Capital Budgeting vs. Market Timing: An Evaluation Using Demographics*

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Abstract

An ongoing debate in corporate finance pits capital budgeting—equity issuance is dictated by investment opportunities —against market timing—equity issuance exploits market mis-valuation. A difficulty in evaluating these theories is finding exogenous proxies for investment opportunities and for mis-valuation. In this paper, we suggest that demographic variables provide proxies for both, allowing for an evaluation of the two theories. We consider age-sensitive industries that are affected by (forecastable) shifts in cohort sizes, such as toys, beer, and nursing homes. We compare industries in which demographics induces positive demand shifts and in which it induces negative demand shifts. According to capital budgeting, industries affected by contemporaneous positive demand shifts should raise capital with IPOs and equity issuance to increase production through investment. We rely on the finding in DellaVigna and Pollet (2005) to motivate a test of market timing. Because demographic shifts 5 to 10 years ahead are not fully incorporated into asset prices, industries affected by positive demand shifts 5 to 10 years ahead are more likely to be undervalued. Hence, market timing suggests that these undervalued firms should be less likely to raise capital with IPOs and equity issuance. We find evidence to support both capital budgeting and market timing: IPOs and equity issuance respond positively to demand shifts up to 5 years ahead, and negatively to demand shifts 5 to 10 years ahead. Capital budgeting and market timing both appear to play important roles in equity issuance.

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1 Introduction

The determinants of equity issuance are the subject of an ongoing debate in corporate finance. Are initial and seasoned offerings best explained by the demands for external finance, or are they driven by market timing in response to company mis-valuation?

Capital budgeting holds that firms issue equity in order to invest the proceeds in positive net-present-value projects, for example to expand production when demand is high (Brealey and Myers, 2002). Market timing instead holds that firms issue equity in order to take advantage of mis-pricing by new investors. (Baker, Ruback, and Wurgler, forthcoming; Stein, 1996).

A difficulty in evaluating these theories is the lack of exogenous proxies for investment opportunities, on the one hand, and for misvaluation, on the other hand. For instance, the relationship between the market-to-book ratio and corporate decisions could reflect investment opportunities (Campello and Graham, 2006) or it could reflect mispricing related to previous returns or dispersion of opinion (Polk and Sapienza 2004; Gilchrist, Himmelberg, and Huberman 2005). These issues are also linked to whether market-to-book is a proxy for risk (Fama and French, 1992) or a measure of mispricing relative to accounting fundamentals (Lakonishok, Shleifer, and Vishny, 1994).

In this paper, we suggest that demographic variables can provide exogenous proxies for both, allowing for an evaluation of the two theories. We consider age-sensitive industries that are affected by (forecastable) shifts in cohort sizes, such as the toy, beer, and nursing home industries. These industries have distinctive age profiles of consumption. Therefore, forecastable changes in the age distribution produce forecastable shifts in demand for various goods. We compare industries in which demographics induces positive demand shifts and in which it induces negative demand shifts. In addition, we can distinguish between shifts that will affect an industry in the near future, up to 5 years ahead, and shifts that will occur in the further future, 5 to 10 years ahead.

Traditional capital budgeting suggests that industries affected by positive demand shifts in the near-term should raise capital to increase production. Demand shifts due to demographics that are contemporaneous or in the near future, therefore, should be positively correlated with equity issuance. This is the first prediction tested in this paper.

A second prediction relies on DellaVigna and Pollet (2005), who show that forecastable demographic shifts 5 to 10 years ahead are not fully incorporated into asset prices. Thus, demand shifts in the distant future can serve as proxies of mispricing.

The findings of DellaVigna and Pollet (2005) are summarized in Figure 1, which plots the coefficient of univariate regressions of abnormal annual industry stock returns in year t on forecasted demand growth due to demographics in year $t + h$. The panel includes up to 48 industries over the years 1974-2004. As Figure 1 shows, while contemporaneous demand shifts

(h equal to 1 or 2) do not significantly forecast stock returns, demand shifts 5-10 years ahead (h equal to 5-10) significantly predicts returns. DellaVigna and Pollet (2005) interpret the result as evidence that investor neglect forecastable determinants of fundamentals that are more than 5 years in the future. The stock returns in an industry increase when the inattentive investors realize the upcoming demand shift 5 years into the future.

To the extent that managers in a particular industry have (somewhat) longer horizons than investors, they should respond to the mis-pricing of their company by modifying their equity issuance decisions. Specifically, companies in industries with positive demand shifts 5 to 10 years ahead will tend to be undervalued, and the managers should respond by reducing the equity issuance. Conversely, companies in industries with negative demand shifts 5 to 10 years ahead will tend to be overvalued, and managers should react by issuing additional equity.

To summarize, capital budgeting predicts that demand shifts due to demographics in the near future should be positively correlated with equity issuance, while market timing suggests that demand shifts in the further future should be negatively correlated with equity issuance.

We test the two predictions using various measures of equity issuance. We construct demand shifts due to demographics by combining forecasts of future cohort sizes and estimates of age profiles of consumption. We follow the procedure described in DellaVigna and Pollet (2005) and summarized in Section 2. In Section 2 we also introduce the measures of equity issuance.

In Section 3, we consider first the impact of demand shifts due to demographics on the likelihood of initial public offerings (IPOs) in an industry, since IPOs allow private firm to raise cash. Our benchmark measure of IPOs in an industry is the number of new stock listings as a share of the existing firms in the industry. We control for aggregate IPO waves and for the industry market-to-book values. We find that demand shifts due to demographics up to 5 years ahead are positively correlated with the IPO share, albeit insignificantly so. Demand shifts due to demographics 5 to 10 years are significantly negatively correlated with the IPO measure. The share of IPOs in an industry decreases by 3 percentage points for each additional percentage point of annualized demand growth induced by demographics. We find similar results using an alternative IPO measure.

We then consider the impact on equity issuance for public firms. Our benchmark measure is the share of net equity issuances to the value of assets in an industry (Frank and Goyal, 2003). We find that this measure exhibits a (significant) positive response to predicted demand shifts up to 5 years ahead, consistent with capital budgeting. We also find that this measure has a significant negative response to predicted demand shifts 5 to 10 years ahead, consistent with market timing. The result is due mostly to increases in new equity issuance, as opposed to decreases in equity repurchases. We find qualitatively similar, but less precisely estimated, effects using an alternative measure of net equity issuance (Baker and Wurgler, 2002)

The findings above suggest that both capital budgeting and market timing are important determinants of equity issuance.

This paper also relates to the literature on the corporate response to anticipated demand shifts. Acemoglu and Linn (2005) document that research and investment in classes of pharmaceuticals responds to anticipated shifts in demand. Ellison and Ellison (2000) document that pharmaceutical firms respond to anticipated patent expiration by altering their advertisement decisions. Goolsbee and Syverson (2004) document that airline companies cut their fare in response to the anticipated entry of a competitor. Unlike these papers, we focus on equity issuance decisions.

This paper acontributes to the literature on the role of attention allocation in economics and finance (Barber and Odean, 2002; Daniel, Hirshleifer, and Subrahmanyam, 1998; Dyck and Zingales, 2003; Gabaix, Laibson, Moloche, and Weinberg, forthcoming; Hirshleifer, Lim, and Teoh, 2004; Hong and Stein, 1999; Huberman and Regev, 2001; Peng and Xiong, forthcoming). The evidence in this paper suggests that the inattention of investors with respect to long-term information (DellaVigna and Pollet, 2005) has real effects on corporate decisions.

This paper extends the literature on the effect of demographics on corporate outcomes (Acemoglu and Linn, 2005; Mankiw and Weil, 1989) and on aggregate stock returns (Abel, 2003; Poterba, 2001).

2 Data

In this Section, we summarize the construction of the measures of demand growth due to demographics; additional details are in DellaVigna and Pollet (2005). We then present summarize statistics on the benchmark measures of IPOs and net equity issuance.

2.1 Demand Shifts Due to Demographics

To obtain demographic-based forecasts of demand growth by industry, we generate demographic forecasts and combine them with estimates of age patterns in consumption data by industry.

Demographic Forecasts. We combine data from the *Census* on cohort size, mortality, and fertility rates to form forecasts of subsequent cohort sizes. We use demographic information available in year t to forecast the age distribution by gender and one-year age groups for years $u > t$. We assume that fertility rates for the years $u > t$ equal the fertility rates for year t. We also assume that future mortality rates equal mortality rates in year t except for a backward-looking percentage adjustment. Using cohort size in year t and the forecasts of future mortality and fertility rates, we form preliminary forecasts of cohort size for each year $u > t$, which we the adjust for net migration.

We define $\hat{A}_{g,u|t} = \left[\hat{A}_{g,0,u|t},\ \hat{A}_{g,1,u|t},\ \hat{A}_{g,2,u|t}, ...\right]$ as the future forecasted age distribution. $\hat{A}_{g,j,u|t}$ is the number of people of gender g alive at u with age j forecasted using demographic information available at t. $A_{g,j,u}$ is the actual cohort size of gender g alive at u with age j. In DellaVigna and Pollet (2005) we show that, using these estimates, we can forecast the actual population growth rate over the next 5 years, $\log A_{g,j,t+5} - \log A_{g,j,t}$, with an R^2 of 0.83. The forecasts 5 to 10 years in the future are only slightly less precise. Our forecasts also closely parallel publicly available demographic forecasts, in particular the Census Bureau population forecasts created using data from the 2000 Census.

Age Patterns in Consumption. We use data from the *Survey of Consumer Expenditures, 1972-1973* and the 1983-1984 cohorts of the ongoing *Consumer Expenditure Survey* to estimate the age patterns in consumption. We cover all major expenditures on final goods included in the survey data. The selected level of aggregation attempts to distinguish goods with potentially different age-consumption profiles. For example, within the category of alcoholic beverages, we separate beer and wine from hard liquor expenditures. Similarly, within insurance we distinguish among health, property, and life insurance expenditures.

In Figure 2 (from DellaVigna and Pollet, 2005), we illustrate the age profile for two goods using kernel regressions of household annual consumption on the age of the head of household[1]. Figure 2 plots normalized[2] expenditure on bicycles and drugs for the 1972-73 and 1983-84 surveys. Across the two surveys, the consumption of bicycles peaks between the ages of 35 and 45. At these ages, the heads of household are most likely to have children between the ages of 5 and 10. The demand for drugs, instead, is increasing with age, particularly in the later survey. Older individuals demand more pharmaceutical products.

This evidence on age patterns in consumption supports three general statements. First, the amount of consumption for each good depends significantly on the age of the head of household. Patterns of consumption for most goods are not flat with respect to age. Second, these age patterns vary substantially across goods. Some goods are consumed mainly by younger household heads (child care and toys), some by heads in middle age (life insurance and cigars), others by older heads (cruises and nursing homes). Third, the age profile of consumption for a given good is quite stable across time. For example, the expenditure on furniture peaks at ages 25-35, whether we consider the 1972-73 or the 1983-84 cohorts. Taken as a whole, the evidence suggests that changes in age structure of the population have the power to influence consumption demand in a substantial and consistent manner.

In order to match the consumption data with the demographic data, we transform the household-level consumption data into individual-level information. We use the variation in demographic composition of the families to extract individual-level information—consumption of the head, of the spouse, and of the children—from household-level consumption data. We use an OLS regression in each of the two cross-sections. We denote by $c_{i,k,t}$ the consumption by

[1] We use an Epanechnikov kernel with a bandwidth of 5 years of age for all the goods and years.

[2] For each survey-good pair we divide age-specific consumption for good k by the average consumption across all ages for good k.

household i of good k in year t and by $H_{i,t}$ a set of indicator variables for the age groups of the head of household i in year t. In particular, $H_{i,t} = [H_{18,i,t}, H_{27,i,t}, H_{35,i,t}, H_{45,i,t}, H_{55,i,t}, H_{65,i,t}]$ where $H_{j,i,t}$ is equal to 1 if the head of household i in year t is at least as old as j and younger than the next age group. For example, if $H_{35,i,t} = 1$ then the head of household i is aged 35 to 44 in year t. The variable $H_{65,i,t}$ indicates that the age of the head of household is greater than or equal to 65. Similarly, let $S_{i,t}$ be a set of indicator variables for the age groups of the spouse. Finally, we add discrete variables $O_{i,t} = [O_{0,i,t}, O_{6,i,t}, O_{12,i,t}, O_{18,i,t}, O_{65,i,t}]$ that count the total number of other individuals (children or old relatives) living with the family in year t. For instance, if $O_{0,i,t} = 2$, then two children aged 0 to 5 live with the family in year t.

The regression specification is

$$c_{i,k,t} = B_{k,t} H_{i,t} + \Gamma_{k,t} S_{i,t} + \Delta_{k,t} O_{i,t} + \varepsilon_{i,k,t}.$$

This OLS regression is estimated separately for each good k and for each of the two consumption data sets t. The purpose is to obtain estimates of annual consumption of good k for individuals at different ages. For example, the coefficient $B_{35,\text{cars},1972}$ is the average total amount that a (single) head aged 35 to 44 spends on cars in 1972.

Demand Forecasts. We combine the estimated age profiles of consumption with the demographic forecasts in order to forecast demand for different goods. For example, consider a forecast of toys consumption in 1985 made as of 1975. For each age group, we multiply the forecasted cohort sizes for 1985 by the age-specific consumption of toys estimated on the most recent consumption data as of 1975, that is, the 1972-73 survey. Next, we aggregate across all the age groups to obtain the forecasted overall demand for toys for 1985.

Formally, let $\hat{A}^b_{g,u|t}$ be the aggregation of $\hat{A}_{g,u|t}$ into the same age bins that we used for the consumption data. For example, $\hat{A}^b_{f,35,u|t}$ is the number of females aged 35 though 44 forecasted to be alive in year u as of year t. We combine the forecasted age distribution $\hat{A}^b_{g,u|t}$ with the age-specific consumption coefficients $B_{k,t}$, $\Gamma_{k,t}$, and $\Delta_{k,t}$ for good k. In order to perform this operation, we estimate the shares $h_{g,j,t}$, $s_{g,j,t}$, and $o_{g,j,t}$ of people in the population for each age group j. For instance, $h_{f,35,t}$ is the number of female heads 35-44 divided by the total number of females aged 35-44 in the most recent consumption survey prior to year t. We obtain a demographic-based forecast at time t of the demand for good k in year u which we label $\hat{C}_{k,u|t}$:

$$\hat{C}_{k,u|t} = \sum_{g \in \{f,m\}} \sum_{j \in \{0,6,12,18,\ldots,65\}} \hat{A}^b_{g,j,s|t} \left(h_{g,j,t} B_{j,k,t} + s_{g,j,t} \Gamma_{j,k,t} + o_{g,j,t} \Delta_{j,k,t} \right).$$

The coefficients B, Γ, and Δ in this expression are estimated using the most recent consumption survey prior to year t with information on good k. This forecast implicitly assumes that the tastes of consumers for different products depend on age and not on cohort of birth. By construction, we hold the prices of each good constant at its level in the most recent consumption survey prior to year t.

In Table 1, we present summary statistics on the consumption forecasts. Columns 2 and 4 present the five-year predicted growth rate due to demographics, $\ln \hat{C}_{k,t+5|t-1} - \ln \hat{C}_{k,t|t-1}$, respectively for years $t = 1975$ and $t = 2000$. The bottom two rows present the mean and the standard deviation across goods of this measure. In each case, data from the most recent consumer expenditure survey is used. In 1975, the demand for child care and toys is low due to the small size of the 'Baby Bust' generation. The demand for most adult-age commodities is predicted to grow at a high rate (1.5-2 percent a year) due to the entry of the 'Baby Boom' generation into prime consumption age. In 2000 the demand for child-related commodities is relatively low. The aging of the 'Baby Boom' generation implies that the highest forecasted demand growth is for goods consumed later in life, such as cigars, cosmetics, and life insurance.

Demographic Industries. We also categorizes goods by their sensitivity to demographic shifts. For example, the demand for oil and utilities is unlikely to be affected by shifts in the relative cohort sizes, while the demand for bicycles and motorcycles depends substantially on the relative size of the cohorts aged 15-20 and 20-30, respectively. We construct a measure of Demographic Industries using information available at time $t-1$ to identify the goods where demographics shifts are likely to have the most impact. In each year t and industry k, we compute the standard deviation of the one-year consumption forecasts up to 15 years ahead given by $\left(\ln \hat{C}_{k,t+s+1|t-1} - \ln \hat{C}_{k,t+s|t-1}\right)$ for $s = 0, 1, ..., 15$. We define the set of Demographic Industries[3] in each year t as the 20 industries with the highest standard deviation of demand growth. In these industries, the forecasted aging of the population induces different demand shifts at different times in the future, enabling the estimation of investor horizon. Table 1 lists all industries and indicates which industries belong to the subset of demographics industries in 1975 (Column 3) and 2000 (Column 5). Column 6 summarizes the percentage of years in which an industry belongs to the Demographic Industries subsample. The Demographic Industries are associated with high demand by children (child care, toys) and by young adults, such as housing.

2.2 Equity Issuance

IPOs. The first measure of equity issuance captures the decision of firms in an industry to go public, since going public is a way to issue equity. As we discussed in the Introduction, we expect firms to conduct an IPO to raise capital for investment opportunities (capital budgeting), or in response to perceived overvaluation (market-timing).

[3]Ideally, we would like to select industries in which demographics better predicts contemporaneous profitability or revenue growth. Unfortunately, this avenue is not feasible for two reasons. First, demographics is a small predictor of revenue and profit, so one would need a long time series to identify the industries with the highest predictive power. For univariate series with 20-30 observations, the estimation would be poor. Second and relatedly, it would be impossible to do such test in the early years of data without violating the requirement of only using backward-looking information.

We construct the benchmark measure of IPOs as the share of traded companies in industry k and year t that are new equity listings in year t. Columns 1 and 2 in Table 2 display the mean and the standard deviation of this measure by industry. The measure of new equity listings is available for the full sample (1974-2003) for the large majority of the industries. The average share of new listings ranges from 0.011 (Books: College Texts) to 0.133 (Cruises).

As an alternative measure, we also use the share of companies in industry k and year t that undertake an IPO according to the Jay Ritter data set of IPOs. Columns 5 and 6 in Table 2 display the mean and standard deviation for this measure. The main disadvantage of this alternative measure is that the data is available only starting from 1980. Over the sample in which both measures exist, the correlation between the two measures is .8864.

Net Equity Issuance. The benchmark measure of equity issuance for public companies is the industry net stock issuance scaled by industry book value of assets for industry k and year t (Frank and Goyal, 2003). We expect firms to issue shares in order to raise capital (capital budgeting), or in response to a perceived overvaluation (market-timing).

Columns 1 and 2 in Table 3 display the mean and the standard deviation of this measure by industry. The measure of net stock repurchases varies from -.060 (Cigars and Other Tobacco) to .081 (Dental Equipment). The measure is available for the entire sample period for most industries, even though the number of companies included in the industry (Column 8) is smaller than the corresponding number for the IPO measure. This difference is due to the additional data requirement that the company is in Compustat as well as CRSP.

Following Baker and Wurgler (2002), we define an alternative measure of net equity issuance as the change in book equity minus the change in retained earnings (scaled by lagged assets). Columns 5 and 6 in Table 2 display the mean and standard deviation for this measure. The correlation between the two measures of net issuance is .6522.

3 Empirical Estimates

3.1 Graphical Evidence

We first present graphical evidence on how IPOs and net equity issuance respond to demographic shifts at different time horizons, with Figures parallel to Figure 1 for returns. Define $e_{k,t}$ to be the equity issuance measure for industry k in year t. Denote the corresponding variable for the market over the same horizon as $e_{m,t}$. Further, let $mb_{k,t}$ denote the measure of the market-to-book value of assets in industry k and year t.

We estimate the regression:

$$e_{k,t+1} = \lambda + \delta_H[\hat{c}_{k,t+h+1|t-1} - \hat{c}_{k,t+h|t-1}] + \beta_m e_{m,t+1} + \beta_b mb_{k,t+1} + \eta_k + \varepsilon_{k,t} \qquad (1)$$

for the sample of Demographic Industries, for horizon h between 0 and 15 years. The coefficient

δ_H measures the extent to which consumption growth h years ahead forecasts stock returns in year $t+1$. The specification controls for market-wide patterns in equity issuance, as captured by $e_{m,t+1}$, and for book-to-market, as captured by $mb_{k,t+1}$. In addition, we control for industry fixed effects, to hold constant time-invariant differences across industries.[4]

Figure 3 shows the results of the estimation of (1) with the share of net equity listings and the share of IPOs as dependent variables. Demand growth due to demographics 1 to 3 years ahead is associated with a small (not significant) increase in IPOs according to both measures. Demand growth due to demographics more than 4 years ahead, instead, has a negative impact on IPO issuance. The impact is most negative for demand shifts 7 to 9 years ahead, and is significant for the share of IPOs variable. Demographic shifts more than 10 years into the future appear to have little or no impact on IPO decisions.

Figure 4 shows the results of the estimation of (1) with the two different measures of net share repurchases as dependent variables. Demand growth due to demographics up to 2 years ahead is associated with an increase in net equity issuance according to either measure, and significantly so for contemporaneous demand shifts. Demand growth due to demographics more than 5 years ahead, instead, has a negative impact on net issuances according to both measures. The impact is most negative for demand shifts over 9 years ahead. One difference from the pattern for IPOs is that the demographic shifts more than 10 years into the future appear to still impact corporate decisions.

These Figures provide us with some first evidence supporting both capital budgeting—net equity issuance responds positively to demand shifts in the near future—and market timing—IPOs and net equity issues respond negatively to demand shifts over 5 years in the future. However, the evidence in these Figures should be taken as only suggestive. Demand growth at different horizons in the future are correlated with each other, so it is hard to make conclusions on the effect of demand at one horizon without controlling for the other horizons. Since we cannot control for demand growth at all horizons, in the baseline specifications we control for demand growth due to demographics in the present and near future (0 to 5 years ahead) and in the further future (5 to 10 years ahead).

3.2 Baseline Specification

In the baseline specification we regress the equity issuance variables on the forecasted growth rate of demand due to demographics from t to $t+5$ (the present and the near future) and $t+5$ to $t+10$ (the further future). The specification of the regression is

$$e_{k,t+1} = \gamma + \delta_0[\hat{c}_{k,t+5|t-1} - \hat{c}_{k,t|t-1}]/5 + \delta_1[\hat{c}_{k,t+10|t-1} - \hat{c}_{k,t+5|t-1}]/5 + \beta_m e_{m,t+1} + \beta_b mb_{k,t+1} + \varepsilon_{k,t} \tag{2}$$

[4]We introduce the controls because they appear to influence the results in the later specifications. The results without controls display more accentuated patterns of similar type.

Since the consumption growth variables are scaled by 5, the coefficients δ_0 and δ_1 represent the average increase in equity issuance for one percentage point of additional annualized growth in demographics at the two different horizons. (The forecasts of consumption as of time t only use information available in period $t-1$.) The specification controls for market-wide patterns in equity issuance, as captured by $e_{m,t+1}$, and for book-to-market, as captured by $mb_{k,t+1}$.

In this panel setting it is unlikely that the errors from the regression are uncorrelated across industries and over time because there are persistent shocks that affect multiple industries at the same time. We allow for heteroskedasticity and arbitrary contemporaneous correlation across industries by calculating standard errors clustered by year. In addition, we correct these standard errors to account for autocorrelation in the error structure.[5]

More formally, let X be the matrix of regressors, θ the vector of parameters, and ε the vector of errors. The panel has T periods and K industries. Under the appropriate regularity conditions, $\sqrt{\frac{1}{T}}(\hat{\theta}-\theta)$ is asymptotically distributed $N(0,(X'X)^{-1}\,S(X'X)^{-1})$ where $S=\Gamma_0+\sum_{q=1}^{\infty}(\Gamma_q+\Gamma_q')$ and $\Gamma_q=E[(\sum_{k=1}^{K}X_{kt}\varepsilon_{kt})'(\sum_{k=1}^{K}X_{kt-q}\varepsilon_{kt-q})]$. The matrix Γ_0 captures the contemporaneous covariance, while the matrix Γ_q captures the covariance structure between observations that are q periods apart. While we do not make any assumptions about contemporaneous covariation, we assume that $X_{kt}'\varepsilon_{kt}$ follows an autoregressive process given by $X_{kt}'\varepsilon_{kt}=\rho X_{kt-1}'\varepsilon_{kt-1}+\eta_{kt}'$ where $\rho<1$ is a scalar and $E[(\sum_{k=1}^{K}X_{kt-q}\varepsilon_{kt-q})'(\sum_{k=1}^{K}\eta_{kt})]=0$ for any $q>0$.

These assumptions imply $\Gamma_q=\rho^q\Gamma_0$ and therefore, $S=[(1+\rho)\,/\,(1-\rho)]\Gamma_0$. (Derivation and details are in DellaVigna and Pollet, 2005) The higher the autocorrelation coefficient ρ, the larger the terms in the matrix S. Since Γ_0 and ρ are unknown, we estimate Γ_0 with $\frac{1}{T}\sum_{t=1}^{T}X_t'\hat{\varepsilon}_t\hat{\varepsilon}_t'X_t$ where X_t is the matrix of regressors and $\hat{\varepsilon}_t$ is the vector of estimated residuals for each cross-section. We estimate ρ from the pooled regression for each element of $X_{kt}'\hat{\varepsilon}_{kt}$ on the respective element of $X_{kt-1}'\hat{\varepsilon}_{kt-1}$.

We use the set of Demographic Industries for the years 1974-2003 as the baseline sample for the paper. As discussed above, the Demographic Industries are more likely to be affected by demographic demand shifts.

3.3 IPO Results

Benchmark Measure. In Table 4, we estimate specification (2) for the share of new equity listings, the benchmark measure of IPOs. Columns 1 through 4 present the estimates of (2) for the sample of Demographic Industries. In the specification without industry or year fixed effects (Column 1), the impact of demographics on new equity listings is identified by

[5] This method is more conservative than clustering by either industry or year. In the empirical specifications that follow, the standard errors computed with either of these methodologies are almost uniformly lower than our standard errors.

both between- and within-industry variation in demand growth. The coefficient on short-term demographics, $\hat{\delta}_0 = 2.95$, is not significantly different from zero, while the coefficient on long-term demographics, $\hat{\delta}_1 = -5.17$, is significantly larger than zero. Introducing the controls for the industry market-to-book ratio $mb_{k,t}$ and for the aggregate share of new listings $e_{m,t}$ (Column 2) reduces the effect of long-term demographics to a marginally significant $\hat{\delta}_1 = -2.60$. The control for the aggregate share of new listings is highly significant and close to 1, suggesting the importance of controlling for market waves in IPOs. In this and the subsequent specifications in Table 4, the estimate of ρ is approximately 0.17, resulting in a proportional correction for the standard errors of $\sqrt{(1+\hat{\rho})/(1-\hat{\rho})} = 1.19$.

In Column 3 we introduce industry fixed effects. In this case, the identification depends only on within-industry variation in demand growth. In this specification, the demand growth in the near-future has a marginally significant positive effect on the share of new listings ($\hat{\delta}_0 = 2.58$), while the demand growth in the further future has a significant negative effect ($\hat{\delta}_1 = -3.21$). We obtain similar results in Column 4, where we introduce year fixed effects as well. In this specification, the identification depends on within-industry variation in demand growth after controlling for common time-series patterns.

Across the specifications in Column 2-4, a one percent annualized increase in demand from year 0 to 5 increases the share of net equity issues by about 2 percentage points from an average of 6.45 percent, although the result is at best marginally significant. (A one percentage point increase in demand growth corresponds approximately to a 1.6 standard deviation movement[6]) A one percentage point annualized increase in demand from year 5 to 10 decreases the share of net equity issues by about 3 percentage points, a significant and economically large effect. While this effect may appear too large, we should point out that we cannot reject a decrease of .5 percentage points.

Over the larger sample with all 48 industries (Columns 5 through 8), the parameter estimates are similar to the ones in the Demographic Sample. In particular, the coefficient on demand growth due to demographics 5 to 10 years ahead is significantly negative in all the specifications.

To summarize, the impact of demand shifts on the share of new equity listings depends on the horizon of the demand shifts. Demand shifts occurring in the near future appear to, if anything, increase the share of IPOs, consistent with capital budgeting, although this effect is at best marginally significant. Demand shifts occurring in the farther future, instead, significantly decrease the share of IPOs, consistent with market timing. In both cases, the effect is economically large.

Alternative Measure. In Columns 1 through 4 of Table 5 we replicate the results of Columns 1-4 of Table 4 for the alternative measure of IPOs based on the share of IPOs

[6]For this sample, the mean forecasted demand growth 5-10 years ahead is .0109, with standard deviation .0060. The average within-year standard deviation is .0051.

according to the Jay Ritter data set to the companies in the industry. The results are similar to the ones obtained with the benchmark measure.

3.4 Net Equity Issuance Results

Benchmark Measure. In Table 6, we estimate specification (2) for the benchmark measure of net equity issuance. Columns 1 through 4 present the estimates of (2) for the sample of Demographic Industries. In the specification without industry or year fixed effects (Column 1), the coefficient on short-term demographics is significantly positive ($\hat{\delta}_0 = 1.82$), while the coefficient on long-term demographics is significantly negative ($\hat{\delta}_1 = -1.51$). Introducing the controls for the industry market-to-book ratio $mb_{k,t+1}$ and for the aggregate share of new listings $e_{m,t+1}$ (Column 2) essentially does not affect the point estimates. In this and the subsequent specifications in Table 6, the estimate of ρ varies between 0 and .30, for an average of 0.15, resulting in a proportional correction for the standard errors of $\sqrt{(1+\hat{\rho})\,/\,(1-\hat{\rho})} = 1.16$. In Column 3 we introduce industry fixed effects, which leads to a more negative estimate of the impact of long-term demographics. Introduce year fixed effects (Column 4) reduces the point estimates in absolute value for both coefficient, rendering δ_1 marginally significant. Over the larger sample with all 48 industries (Columns 5 through 8), the parameter estimates are very similar to the ones in the Demographic Sample.

Across the specifications in Columns 1-8, a one percent annualized increase in demand from year 0 to 5 increases the net equity issuance by 1.4 to 1.8 percentage points. We can evaluate this effect in units of standard deviations. A one-standard-deviation increase in the annualized demand growth due to demographics 0 to 5 years ahead, a .61 percent shift, increases the net equity issuance by about $.61 * 1.6 \approx 1$ percentage point, corresponding to .18 standard deviations, a large effect. A one percentage point annualized increase in demand from year 5 to 10 decreases the net equity issuance by 1.2 to 2.1 percentage points. Repeating the calculation in standard deviation units, a one-standard-deviation increase in the demand growth 5 to 10 years ahead decreases net issuance by $.61 * 1.7 = 1.04$ percentage points, corresponding to .2 standard deviations, again a large effect.

Similarly to the findings for IPOs, therefore, the impact of demand shifts on the share of new equity listings depends on the horizon of the demand shifts. Demand shifts occurring in the near future increase the share of IPOs, consistent with capital budgeting. Unlike for the IPO results, this effect is significantly different from zero. Demand shifts occurring in the farther future, instead, significantly decrease the share of IPOs, consistent with market timing. In both cases, the effect is economically large.

Alternative Measure. In Columns 5 through 8 of Table 5 we replicate the results of Columns 1-4 of Table 6 for the alternative measure of net equity issuance based on Baker and Wurgler (2002) and defined as the change in book equity minus the change in retained earnings (scaled by lagged assets). We obtain similar results for the positive impact of near-term demographic shifts on net equity issuance. The impact of long-term demographic shifts on issuance is still negative, but not significant.

New Issues vs. Repurchases. The results on net equity issuance could be due to changes in the number of shares issued, or changes in the number of share repurchased. Since the net equity is the difference between the two, the results above cannot tell the two channels apart.

To do so, we introduce separate measures. As a measure of shares issued, we use the fraction of companies in an industry that in a given year issue on net new shares for at least 3 percent of their assets. This threshold, albeit arbitrary, allows us to eliminate equity issuances that are part of ordinary transactions, such as executive compensation. The mean of this variable is .107, with a standard deviation of .195. Similarly, as a measure of share repurchased, we use the fraction of companies in an industry that in a given year repurchase on net shares for at least 3 percent of their assets. The mean of this variable is .059, with a standard deviation of .147.

In Table 7 we present evidence on the two channels. In Columns 1-4 we replicate specification (2) for the measure of large share issues in the sample of Demographic Industries. We find clear evidence for both effects that we documented above: near-term demographic shifts increase share issuance, and long-term demographic shifts decrease share issuance. In Columns 5-8 we present the corresponding results for the measure of share repurchases. We find qualitatively consistent patterns—near-term demographic shifts diminish the repurchases and long-term demographic shifts increase the repurchases—but the effects are not significant in Columns 7 and 8. Overall, the effect on net equity is driven mostly by new equity issues, as opposed to repurchases.

3.5 Fama-MacBeth Regressions

In Table 8 we present the results of Fama-MacBeth regressions as an alternative estimation approach that controls for time-series patterns. We estimate separate cross-sectional regressions of (2) for each year t from 1974 until 2003, and then compute the time-series average of the estimated coefficients. Since the regression is estimated separately for each year, year effects that may be correlated with returns and with demographics do not contribute to the identification of the coefficients δ_0 and δ_1. The standard errors are based on the time-series variation of the OLS coefficients. We estimate the regressions for the sample of All Industries[7], with the benchmark measures of IPOs (Columns 1-4) and the benchmark measure of net equity issues (Columns 5-8) as the dependent variable.

[7]We use the sample of All Industries instead of the sample of Demographics Industries to avoid running cross-sectional regressions with 20 or fewer observations.

The results for the IPO measure are as follows. When we control for near-term demand growth only (Column 1) or we control for long-term demand growth only (Column 2), the results are qualitatively similar to the benchmark ones in Table 4 but are not significant. When we control for both measures at the same time (Column 3), as we do in Table 4, we obtain significant effects consistent with the evidence in Table 4. The results are not altered substantially if we introduce a control for market-to-book (Column 4). The difference between the estimates in Columns 1-2 versus 3-4 is not surprising. Since growth rate due to demographics in the short-term and in the long-term are positively correlated, failing to control for both biases leads one to estimate a combination of the two effects, one of which is positive, and one is negative.

The results for the net equity issuance measure show strong evidence of a positive response to growth rates that are contemporaneous or in the near future in all specifications. We also find a negative response to the long-term demographics (Column 7), but the result is not significant if we introduce a control for market-to-book (Column 8).

Overall, the results of the Fama-MacBeth procedure are largely consistent with the results in the panel regressions.

4 Conclusions

Are equity issuances better explained by capital budgeting or by market timing? In this paper, we attempted to provide an answer to this question by using separate, exogenous proxies for investment opportunities and for mispricing.

We rely on demographics and on the (predictable) demand shifts across industries generated by aging of different cohorts. We use short-term shifts in demand due to demographics to test capital budgeting. In the short-term, positive demand shifts should increase the demand for capital and lead to more equity issuance.

We use long-term shifts in demand due to demographics to provide evidence on market timing. Following the evidence in DellaVigna and Pollet (2005), we assume that information in the distant future embedded in demographics is not fully incorporated into asset prices. To the extent that managers have (somewhat) longer horizons than investors, they will respond to the mispricing by modifying their equity issuance decisions. Specifically, companies in industries with positive demand shifts 5 to 10 years ahead will tend to be undervalued, and the managers should reduce the equity issuance. Conversely, companies in industries with negative demand shifts 5 to 10 years ahead will tend to be overvalued, and managers should issue additional equity.

In general, capital budgeting predicts that demand shifts in the near future should be positively correlated with equity issuance, while market timing suggests that demand shifts in the further future should be negatively correlated with equity issuance.

Our empirical analysis suggests that both market timing and capital budgeting appear to play substantial roles in the decision to issue new or seasoned equity. We find that demand shifts due to demographics in the short-term are positively correlated with the occurrence of IPOs in an industry (though not significantly so), and with net equity issuance of public firms (significantly). Demand shifts due to demographics in the further future are significantly negatively related to the share of IPOs and to the net issuance of firms.

While the limited precision of our estimates does not allow us to establish whether one channel is more important than the other, we find evidence that both channels have economically large impacts.

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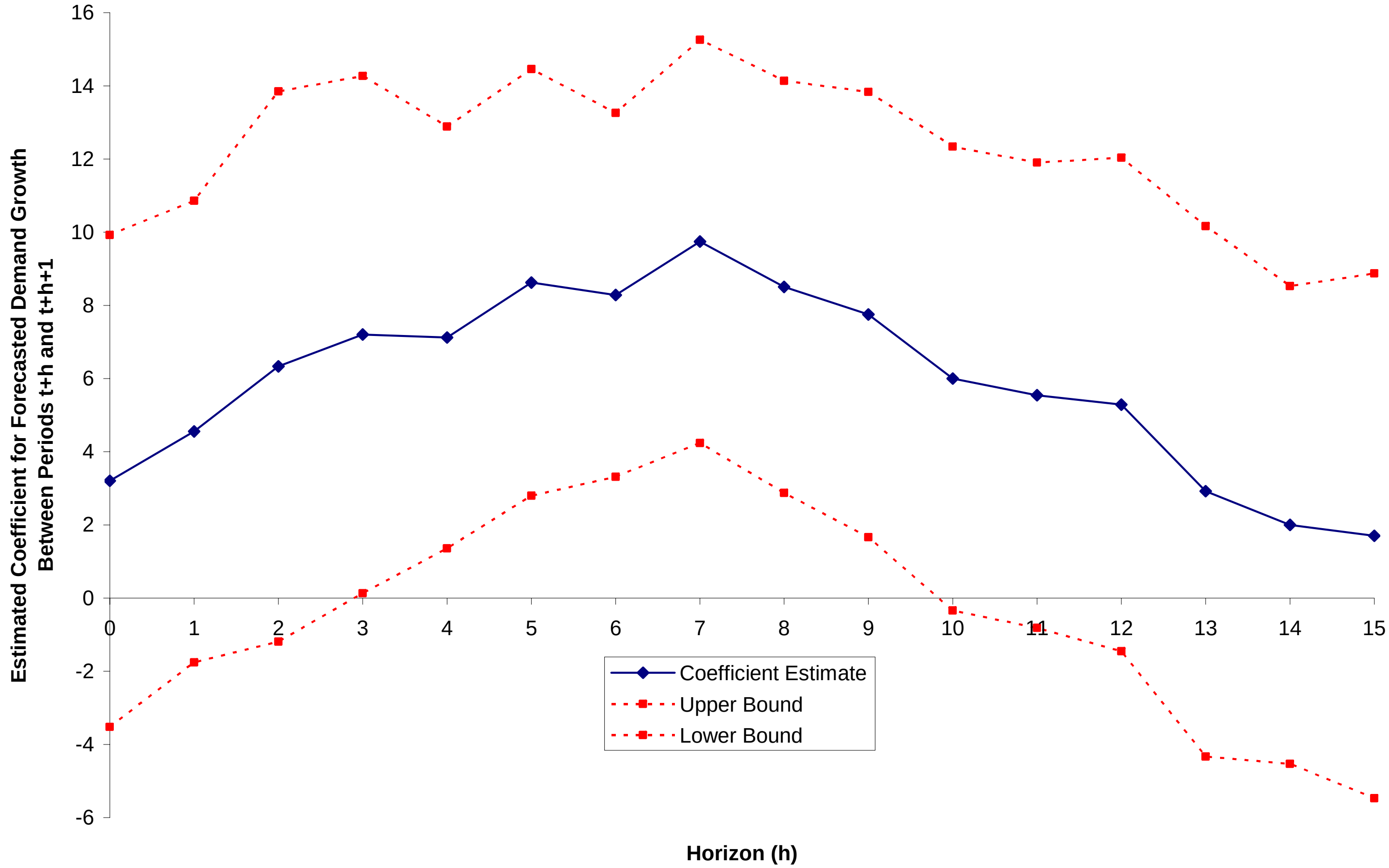
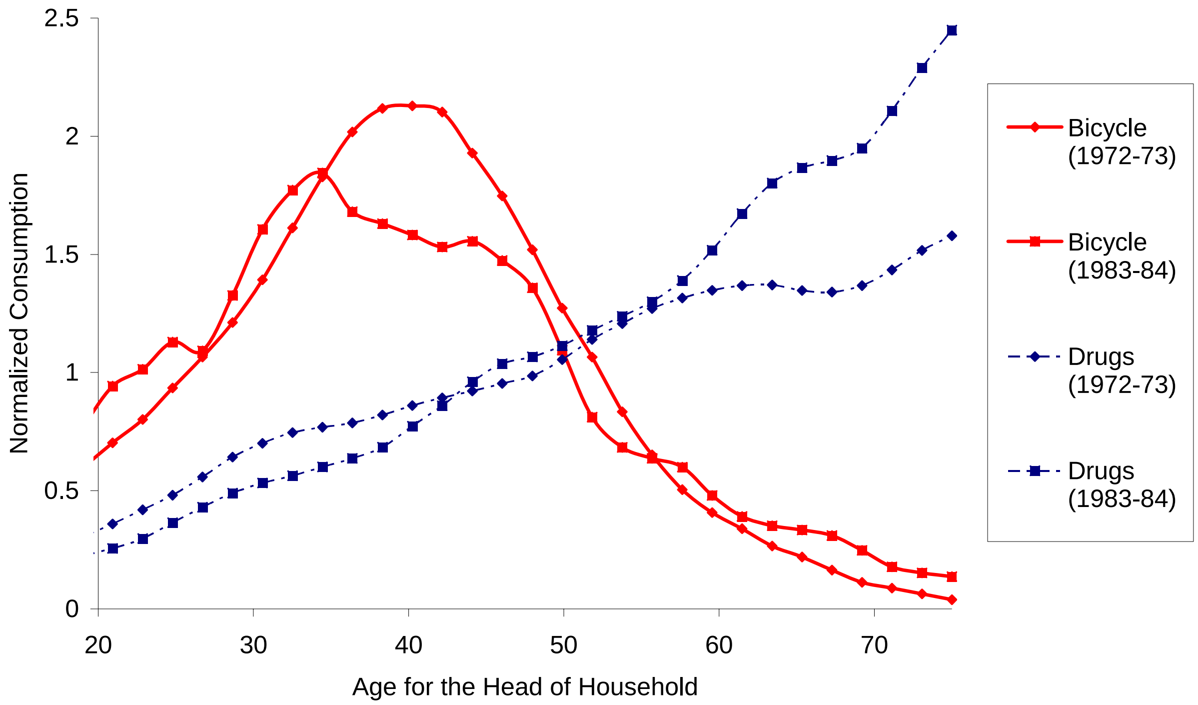
Figure 1: Return Predictability Coefficient for Demand Growth Forecasts at Different Horizons



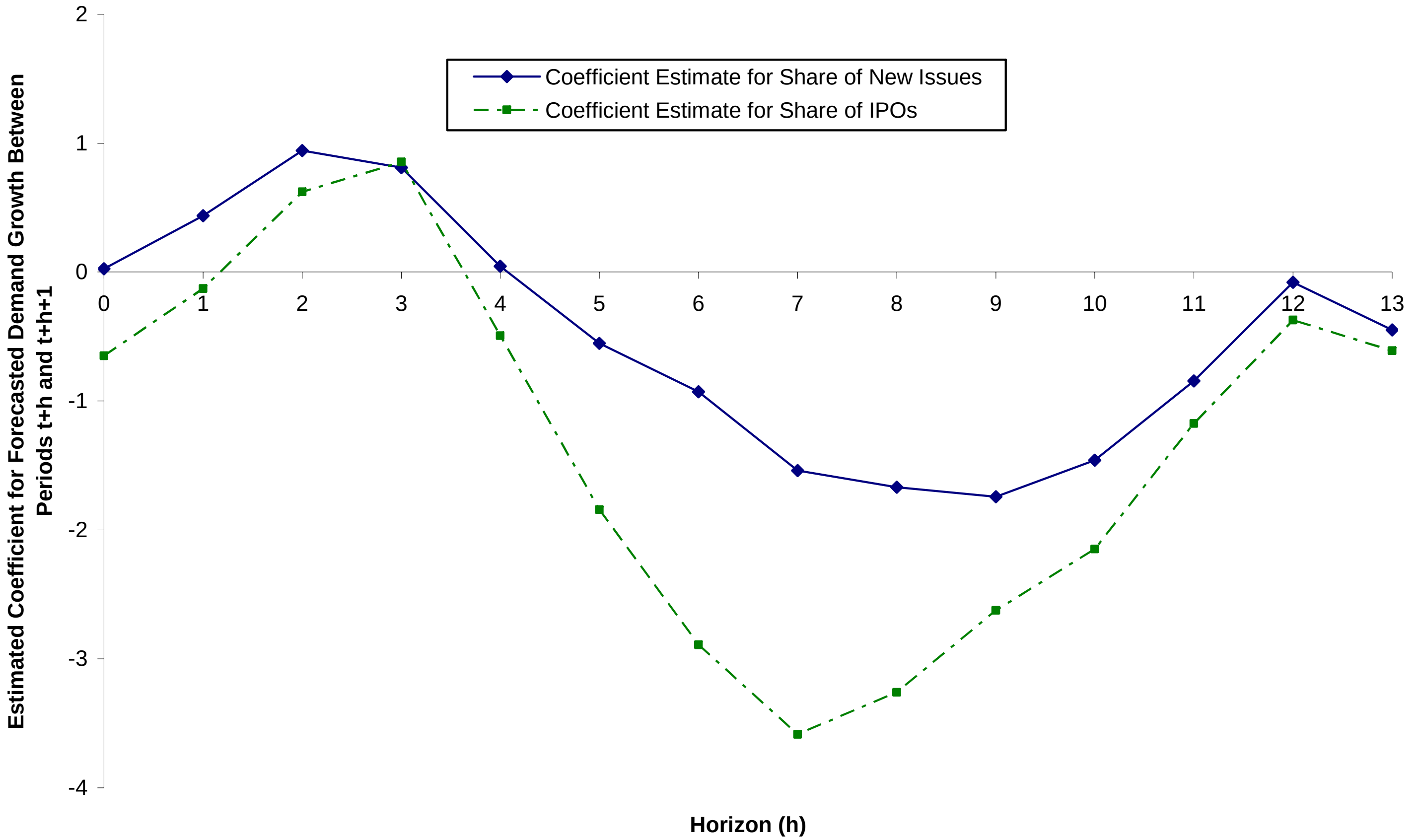
Notes: The estimated coefficient for each horizon is from a univariate OLS regression of abnormal returns at $t+1$ on forecasted consumption growth between $t+h$ and $t+h+1$ for the subsample of *Demographic Industries* over the period 1974-2003. The confidence intervals are constructed using robust standard errors clustered by year and then scaled by a function of the autocorrelation coefficient estimated from the sample orthogonality conditions..

Figure 2. Age Profile of Bicycle and Drugs Consumption



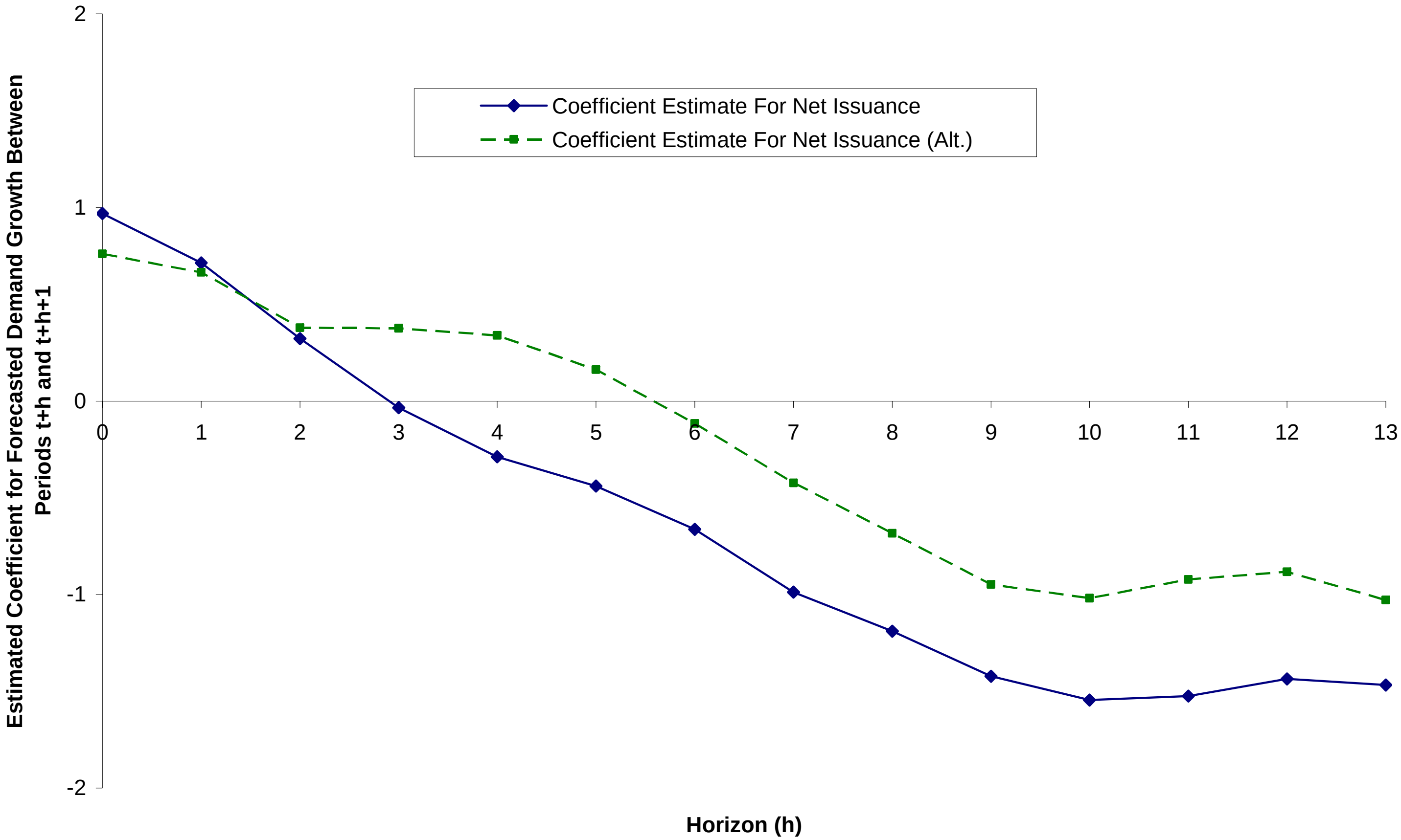
Notes: Figure 2 displays a kernel regressions of normalized household consumption for each good as a function of the age for the head of the household. The regression uses an Epanechnikov kernel and a bandwidth of 5 years. Each different line for a specific good uses an age-consumption profile from a different consumption survey. Expenditures are normalized so that the average consumption for all ages is equal to 1 for each survey-good pair.

Figure 3: Predictability of New Issues and IPOs as a Function of Demand Growth Forecasts at Different Horizons



Notes: The estimated coefficient for each horizon is from a univariate OLS regression of the IPO measure (the share of new issues or the IPO share) at t+1 on forecasted consumption growth between t+h and t+h+1 for the subsample of *Demographic Industries* over the period 1974-2003. The IPO measures are described in the text and in Table 2.

Figure 4: Predictability of Net Stock Issuance as a Function of Demand Growth Forecasts at Different Horizons



Notes: The estimated coefficient for each horizon is from a univariate OLS regression of the net stock issuance measure at t+1 on forecasted consumption growth between $t+h$ and $t+h+1$ for the subsample of *Demographic Industries* over the period 1974-2003. The net equity issuance measures are described in the text and in Table 4.

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		

Notes: Complete list of expenditure categories, with number of years of availability of data (Column 1) and average predicted five-year demand growth rate due to demographic changes in 1975 (Column 2), and in 2000 (Column 4). The last two Rows present the Mean and Standard Deviation of the 5-year predicted consumption growth across all the goods in the relevant year. Table 3 also indicates whether the industry belongs to the subsample of *Demographic Industries* in 1975 (Column 3), and in 2000 (Column 5). Each year the subset *Demographic Industries* includes the 20 industries with the highest standard deviation of forecasted annual consumption growth over the next 15 years. Column 6 presents percentage of the years 1974-2003 in which the expenditure category belongs to the subsample of "Demographic Industries".

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

Industry Category	Net Equity Issuance in the Industry (5) Mean	(6) Std. Dev.	(7) # Years	(8) # Firms	Net Equity Issuance in the Industry (Alternative Measure) (5) Mean	(6) Std. Dev.	(7) # Years	(8) # 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

Notes: The first measure of net equity issuance is the industry net stock issuance scaled by industry book value of assets for industry k and year t (Frank and Goyal, 2003). 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 net equity issuance is change in book equity minus the change in retained earnings (scaled by lagged assets) (Baker and Wurgler, 2002). Column 5 displays the mean of this measure. Columns 6 through 8 are parallel to Columns 2 through 4.

Table 4. Predictability of Industry Share Of New Equity Listings Using Demographic Changes

	Dependent Variable: Share of new public firms to existing public firms in an industry in year t+1							
Sample	**Demographic Industries**				**All Industries**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.0820	-0.0160	0.0067	0.0387	0.0952	-0.0076	0.0459	0.0818
	(0.0227)***	(0.0257)	(0.0382)	(0.0425)	(0.0211)***	(0.0211)	(0.0232)**	(0.0256)***
Forecasted annualized demand growth between *t* and *t+5*	2.9569	2.2326	2.5849	2.7147	2.8666	2.2067	2.3742	2.1533
	(1.9075)	(1.5501)	(1.5482)*	(1.5372)*	(1.9347)	(1.5207)	(1.5378)	(1.4661)
Forecasted annualized demand growth between *t+5* and *t+10*	-5.1730	-2.6035	-3.2178	-3.2722	-5.7383	-3.0647	-3.4732	-3.9936
	(1.6622)***	(1.5085)*	(1.5546)**	(1.5407)**	(1.6798)***	(1.5505)**	(1.5709)**	(1.6830)**
Industry market to book ratio		0.0013	0.0009	-0.0036		0.0121	0.0152	0.0173
		(0.0097)	(0.0145)	(0.0149)		(0.0087)	(0.0091)*	(0.0109)
Aggregate share of new listings		0.9671	0.9499			0.7749	0.7607	
		(0.1408)***	(0.1517)***			(0.0867)***	(0.0852)***	
Industry Fixed Effects			X	X			X	X
Year Fixed Effects				X				X
R^2	0.0403	0.1321	0.2352	0.2963	0.0369	0.1310	0.2238	0.2517
N	N = *558*	N = *558*	N = *558*	N = *558*	N = *1378*	N = *1378*	N = *1378*	N = *1378*

Notes: Columns 1 through 8 report the coefficients of OLS regressions of the industry share of new listings in CRSP 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 coefficient indicates the average increase in the industry share of new equity listings due to an annualized one percentage point increase in forecasted consumption due to demographics. Each year the subset *Demographic Industries* includes the 20 industries with the highest standard deviation of forecasted annual consumption growth over the next 15 years. Robust standard errors are clustered by year and then scaled by a function of the autocorrelation coefficient estimated from the sample orthogonality conditions. A thorough description of the standard errors is available in the text.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Predictability of IPOs and Alternative Net Issues on Demographic Changes

Dependent Variable	Industry Share of Initial Public Offerings				Industry Net Equity Issues (Alternative)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.0714	-0.0013	0.0206	0.0663	0.0071	-0.0267	-0.0320	-0.0281
	(0.0262)***	(0.0233)	(0.0262)	(0.0335)**	(0.0055)	(0.0134)**	(0.0153)**	(0.0138)**
Forecasted annualized demand growth between *t* and *t+5*	3.3769	2.3131	2.6861	3.0232	1.4381	1.5811	1.5091	0.9333
	(2.2370)	(1.8229)	(2.2068)	(2.2970)	(0.6548)**	(0.7060)**	(0.7627)**	(0.6665)
Forecasted annualized demand growth between *t+5* and *t+10*	-5.6065	-3.9124	-5.0758	-3.8779	-1.1014	-1.0641	-1.3832	-0.5760
	(2.2298)**	(1.9199)**	(2.1069)**	(1.9693)**	(0.7444)	(0.7828)	(0.7891)*	(0.7960)
Industry market to book ratio		-0.0024	-0.0074	-0.0170		0.0193	0.0212	0.0214
		(0.0084)	(0.0147)	(0.0149)		(0.0081)**	(0.0072)***	(0.0069)***
Aggregate net stock repurchases		1.2939	1.3045			0.9226	1.2289	
		(0.2540)***	(0.2297)***			(0.6743)	(0.7953)	
Industry Fixed Effects			X	X			X	X
Year Fixed Effects				X				X
R^2	0.0430	0.1409	0.2298	0.2953	0.0143	0.0528	0.1871	0.2487
N	N = *445*	N = *445*	N = *445*	N = *445*	N = *545*	N = *545*	N = *545*	N = *545*

Notes: Columns 1 through 4 report the coefficients of OLS regressions of the industry share of IPOs recorded by Jay Ritter 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 1 through 4 report the coefficients of OLS regressions of the industry change in book equity plus net of stock repurchases (scaled by industry book value of assets) 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). Each year the subset *Demographic Industries* includes the 20 industries with the highest standard deviation of forecasted annual consumption growth over the next 15 years. Robust standard errors are clustered by year and then scaled by a function of the autocorrelation coefficient estimated from the sample orthogonality conditions. A thorough description of the standard errors is available in the text.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Predictability of Industry Net Issuance Using Demographic Changes

	Dependent Variable: Annual industry net equity issues							
Sample	**Demographic Industries**				**All Industries**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-0.0003	-0.0193	-0.0380	-0.0303	-0.0027	0.0056	0.0120	0.0098
	(0.0052)	(0.0125)	(0.0102)***	(0.0109)***	(0.0053)	(0.0159)	(0.0163)	(0.0151)
Forecasted annualized demand growth between *t* and *t+5*	1.8167	1.7586	1.7910	1.3740	1.8212	1.4659	1.7263	1.6240
	(0.6351)***	(0.6620)***	(0.6626)***	(0.5825)**	(0.6833)***	(0.6926)**	(0.6839)**	(0.7102)**
Forecasted annualized demand growth between *t+5* and *t+10*	-1.5073	-1.5098	-2.1744	-1.2524	-1.6537	-1.7549	-2.1086	-1.4897
	(0.6917)**	(0.6987)**	(0.6854)**	(0.7194)*	(0.7505)**	(0.7480)**	(0.7083)***	(0.8009)*
Industry market to book ratio		0.0134	0.0162	0.0158		-0.0030	0.0033	0.0027
		(0.0081)*	(0.0057)***	(0.0059)***		(0.0095)	(0.0092)	(0.0107)
Aggregate net stock repurchases		1.7225	2.8948			1.5397	2.0029	
		(0.8698)**	(0.6312)***			(0.4404)***	(0.3923)***	
Industry Fixed Effects			X	X			X	X
Year Fixed Effects				X				X
R^2	0.0225	0.0457	0.2282	0.2685	0.0158	0.0327	0.1715	0.1849
N	N = *548*	N = *548*	N = *548*	N = *548*	N = *1357*	N = *1357*	N = *1357*	N = *1357*

Notes: Columns 1 through 8 report the coefficients of OLS regressions of the industry stock issues net of stock repurchases (scaled by industry book value of assets) 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 coefficient indicates the average increase in the industry net equity repurchases due to an annualized one percentage point increase in forecasted consumption due to demographics. Each year the subset *Demographic Industries* includes the 20 industries with the highest standard deviation of forecasted annual consumption growth over the next 15 years. Robust standard errors are clustered by year and then scaled by a function of the autocorrelation coefficient estimated from the sample orthogonality conditions. A thorough description of the standard errors is available in the text.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Predictability of Industry Net Issuance and Net Repurchases Using Demographic Changes

Dependent Variable	Share of Large Net Equity Issuers				Share of Large Net Equity Repurchasers			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.1289	-0.1626	-0.1243	-0.0294	0.0796	-0.0443	-0.0248	-0.0025
	(0.0285)***	(0.0606)***	(0.0503)**	(0.0389)	(0.0231)***	(0.0390)	(0.0294)	(0.0345)
Forecasted annualized demand growth between *t* and *t+5*	6.0919	6.5080	5.9016	4.5245	-3.7809	-2.2113	-1.5367	-1.0228
	(2.6212)**	(2.2215)***	(1.8776)***	(1.5890)***	(1.8539)**	(1.8803)	(1.6819)	(2.0085)
Forecasted annualized demand growth between *t+5* and *t+10*	-9.3736	-4.7890	-5.1331	-6.3250	2.6526	3.0856	3.3580	2.5976
	(2.3928)***	(2.5085)*	(1.9172)***	(1.8365)***	(1.5401)*	(1.5328)**	(2.1730)	(2.5951)
Industry market to book ratio		0.0631	0.0589	0.0825		0.0319	0.0220	0.0179
		(0.0267)**	(0.0275)**	(0.0290)***		(0.0170)*	(0.0118)*	(0.0128)
Aggregate net stock repurchases		1.0275	0.9986			1.1726	1.3497	
		(0.1273)***	(0.1328)***			(0.4917)**	(0.4829)***	
Industry Fixed Effects			X	X			X	X
Year Fixed Effects				X				X
R^2	0.0458	0.1783	0.3124	0.3636	0.0126	0.0617	0.1356	0.2100
N	N = *548*	N = *548*	N = *548*	N = *548*	N = *548*	N = *548*	N = *548*	N = *548*

Notes: Columns 1 through 4 report the coefficients of OLS regressions of the share of firms in an industry with stock sales minus stock repurchases divided by the lagged book value of assets that is greater than 3% 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 5 through 8 report the coefficients of OLS regressions of the share of firms in an industry with stock repurchases minus stock sales divided by the lagged book value of assets that is greater than 3% 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 demand 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 coefficient indicates the average increase in the industry net equity repurchases due to an annualized one percentage point increase in forecasted consumption due to demographics.

The subset Demographic Industries includes the 20 industries with the highest standard deviation of forecasted annual consumption growth over the next 15 years and this subset is used in all specifications. Robust standard errors are clustered by year and then scaled by a function of the autocorrelation coefficient estimated from the sample orthogonality conditions. A thorough description of the standard errors is available in the text.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Fama-MacBeth Regressions of New Listings and Net Issuance on Demographic Changes

Dependent Variable	Industry Share of New Listings				Industry Net Equity Issuance			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.0409	0.0841	0.0470	0.0336	-0.0109	0.0043	-0.0107	-0.0009
	0.01555)***	(0.0143)***	(0.0161)***	(0.0176)*	(0.0047)**	(0.0043)	(0.0049)**	(0.0068)
Forecasted annualized demand growth between *t* and *t+5*	1.6093		3.9447	2.4412	1.0489		1.9899	1.4248
	(1.2238)		(1.7896)**	(1.4172)**	(0.4056)***		(0.6145)***	(0.5675)**
Forecasted annualized demand growth between *t+5* and *t+10*		-1.7285	-3.4310	-2.7885		-0.1232	-1.1728	-0.7115
		(0.9047)*	(1.3306)***	(1.2044)**		(0.3794)	(0.5506)**	(0.5553)
Industry market to book ratio				0.0210				-0.0037
				(0.0077)***				(0.0046)
N	*N* = 30	*N* = 30	*N* = 30	*N* = 30	*N* = 30	*N* = 30	*N* = 30	*N* = 30

Notes: Columns 1 through 4 report the time series averages of the OLS coefficients from 30 cross-sectional regressions of the industry share of new listings 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 from 1974 until 2003. Columns 5 through 8 report the time series averages of the OLS coefficients from 30 cross-sectional regressions of the industry stock sales net of stock repurchases (scaled by industry lagged book value of assets) 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 from 1974 until 2003. The demand forecasts are made using information available as of year t-1. All industries are included in each of the cross-sectional regressions. The coefficients on the forecasted annual demand growth are normalized by the number of years of the forecast (5 for both coefficients). Standard errors are based on the time-series variation of the regression coefficients using OLS standard errors.

* significant at 10%; ** significant at 5%; *** significant at 1%