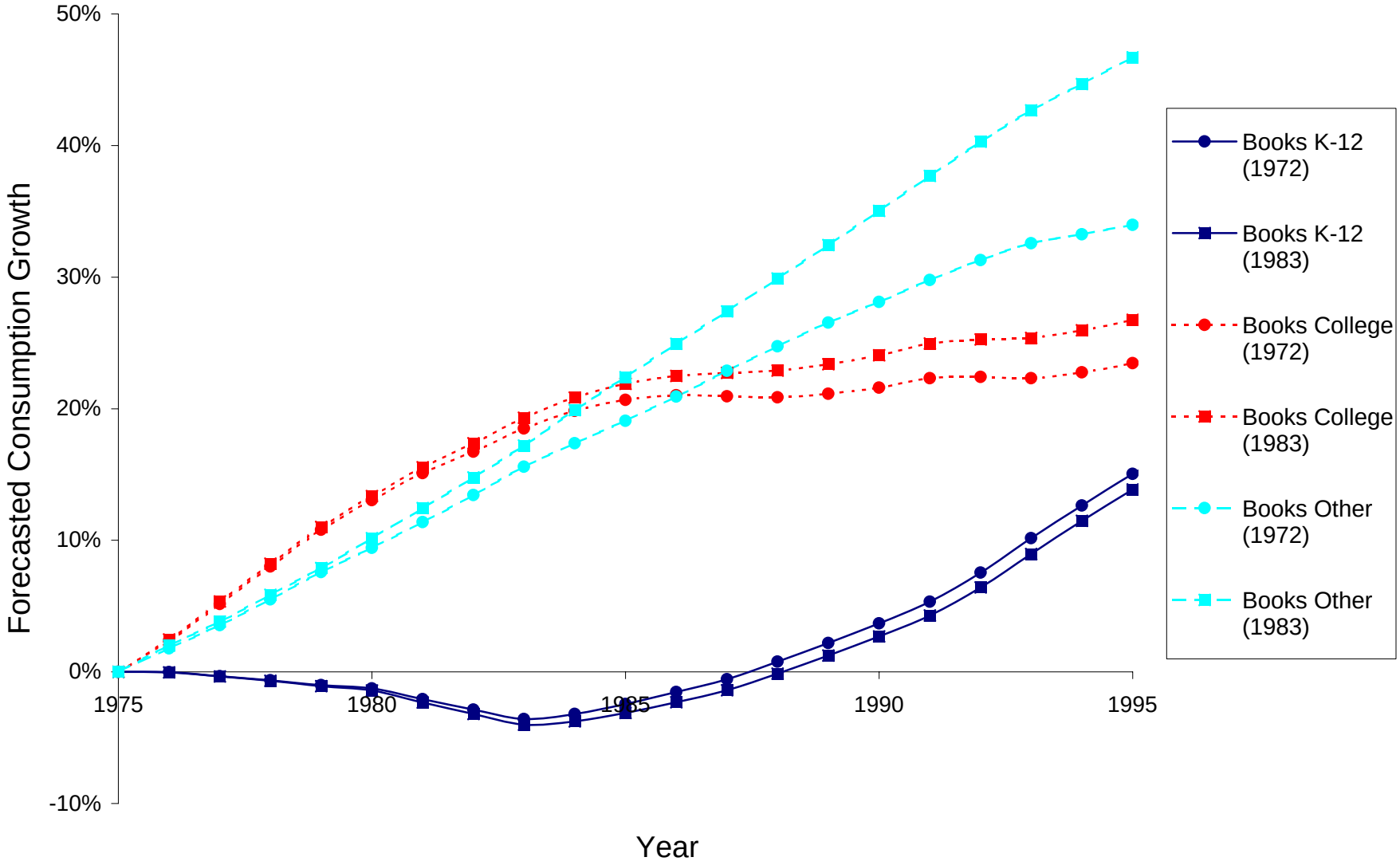
Step III – Demand Forecasts

- Combine demographic forecasts and age patterns in consumption to create demand growth forecasts over time:
  - 48 different goods/industries
  - Time period: 1973-2004
- 20 *Demographic Industries:* goods most sensitive to cohort size differences
  - Highest standard deviations of forecasted demand growth rates
  - Child-related goods (child care, baby clothes), Old-age-related (funeral homes), Others (beer)

Table 1. Summary Statistics: Predicted Demand Growth Rates Due to Demographics

Expenditure Category	No. Years	Forecasted 0-5 Growth	Demogr. Industry	Forecasted 0-5 Growth	Demogr. Industry	% Dem. Industry
		1975		2000		
	(1)	(2)	(3)	(4)	(5)	(6)
Child Care	30	0.0001	Yes	-0.0035	Yes	100%
Children's Books	28	.	.	0.0036	Yes	93%
Children's Clothing	30	0.0226	Yes	0.0087	No	93%
Toys	30	0.0044	Yes	0.0051	No	80%
Books -- college text books	30	0.0270	Yes	0.0133	Yes	100%
Books -- general	30	0.0205	Yes	0.0077	No	87%
Books -- K-12 school books	30	-0.0087	Yes	0.0075	Yes	100%
Movies	30	0.0232	Yes	0.0093	No	23%
Newspapers	30	0.0174	No	0.0119	No	0%
Magazines	30	0.0206	Yes	0.0097	No	13%
Cruises	28	.	.	0.0118	No	29%
Dental Equipment	30	0.0138	No	0.0111	No	43%
Drugs	30	0.0167	No	0.0137	No	0%
Health Care (Services)**	30	0.0173	No	0.0114	No	7%
Health Insurance	30	0.0168	No	0.0125	Yes	3%
Medical Equipment**	30	0.0173	No	0.0114	No	7%
Funeral Homes and Cemet.	28	.	No	0.0152	Yes	43%
Nursing Home Care	30	0.0198	Yes	0.0107	Yes	100%
Construction Equipment*	30	0.0200	Yes	0.0092	Yes	100%
Floors	30	0.0177	No	0.0118	Yes	80%
Furniture	30	0.0201	Yes	0.0077	No	60%
Home Appliances Big	30	0.0169	No	0.0091	No	0%
Home Appliances Small	30	0.0153	No	0.0108	No	7%
Housewares	30	0.0192	Yes	0.0115	Yes	57%
Linens	30	0.0170	No	0.0107	No	53%
Residential Construction*	30	0.0200	Yes	0.0092	Yes	100%
Residential Development*	30	0.0168	No	0.0107	No	0%
Residential Mortgage	30	0.0164	Yes	0.0036	No	80%
Beer (and Wine)	30	0.0209	No	0.0081	No	33%
Cigarettes	30	0.0178	No	0.0108	No	10%
Cigars and Other Tobacco	30	0.0141	No	0.0140	Yes	10%
Food	30	0.0145	No	0.0104	No	0%
Liquor	28	.	No	0.0120	No	7%
Clothing (Adults)	30	0.0197	Yes	0.0106	Yes	37%
Cosmetics	30	0.0222	Yes	0.0129	No	7%
Golf	30	0.0217	Yes	0.0123	Yes	73%
Jewelry	30	0.0189	Yes	0.0110	Yes	60%
Sporting Equipment	30	0.0183	No	0.0069	Yes	63%
Life Insurance	30	0.0140	No	0.0129	Yes	47%
Property Insurance	30	0.0177	No	0.0110	No	10%
Airplanes	28	.	.	0.0118	Yes	7%
Automobiles	30	0.0199	Yes	0.0086	No	27%
Bicycles	30	0.0027	Yes	0.0010	Yes	73%
Motorcycles	28	.	.	0.0090	Yes	93%
Coal	30	0.0149	No	0.0112	No	0%
Oil	30	0.0161	No	0.0105	No	0%
Telephone	30	0.0185	No	0.0104	No	3%
Utilities	30	0.0149	No	0.0114	No	0%
Mean 0-5 Cons. Growth		0.0165		0.0098		
Std. Dev. 0-5 Cons. Growth		0.0064		0.0034		

Figure 3. Forecasted Demand Growth for Books



Regression of industry returns on forecasted demand (from DellaVigna and Pollet, AER 2007)

- Test of inattention to demographic information:

$$r_{k,t+1,t} - \hat{\beta}_{k,t} r_{m,t+1,t} = \gamma + \delta_0 \begin{bmatrix} \hat{c}_{k,t+5|t-1} \\ -\hat{c}_{k,t|t-1} \end{bmatrix} /5 + \\ + \delta_1 \begin{bmatrix} \hat{c}_{k,t+10|t-1} \\ -\hat{c}_{k,t+5|t-1} \end{bmatrix} /5 + \varepsilon_{k,t+1}$$

  - Notation: $r_{k,t+1,t}$ is the log of stock return for good k between t and $t+1$; $r_{m,t+1,t}$ is the log of market return.

  - Null hypothesis: $\delta_0 = \delta_1 = 0$

Table 6. Predictability of Stock Returns Using Demographic Changes

	Dep. Var.: Beta-Adjusted Log Industry Stock Return at t+1					
	Demographic Industries			All Industries		
	(1)	(2)	(3)	(7)	(8)	(9)
Constant	-0.0903	0.1223	0.3768	-0.0808	-0.0692	0.1128
	(0.0574)	(0.1003)	(0.0751)***	(0.0501)	(0.0632)	(0.0661)*
Forecasted annualized demand growth between *t* and *t+5*	-1.5224	-1.9834	-2.9107	-2.3641	-2.1856	-2.4817
	(4.3291)	(4.1279)	(3.5202)	(4.2480)	(4.7213)	(3.2457)
Forecasted annualized demand growth between *t+5* and *t+10*	8.9175	11.2967	6.9180	8.9438	11.5216	6.7293
	(4.0339)**	(3.8097)***	(3.6965)*	(3.4437)***	(3.9984)***	(3.8688)*
Industry Fixed Effects		X	X		X	X
Year Fixed Effects			X			X
Year >= 1974	X	X	X	X	X	X
R^2	0.0218	0.1031	0.3140	0.0150	0.0516	0.1932
N	*N* = 569	*N* = 569	*N* = 569	*N* = 1387	*N* = 1387	*N* = 1387

Data for Equity Issuance

- **New Listings**
  - Measure 1. Share of new equity listings relative to listed companies in industry k and year t
  - Measure 2. Share of IPOs (according to Jay Ritter) relative to listed companies in industry k and year t (only 1980 on)
- **Net Equity Issuance**
  - Measure 1. Industry net equity issuance scaled by industry book value of assets in industry k and year t (Frank and Goyal, 2003)
  - Measure 2. Change in book equity minus the change in retained earnings in industry k and year t (scaled by lagged assets) (Baker and Wurgler, 2002)

Results for Equity Issuance

- **Baseline Panel Specification**:

$$\begin{aligned} e_{k,t+1} \;=\; & \gamma + \delta_0[\hat{c}_{k,t+5|t-1} - \hat{c}_{k,t|t-1}]/5 \\ & + \delta_1[\hat{c}_{k,t+10|t-1} - \hat{c}_{k,t+5|t-1}]/5 \\ & + \beta_m e_{m,t+1} + \beta_b m b_{k,t+1} + \varepsilon_{k,t} \end{aligned}$$

- Standard errors clustered by year and adjusted for AR(1) autocorrelation

- Control for: industry M/B, aggregate issuance, fixed effects

- **New Listings** (Table 2)

- Results using share of new equity (mean 6.45 percent) in Demographic Industries
  - Positive effect of short-term demographics $\hat{\delta}_0$
  - Negative effect of long-term demographics $\hat{\delta}_1$

- Similar results using Jay Ritter IPOs (mean 5.43 percent)

- Much noisier estimates in sample of non-Demographic Industries

- Magnitude of long-term effect ($\hat{\delta}_1$): 1 s.d. change in long-term demographics (.59 pct) –>.15 s.d. decrease in IPO share (-3.2*.59=-1.88 pct)

- Support for both capital budgeting and market timing

Table 2. Predictability of New Equity Listings Using Demographics

Dependent variable	**Share of Firms That Are New Equity Listings**							
Industry Sample	**Demographic**						**Non-Demographic**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecasted annualized demand growth between *t* and *t+5*	3.349 (1.847)*	2.237 (1.474)	2.446 (1.270)*	2.785 (1.304)**	1.994 (1.877)	2.831 (2.273)	1.687 (2.866)	-0.525 (4.502)
Forecasted annualized demand growth between *t+5* and *t+10*	-4.843 (1.453)***	-2.486 (1.384)*	-3.071 (1.403)**	-3.153 (1.360)**	-4.793 (1.949)**	-3.572 (1.913)*	-4.955 (3.289)	-6.930 (4.270)
Industry market to book ratio		0.000 (0.0065)	0.003 (0.007)	0.004 (0.010)	0.006 (0.009)	0.002 (0.012)	0.004 (0.009)	0.011 (0.009)
Aggregate share of new listings		0.890 (0.143)***	0.841 (0.151)***		1.229 (0.1507)***		0.716 (0.072)***	
Industry fixed effects			X	X	X	X	X	X
Year fixed effects				X		X		X
Jay Ritter's IPO sample					X	X		
R^2	0.040	0.133	0.245	0.306	0.260	0.315	0.264	0.297
N	*N* = 580	*N* = 580	*N* = 580	*N* = 580	*N* = 451	*N* = 451	*N* = 848	*N* = 848

- **Net Equity Issuance** (Table 3)

- Results using share of companies with large positive net equity issuance (above 3 percent of assets)
  - Positive effect of short-term demographics $\hat{\delta}_0$
  - Negative effect of long-term demographics $\hat{\delta}_1$

- Opposite results using share of companies with large negative net equity issuance (above 3 percent of assets)

- Consistent results using measure of continuous equity issuance

- Noisier estimates in sample of non-Demographic Industries

- Similar but less precise results using Baker-Wurgler measure of equity issuance

Table 3. Predictability of Net Equity Issuance and Net Equity Repurchases Using Demographics

Dependent variable	Large Net Equity Issues			Large Net Equity Repurchases			Net Equity Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecasted annualized demand growth between *t* and *t+5*	4.046	4.564	2.304	-4.209	-1.688	-0.939	2.529	1.782
	(2.539)	(1.955)**	(1.637)	(1.839)**	(1.357)	(1.619)	(0.9970)**	(0.821)**
Forecasted annualized demand growth between *t+5* and *t+10*	-7.241	-5.267	-4.294	3.080	3.699	3.222	-2.852	-1.533
	(2.588)***	(2.170)**	(2.013)**	(1.760)*	(1.859)**	(2.070)	(1.034)***	(1.048)
Industry market to book ratio		0.016	0.037		0.056	0.046	0.010	0.012
		(0.021)	(0.023)		(0.016)***	(0.019)**	(0.007)	(0.009)
Aggregate share of large net equity issues		0.892						
		(0.125)***						
Aggregate share of large net equity repurchases					1.047			
					(0.353)***			
Aggregate net equity issuance							2.557	
							(0.677)***	
Industry fixed effects		X	X		X	X	X	X
Year fixed effects			X			X		X
R^2	0.030	0.284	0.349	0.013	0.169	0.213	0.230	0.286
N	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575

- **Combined Equity Issuance – Robustness** (Table 4)

- Measure: Fraction of companies that issue equity either through an IPO (Table 2) or through a large equity issuance (Table 3)

- Results confirm earlier findings

- Robustness:
  - Alternative standard errors (Columns 4-6): double clustering (Thompson, 2006)
  - Additional controls: add lagged ROE and lagged investment

Table 4. Predictability of Combined Equity Issuance Using Demographics

Dependent variable	Share of Firms That Are New Listings or Conducted a Large Net Equity Issuance							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecasted annualized demand growth between *t* and *t+5*	3.717 (2.250)*	3.509 (1.506)**	2.564 (1.247)**	3.717 (1.741)**	3.509 (1.691)**	2.564 (1.802)	3.194 (1.363)**	2.436 (1.168)**
Forecasted annualized demand growth between *t+5* and *t+10*	-6.103 (2.052)***	-3.907 (1.571)**	-3.749 (1.517)**	-6.103 (1.863)***	-3.907 (1.476)**	-3.749 (1.345)***	-3.674 (1.477)**	-3.519 (1.412)**
Industry market to book ratio		0.009 (0.011)	0.021 (0.012)*		0.009 (0.011)	0.021 (0.014)*	0.006 (0.011)	0.014 (0.012)
Industry investment							-0.032 (0.034)	-0.023 (0.032)
Industry accounting return on equity							0.117 (0.047)**	0.141 (0.050)***
Aggregate combined equity issues		0.947 (0.134)***			0.947 (0.148)***		0.974 (0.135)***	
Industry fixed effects		X	X		X	X	X	X
Year fixed effects			X			X		X
Double Clustering				X	X	X		
R^2	0.046	0.349	0.413	0.046	0.349	0.413	0.359	0.426
N	*N* = 572	*N* = 572	*N* = 572	*N* = 572	*N* = 572	*N* = 572	*N* = 572	*N* = 572

- **Graphical Evidence** (Figure 3)

- Define $e_{k,t}$ as equity issuance measure for industry k in year t

- Estimate for Demographic Industries

$$\begin{aligned} e_{k,t+1} &= \lambda + \delta_H \left(\hat{c}_{k,t+h+1|t-1} - \hat{c}_{k,t+h|t-1} \right) \\ &\quad + \beta_m e_{m,t+1} + \beta_b m b_{k,t+1} + \eta_k + \varepsilon_{k,t} \end{aligned}$$

- Plot coefficients $\hat{\delta}_H$ for combined equity issuance

- Pattern consistent with timing of limited attention in stock returns

Figure 3: Combined Equity Issuance Predictability Coefficient Using Growth at Different Horizons

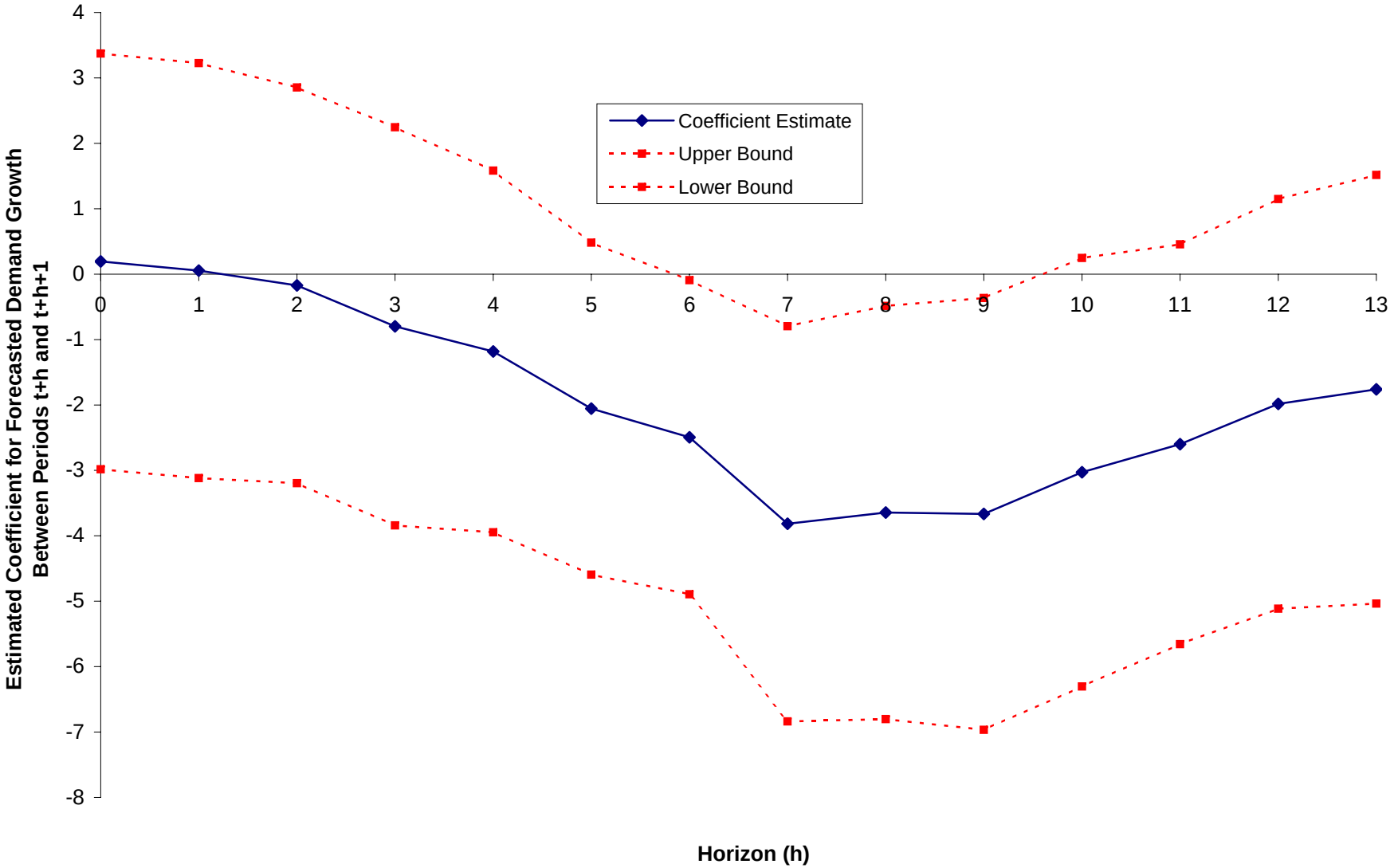
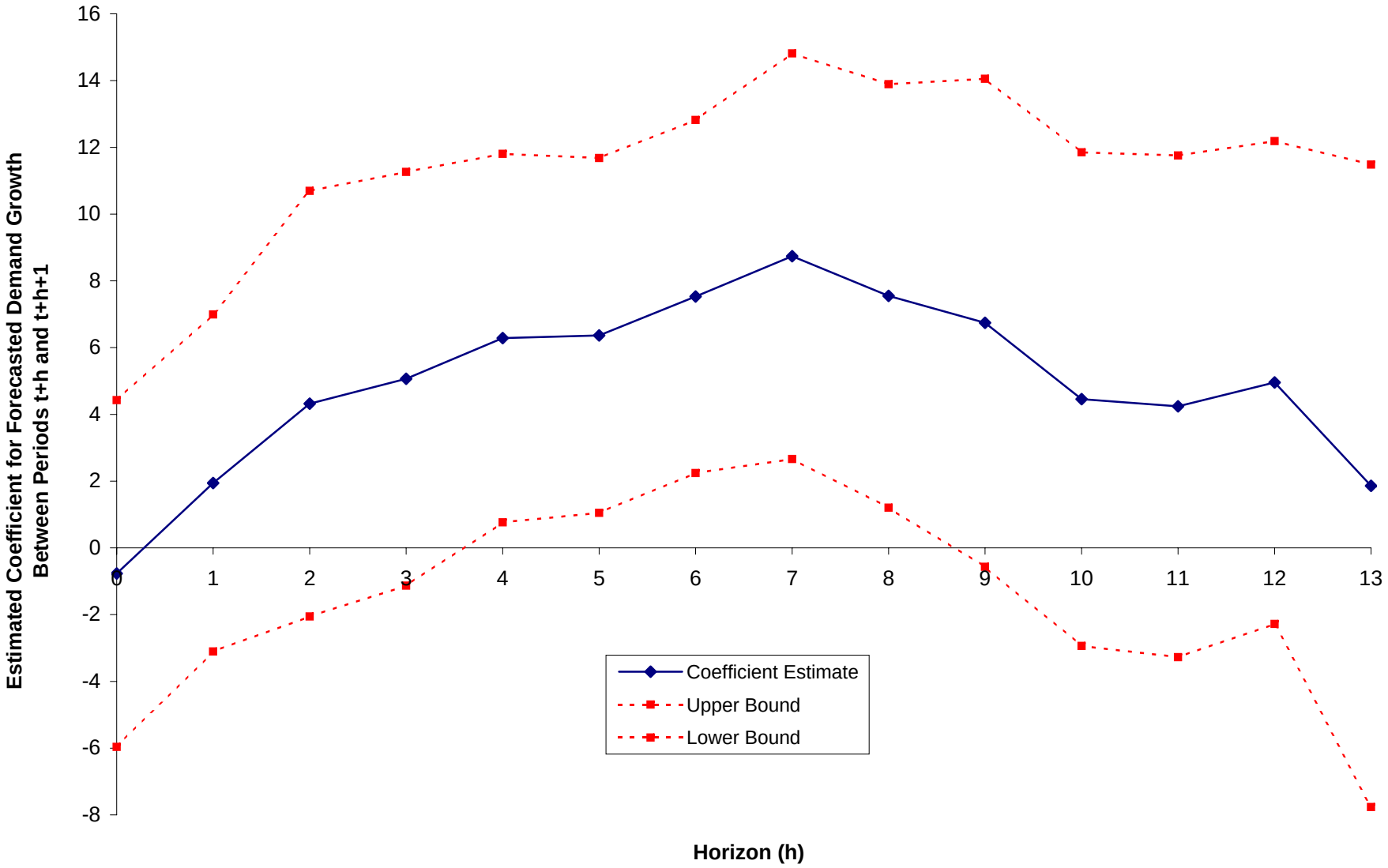


Figure 2: Abnormal Return Predictability Coefficient Using Growth at Different Horizons



- **Time-To-Build** (Table 5)

- Time-To-Build: Investment to expand production not instantaneous

- So far: Allow for time-to-build of up to five years

- Some industries: time required could be longer —> Attenuate negative relationship between long-term demand and security issuance

- Consider case of positive long-term demand shift
  - Market timing –> Equity issuance $\downarrow$
  - Capital budgeting –> Equity issuance $\uparrow$

- Proxy: Work in progress (Compustat data item 77) divided by the book value.

- Results: Stronger effect for low time-to-build industries, as predicted

Table 5. The Impact of Industry Concentration and Time-To-Build on Combined Equity Issuance

Dependent variable	**Share of Firms That Are New Listings or Conducted a Large Net Equity Issuance**							
Sample	**High Time-To-Build**		**Low Time-To-Build**		**High Concentration**		**Low Concentration**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecasted annualized demand growth between *t* and *t+5*	1.101	1.617	5.225	2.078	5.478	6.746	1.057	0.866
	(1.855)	(1.725)	(3.239)	(3.477)	(2.262)**	(3.425)**	(2.337)	(1.980)
Forecasted annualized demand growth between *t+5* and *t+10*	-1.600	-2.951	-6.640	-6.283	-7.358	-8.934	-1.551	-2.302
	(2.413)	(2.762)	(2.874)**	(2.469)***	(3.745)**	(4.017)**	(2.917)	(2.790)
Industry market to book ratio	0.018	0.020	0.022	0.033	0.000	0.000	0.029	0.038
	(0.008)**	(0.012)	(0.013)*	(0.013)***	(0.008)	(0.009)	(0.008)***	(0.007)***
Aggregate net equity issues	0.897		0.751		0.754		0.958	
	(0.102)***		(0.136)***		(0.115)***		(0.132)***	
Industry fixed effects	X	X	X	X	X	X	X	X
Year fixed effects		X		X		X		X
R^2	0.428	0.471	0.313	0.357	0.279	0.317	0.420	0.499
N	*N* = 661	*N* = 661	*N* = 746	*N* = 746	*N* = 447	*N* = 447	*N* = 451	*N* = 451

Notes: Columns 1 through 8 report the coefficients of OLS regressions of the industry share of companies that issued equity either through a new listing in CRSP or through a large equity issuance for year t+1 on the forecasted annualized demand growth due to demographics between t and t+5 and between t+5 and t+10. The forecasts are made using information available as of year t-1. The coefficients on the forecasted annual demand growth are normalized by the number of years of the forecast (5 for both coefficients). The sample in Columns 1 through 4 is split using a measure of industry time-to-build (work in progress divided by the book value of assets, industries where this share is higher than 0.005 are categorized as high time-to-build industries.) The sample in Columns 5 through 8 is split using a measure of industry concentration (C-4 in 1972). The analysis of each split sample is not limited to the subset of Demographic Industries. Standard errors are clustered by year and then scaled by a function of the

- **Effect of Industry Concentration** (Table 5)

- Effect of demand shift on profits and returns increasing in barriers to entry

- Proxy of barriers to entry: Industry concentration index C-4

- DellaVigna and Pollet (2007): Effect on returns larger in high-concentration industries

- Results on equity issuance
  - Use combined measure: Share of firms doing an IPOs or large equity issuance
  - Larger effect for high-concentration industries, as predicted by theory

- **Net Debt Issuance** (Table 6)

- Debt should respond to need for capital (capital budgeting)

- Unclear if there is a response to mispricing of equity (market timing)

- Measure: net debt issuance as share of lagged book value
  - Positive (not significant) effect of short-term demographics $\hat{\delta}_0$
  - No effect of long-term demographics $\hat{\delta}_1$

- Some evidence of effect of capital budgeting on debt issuance

Table 6. Predictability of Net Debt Issuance and Net Debt Repurchases Using Demographic Changes

Dependent variable	Large Net Debt Issues			Large Net Debt Repurchases			Net Debt Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecasted annualized demand growth between *t* and *t+5*	3.515	3.665	2.510	-1.537	-1.281	1.601	1.408	0.569
	(5.240)	(4.397)	(4.630)	(2.425)	(1.807)	(1.576)	(0.795)*	(0.723)
Forecasted annualized demand growth between *t+5* and *t+10*	0.712	2.060	2.004	-2.709	-4.026	-3.416	0.886	0.825
	(4.388)	(3.941)	(4.213)	(1.860)	(1.464)***	(1.483)**	(0.793)	(0.785)
Industry market to book ratio		0.101	0.116		-0.028	-0.056	0.011	0.018
		(0.030)***	(0.036)***		(0.018)*	(0.020)***	(0.005)**	(0.006)***
Aggregate share of large net debt issues		1.319						
		(0.433)***						
Aggregate share of large net debt repurchases					0.509			
					(0.261)*			
Aggregate net debt issuance							0.168	
							(0.641)	
Industry fixed effects		X	X		X	X	X	X
Year fixed effects			X			X		X
R^2	0.012	0.315	0.338	0.016	0.144	0.202	0.187	0.224
N	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575	*N* = 575

- **Investment and R&D** (Table 7)

- Does capital budgeting effect operate through investment?

- Estimate impact of growth due to demographics on investment and R&D

  - Positive effect of short-term demographics $\hat{\delta}_0$ on inv. and R&D

- Compare to Acemoglu and Linn (2004) – Company R&D respond to contemporaneous demand shifts for categories of pharmaceuticals

Table 7. Predictability of Investment and R&D Using Demographic Changes

Dependent variable	Share of Firms With Large Investment			Share of Firms With Large R&D		
	(1)	(2)	(3)	(4)	(5)	(6)
Forecasted annualized demand growth between *t* and *t+5*	2.746 (1.285)**	2.990 (1.383)**	2.113 (1.287)*	0.833 (3.453)	3.849 (1.891)**	3.728 (2.147)*
Forecasted annualized demand growth between *t+5* and *t+10*	-0.530 (1.325)	-0.174 (1.685)	0.727 (1.709)	0.381 (2.667)	-0.721 (1.348)	0.161 (1.616)
Industry market to book ratio	0.008 (0.010)	0.004 (0.014)	0.012 (0.015)	0.025 (0.031)	-0.005 (0.006)	-0.004 (0.007)
Aggregate investment	0.934 (0.305)***	0.870 (0.289)***				
Aggregate R&D				0.089 (0.237)	0.310 (0.136)**	
Industry fixed effects		X	X		X	X
Year fixed effects			X			X
R^2	0.066	0.231	0.282	0.055	0.506	0.537
N	*N* = 582	*N* = 582	*N* = 582	*N* = 582	*N* = 582	*N* = 582

Notes: Columns 1 through 3 report the coefficients of OLS regressions of the industry share of companies undertaking significant investments (capital expenditures scaled by lagged property, plant and equipment) for year t+1 on the forecasted annualized demand growth due to demographics between t and t+5 and between t+5 and t+10. Columns 4 through 6 report similar regressions for the industry share of companies doing significant R&D spending (research and development scaled by lagged assets). The forecasts are made using information available as of year t-1. The coefficients on the forecasted annual demand growth are normalized by the number of years of the

- **Fama-MacBeth Regressions** (Internet Table 2)

- Different way to control for year effects
  - Separate regressions run each year to obtain $\hat{\delta}_0$, $\hat{\delta}_1$
  - Compute average of coefficients $\hat{\delta}_0$, $\hat{\delta}_1$ across years

- Results are similar to panel methodology
  - Evidence of capital budgeting for IPOs and net equity issuance
  - Evidence of market timing for IPOs and net equity issuance

Other Explanations

- *Signalling Model.* Miller-Rock signalling with equity –> Issue equity when pos. private info.
  BUT: Demographics is verifiable –> Cheaper to release forecasts

- *Unobserved Time Trends.* Time trends correlated with issuance and demographics
  BUT: Control for year f.e. + Fama-MacBeth regressions

- *Capital Budgeting with Fixed Costs of Issuance.* If long-term demand, anticipate future issuance –> Delay current issuance
  BUT: Better to issue already in advance + Little evidence of fixed costs (8 pct. firms issue >=3% equity per year)

Conclusion

- Response of equity issuance to predictable shifts in demand

- We find evidence of:
  - **Capital Budgeting.** Equity issuance and debt issuance increase in the short-term when demand increases
  - **Market Timing.** Equity issuance decreases in response to expected long-term demand increases

- Support for limited-foresight horizon of investors

Figure 1a. Forecasted and Actual Population Ages 10-14

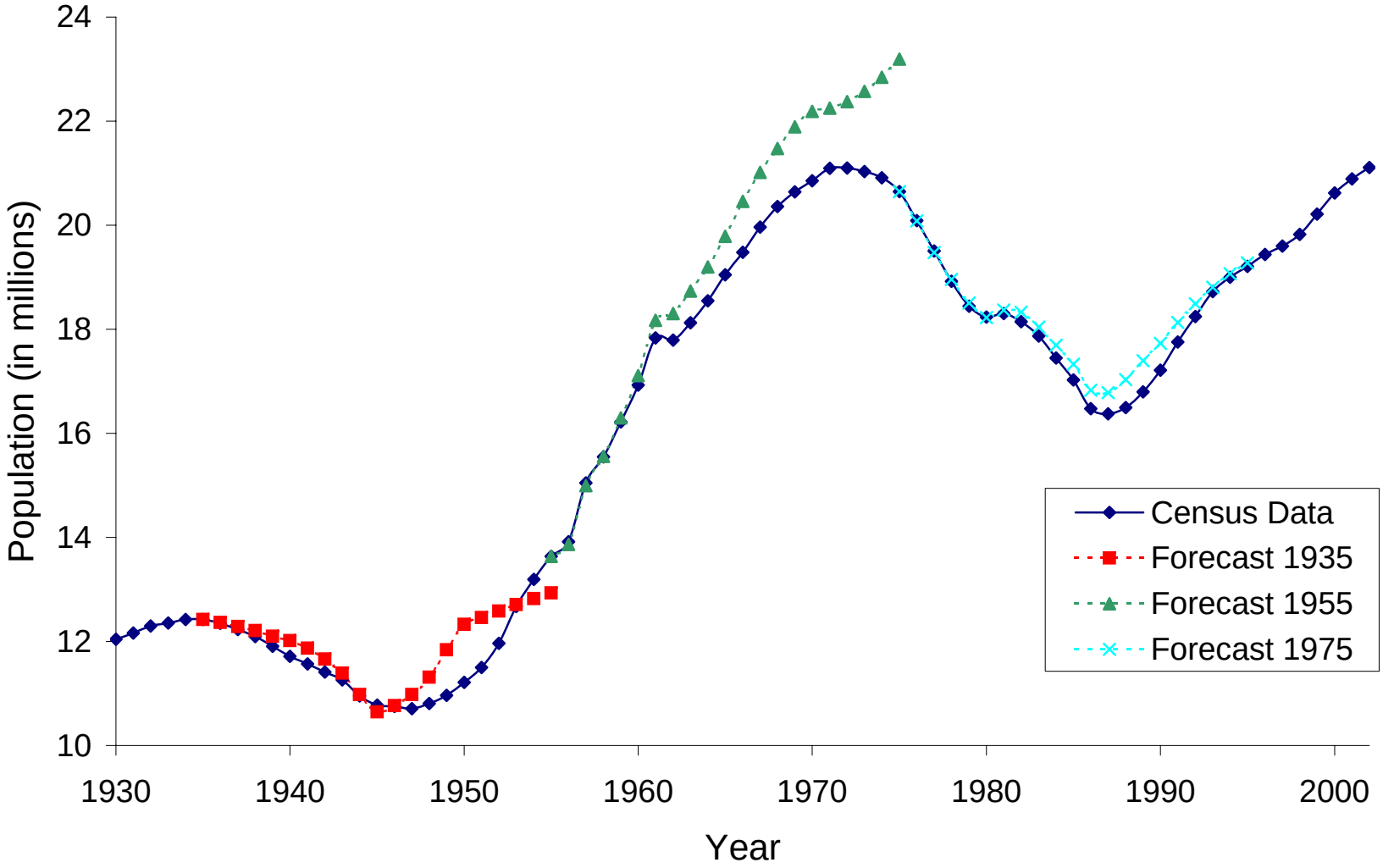


Table 10. Fama-MacBeth Regressions of Issuance on Demographics

Dependent Variable	Share of New Listings		Net Equity Issuance		Net Debt Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.0510	0.0323	-0.0124	-0.0068	0.0000	-0.0193
	(0.0176)***	(0.0192)*	(0.0065)*	(0.0084)	(0.0110)	(0.0148)
Forecasted annualized demand growth between *t* and *t+5*	3.5559	2.2619	2.1608	1.8608	0.8534	1.0625
	(1.6646)**	(1.3393)*	(0.8493)**	(0.7587)**	(0.8769)	(0.8645)
Forecasted annualized demand growth between *t+5* and *t+10*	-3.3161	-2.6260	-1.4567	-1.0677	-0.4891	-0.7375
	(1.2880)***	(1.1578)**	(0.7297)**	(0.7365)	(0.7633)	(0.7444)
Industry market to book ratio		0.0225		-0.0025		0.0155
		(0.0073)***		(0.0039)		(0.0053)***
N	*N* = 31	*N* = 31	*N* = 31	*N* = 31	*N* = 31	*N* = 31

Table 2. Summary Statistics: IPO Measures

	Share of New Public Firms to Public Firms in the Industry				Share of IPOs to Public Firms in the Industry			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Industry Category	**Mean**	**Std. Dev.**	**# Years**	**# Firms**	**Mean**	**Std. Dev.**	**# Years**	**# Firms**
Child Care	0.100	(0.177)	30	3.73	0.070	(0.116)	24	4.29
Children's Books	0.110	(0.246)	22	2.36	0.075	(0.154)	19	2.58
Children's Clothing	0.059	(0.129)	30	3.27	0.074	(0.141)	24	3.33
Toys	0.097	(0.106)	30	14.27	0.077	(0.076)	24	14.54
Books: college texts	0.011	(0.061)	30	2.23	0.000	0.000	24	1.58
Books: general	0.033	(0.060)	30	9.43	0.032	(0.062)	24	9.50
Books: K-12 texts	0.012	(0.064)	27	2.93	0.016	(0.073)	21	2.62
Movies	0.117	(0.079)	30	36.90	0.080	(0.053)	24	40.00
Newspapers	0.045	(0.049)	30	17.33	0.032	(0.043)	24	18.17
Magazines	0.061	(0.067)	30	9.57	0.051	(0.059)	24	9.38
Cruises	0.133	(0.258)	18	3.78	0.078	(0.143)	18	3.78
Dental Equipment	0.083	(0.154)	30	4.00	0.096	(0.168)	24	3.58
Drugs	0.094	(0.068)	30	191.47	0.080	(0.057)	24	222.42
Health Care (Services)	0.126	(0.095)	30	67.90	0.113	(0.097)	24	78.46
Health Insurance	0.083	(0.096)	30	18.83	0.067	(0.090)	24	21.00
Medical Equipment	0.109	(0.075)	30	132.30	0.087	(0.067)	24	155.58
Funeral Homes, Cemet.	0.068	(0.132)	28	3.07	0.038	(0.092)	24	3.00
Nursing Home Care	0.119	(0.089)	30	19.90	0.092	(0.093)	24	21.92
Construction Equip.	0.040	(0.062)	30	28.70	0.036	(0.060)	24	26.13
Floors	0.033	(0.093)	30	6.13	0.041	(0.102)	24	4.75
Furniture	0.036	(0.057)	30	26.87	0.034	(0.059)	24	25.92
Home Appliances Big	0.066	(0.057)	30	31.73	0.061	(0.049)	24	31.96
Home Appliances Small	0.082	(0.134)	30	6.97	0.080	(0.134)	24	6.58
Housewares	0.023	(0.072)	30	3.60	0.029	(0.079)	24	3.25
Linens	0.031	(0.069)	30	5.43	0.032	(0.070)	24	5.33
Residential Const.	0.077	(0.094)	30	17.27	0.064	(0.085)	24	17.00
Residential Develop.	0.065	(0.052)	30	63.00	0.020	(0.024)	24	58.38
Residential Mortgage	0.097	(0.107)	30	19.33	0.076	(0.094)	24	20.67
Beer (and Wine)	0.058	(0.090)	30	12.73	0.052	(0.083)	24	12.29
Cigarettes	0.018	(0.070)	30	4.17	0.000	0.000	24	3.96
Cigars, Other Tobacco	0.032	(0.105)	30	3.53	0.029	(0.108)	24	2.71
Food	0.061	(0.042)	30	276.53	0.051	(0.032)	24	269.63
Liquor	0.023	(0.061)	28	5.36	0.021	(0.061)	24	4.75
Clothing (Adults)	0.046	(0.034)	30	69.03	0.045	(0.036)	24	63.25
Cosmetics	0.065	(0.077)	30	13.23	0.057	(0.071)	24	13.38
Golf	0.080	(0.150)	30	6.00	0.077	(0.140)	24	6.92
Jewelry	0.058	(0.070)	30	13.50	0.064	(0.073)	24	13.13
Sporting Equipment	0.104	(0.103)	30	11.17	0.105	(0.097)	24	11.04
Life Insurance	0.042	(0.039)	30	44.57	0.027	(0.028)	24	38.00
Property Insurance	0.058	(0.072)	30	47.70	0.050	(0.064)	24	53.25
Airplanes	0.053	(0.045)	28	50.11	0.040	(0.040)	24	48.00
Automobiles	0.052	(0.053)	30	81.43	0.042	(0.049)	24	79.88
Bicycles	0.043	(0.119)	30	1.60	0.045	(0.128)	24	1.75
Motorcycles	0.113	(0.282)	25	1.44	0.056	(0.212)	24	1.46
Coal	0.060	(0.092)	30	10.87	0.024	(0.044)	24	10.50
Oil	0.086	(0.064)	30	308.00	0.035	(0.051)	24	328.42
Telephone	0.118	(0.099)	30	50.17	0.097	(0.069)	24	57.67
Electricity	0.027	(0.015)	30	212.67	0.017	(0.012)	24	213.04

Notes: The first measure of IPOs, the share of new public firms for industry k and year t, is the share of traded companies in industry k and year t that are new equity listings in year t. Column 1 displays the mean of this measure, and Column 2 reports the within-industry standard deviation. Also featured are the number of years for which the data is available (Column 3) and the average number of firms in the industry (Column 4). The second measure of IPOs is the share of companies in industry k and year t that undertake an IPO according to the Jay Ritter data set of IPOs. The latter measure is available only starting from 1980. Column 5 displays the mean of this measure. Columns 6 through 8 are parallel to Columns 2 through 4.

Table 3. Summary Statistics: Net Equity Issuance Measures

	Net Equity Issuance in the Industry				Net Equity Issuance in the Industry (Alternative Measure)			
	(5)	(6)	(7)	(8)	(5)	(6)	(7)	(8)
Industry Category	**Mean**	**Std. Dev.**	**# Years**	**# Firms**	**Mean**	**Std. Dev.**	**# Years**	**# Firms**
Child Care	0.001	(0.092)	30	2.20	0.009	(0.089)	29	1.80
Children's Books	0.033	(0.089)	21	2.19	0.026	(0.084)	20	1.90
Children's Clothing	-0.006	(0.049)	30	2.60	0.009	(0.036)	30	2.57
Toys	0.009	(0.035)	30	10.27	0.017	(0.036)	30	9.27
Books: college texts	-0.001	(0.005)	13	2.31	0.007	(0.013)	13	2.31
Books: general	0.000	(0.021)	30	6.47	0.006	(0.025)	30	6.20
Books: K-12 texts	-0.009	(0.025)	27	2.04	0.001	(0.023)	27	2.04
Movies	0.017	(0.034)	30	28.33	0.037	(0.042)	30	24.20
Newspapers	-0.021	(0.040)	30	12.37	0.002	(0.023)	30	11.70
Magazines	-0.002	(0.028)	30	6.63	-0.004	(0.073)	30	5.93
Cruises	0.038	(0.097)	18	3.22	0.044	(0.097)	18	3.22
Dental Equipment	0.081	(0.162)	28	3.18	0.080	(0.168)	28	3.04
Drugs	-0.008	(0.016)	30	155.33	0.009	(0.014)	30	139.47
Health Care (Services)	0.011	(0.025)	30	42.77	0.025	(0.041)	30	37.10
Health Insurance	0.000	(0.006)	30	11.90	0.002	(0.008)	30	10.87
Medical Equipment	0.000	(0.021)	30	106.07	0.014	(0.024)	30	94.10
Funeral Homes, Cemet.	-0.006	(0.029)	16	1.69	0.001	(0.051)	16	1.69
Nursing Home Care	0.012	(0.019)	30	12.20	0.019	(0.024)	30	10.60
Construction Equip.	0.003	(0.012)	30	22.63	0.011	(0.014)	30	21.30
Floors	0.008	(0.041)	27	5.70	0.022	(0.080)	27	5.48
Furniture	0.001	(0.021)	30	22.17	0.005	(0.022)	30	21.17
Home Appliances Big	0.000	(0.016)	30	25.97	0.009	(0.023)	30	24.20
Home Appliances Small	0.000	(0.004)	30	5.53	0.007	(0.017)	30	5.43
Housewares	-0.004	(0.056)	30	2.87	0.014	(0.032)	30	2.77
Linens	-0.001	(0.023)	30	4.40	0.013	(0.044)	30	4.17
Residential Const.	0.007	(0.015)	30	14.97	0.014	(0.025)	30	13.33
Residential Develop.	0.016	(0.035)	30	51.73	0.017	(0.024)	30	44.30
Residential Mortgage	0.005	(0.022)	30	14.50	0.010	(0.027)	30	12.73
Beer (and Wine)	-0.023	(0.030)	30	9.77	-0.012	(0.034)	30	9.37
Cigarettes	-0.012	(0.015)	30	3.47	-0.004	(0.016)	30	3.13
Cigars, Other Tobacco	-0.060	(0.093)	30	2.77	-0.007	(0.118)	28	2.67
Food	-0.007	(0.013)	30	219.13	0.009	(0.024)	30	205.63
Liquor	-0.017	(0.044)	28	3.82	-0.006	(0.049)	28	3.50
Clothing (Adults)	-0.004	(0.015)	30	59.43	0.005	(0.053)	30	55.57
Cosmetics	-0.011	(0.034)	30	10.97	0.000	(0.025)	30	9.77
Golf	0.036	(0.112)	30	5.27	0.026	(0.088)	30	4.37
Jewelry	0.007	(0.022)	30	11.27	0.016	(0.026)	30	10.57
Sporting Equipment	0.011	(0.032)	30	8.87	0.016	(0.037)	30	8.40
Life Insurance	0.000	(0.003)	30	16.93	0.002	(0.004)	30	16.20
Property Insurance	0.000	(0.007)	30	28.70	0.002	(0.007)	30	27.33
Airplanes	0.002	(0.015)	28	40.79	0.007	(0.015)	28	36.14
Automobiles	-0.001	(0.008)	30	63.73	0.004	(0.007)	30	60.07
Bicycles	0.007	(0.045)	27	1.44	0.007	(0.036)	27	1.41
Motorcycles	0.004	(0.028)	22	1.32	0.014	(0.036)	18	1.00
Coal	0.002	(0.014)	30	8.33	0.008	(0.023)	30	7.30
Oil	0.001	(0.009)	30	236.07	0.008	(0.013)	30	208.90
Telephone	0.013	(0.021)	30	33.00	-0.015	(0.187)	30	24.63
Electricity	0.010	(0.012)	30	173.67	0.019	(0.015)	30	170.13