Short-Term Investors, Long-Term Investments, and Firm Value*

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Abstract

This paper shows that an inflow of short-term institutional investors predicts an increase in the likelihood that firms cut R&D investment to report higher earnings and to generate positive earnings surprises, and it also predicts a temporary boost in firm valuations. When short-term investors subsequently leave, the reductions in R&D, higher earnings, and the increase in firm valuations are reversed. Our identification strategy exploits plausibly exogenous variation in the presence of short-term investors around Russell 2000 index inclusions, which are associated with a sharp temporary inflow of short-term investors and a permanent increase in institutional ownership and analyst coverage.

Keywords: Short-term Institutions; Long-term Investments; Analyst Recommendations

JEL Classification: G31; G14; M40

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1. Introduction

A large literature in economics and finance considers the effects of short-horizon investors on corporate policies.[1] Survey evidence by Graham, Harvey, and Rajgopal (2005) suggests that many executives are willing to take short-term actions that are detrimental to long-term firm value, such as cutting long-term investment, possibly in response to short-term pressures by investors. Beyer, Larcker, and Tian (2014) conclude from another survey that long-term shareholders better allow firms to "make long-term investments without the distraction and short-term performance pressures that come from active traders." Similarly, Nobel laureate Edmund S. Phelps (2010, p. 17) is concerned about the effects of short-horizon investors for long-term economic development, arguing that in "…established businesses, short-termism has become rampant." These concerns are mirrored in the popular press that regularly stresses the negative effects of short-term investors (e.g., The Economist, 2012).

Our empirical analysis is motivated by the theory model in Bolton, Scheinkman, and Xiong (2006), which predicts that short-horizon investors pressure executives to cut investment to generate positive earnings surprises, which subsequently lead to temporary boosts in the stock price.[2] Short-horizon investors may benefit from temporarily inflated valuations as their short horizons imply that they generally exit the firm shortly afterwards. As a result, only long-term shareholders eventually suffer from the reduction in investment, which the theory argues is only gradually reflected in equity valuations due to limited arbitrage (caused by differences of opinion and short-sales constraints). Our empirical analyses directly test the model's predictions regarding all three outcome variables, namely how changes in the presence of short-term investors

[1] See Froot, Perold, and Stein (1992), Shleifer and Vishny (1990), Stein (1988, 1989), or Cella, Ellul, and Giannetti (2013).

[2] Bolton, Scheinkman, and Xiong (2006) argue that executives, incentivized by short-horizon investors through short-term pay, take actions that increase the short-term speculative component in the stock price, at the expense of long-term firm value. In their model, such actions do not necessarily need to be cuts to investment as long as they lead to temporarily inflated stock prices. Nevertheless, they provide R&D cuts and earnings manipulation as specific examples of such activity.

are related to changes in long-term investments, short-term earnings and earnings surprises, as well as any reversals in firm valuations.[3]

Our main empirical proxy for the presence of short-term investors is a measure of the stock-holding duration of institutional investors. This measure, called stock duration, is calculated as the weighted-average length of time that institutional investors have held a stock in their portfolios (Cremers and Pareek, 2015). An advantage of this measure is that it allows any given institutional investor to be short-term in some stocks and long-term in others. This matters if decisions within institutions are made by different portfolio managers with heterogeneous horizons, which seems likely for the aggregated 13F holdings reports that we use. A limitation of stock duration is that it only incorporates information from quarterly holdings reports, and it does not measure the general holding periods of institutions. However, we replicate our results using two other measures, share turnover and ownership by transient institutions that mitigate these limitations. Share turnover has the advantage that it incorporates trading by all shareholders, but the disadvantage that much of its recent variation comes from high-frequency traders (rather than the short-term traders that we aim to capture). Ownership by transient investors (Bushee, 1998) has the advantage that it potentially better captures the typical intention of new stock positions than an institution's current holding period in a stock.

A challenge to any analysis of the effects of investor horizons on corporate polices or firm valuations is that investor horizons are generally endogenous and may depend on a firm's investment opportunities or information environment. We address this challenge by employing an identification strategy that exploits plausibly exogenous variation in the presence of short-term investors. Specifically, we instrument our proxies for the presence of short-term investors using Russell 2000 index additions, which are events that neither directly affect future firm growth opportunities nor provide new information to the market (as such reconstitutions are predictable). Russell 2000 index membership is based on a simple firm-size rule such that

[3] Other models of short-termism, such as Stein (1989) or Von Thadden (1995), can also explain why managers cut investment to manipulate earnings. However, these models are less specific about the effects of earnings manipulations on misvaluation, and managerial short-termism arises in these models against the wishes of shareholders.

firms ranked between number 1,000 and 3,000 by market cap at the end of May are included in the index. We focus on the Russell 2000 as the price impact of its reconstitutions has been shown to be particularly significant (e.g., Petajisto, 2011; Cremers, Petajisto, and Zitzewitz, 2013). Our identification strategy is similar to Schmidt and Fahlenbrach (2017) and Fich, Harford, and Tran (2015) who use Russell 2000 inclusions and exclusion to instrument for passive institutional investor ownership and the presence of monitoring institutions, respectively. As in their work, our approach does not use Russell 2000 membership as the instrument (as in Appel, Gormely, and Keim, 2016 or Crane, Michenaud, and Weston, 2016), but the event where a firm gets added to the index.

Russell 2000 inclusions provide a relevant instrument for temporary changes in the presence of short-term investors, and for longer-term changes in a stock's market environment. Specifically, we document that the presence of short-term investors increases sharply—but only temporarily—for stocks newly added to the Russell 2000 'from below.'[4] These are stocks that were previously outside the Russell 3000 and whose recent, relative increase in market capitalization newly puts them into the Russell 2000. This increase in short-term investors is temporary and reverses over the subsequent three years as more passive investors replace these short-term investors. Russell 2000 inclusions are further accompanied by large and permanent increases in institutional ownership and analyst coverage, which previous literature has shown increases liquidity, eases short-sales constraints, and improves market efficiency (e.g., Chang, Hong, and Liskovich, 2015; Biktimirov, Cowan, and Jordan,2004). A potential concern to our approach is that index additions reduce stock duration, but this reduction may reflect the new arrival of (inherently) long-term investors (e.g., index trackers). We mitigate this concern by showing that our results are robust to controlling for ownership by long-term institutional investors, and by using the two alternative proxies of share turnover and transient ownership.

[4] Our results are robust when also using inclusions from 'above'. Inclusions from below are more than five times as frequent, and trigger larger reductions and stronger reversals in stock duration. We do not look at index exclusions as these are often due to events such as bankruptcies or M&A (e.g., Shleifer, 1986 or Harris and Gurel, 1986).

We first study whether firms spend less on R&D and report higher earnings in the presence of short-term investors. We focus on R&D expenses as these are investments whose benefits are likely manifested only in the long-run, while their expenditures depress current earnings.[5] Cutting R&D can boost a firm's stock price in the short term, if investors naïvely use earnings-based multiples to derive their estimate of firm value or misinterpret the positive earnings surprises that result from R&D cuts.[6] We study changes—rather than levels—in R&D and earnings, which takes out any systematic differences in the level of R&D or earnings across firms (these differences may attract certain investors to buy shares).

We document that firms are more likely to cut R&D, report higher earnings, and generate positive earnings surprises in the presence of short-term investors. The magnitudes of the estimated effects are economically meaningful. For example, a standard-deviation decrease in stock duration (0.69 years) is associated with a reduction in R&D expenditures of 0.28%, which corresponds to 7% of the standard deviation of the change in R&D (which equals 0.039). Furthermore, the increased presence of short-term investors tends to be temporary and reverses after a few years. Consistent with this pattern, R&D expenses and earnings also reverse when the inflow of short-term investors reverses, confirming that the effects from temporary increases in short-term investors are transitory.

We then show that these changes in the presence of short-term investors are related to equity valuations. As the presence of short-term investors in firms increases, their market valuations rise relative to fundamentals—but again only temporarily. Contemporaneously, a standard-deviation decrease in stock duration is associated with an increase in the equity market-to-book ratio of 13%. More importantly, this large valuation increase is followed by a predictable decline in the equity market-to-book ratio. A standard-deviation decrease in stock duration this year is associated with a decrease in next year's market-to-book ratio of 8.6%,

[5] As R&D projects can take years to complete and their longer-term outcomes are highly uncertain in the short-term, the benefits from R&D expenditures may occur only several years into the future and beyond the horizon of short-term investors. R&D is particularly susceptible to myopia because managers generally have broad leeway to reduce or postpone R&D projects to boost current earnings.

[6] There is evidence that the stock market is unable to properly value R&D investments (e.g., Cohen, Diether, and Malloy, 2013), implying that the consequences of investment cuts may not be fully understood by the market.

which then reverses back to its initial level over the subsequent year. This predictable reversal suggests that the previous valuation increase reflects overvaluation. We document all our results both in OLS regressions and in the 2SLS framework that uses Russell 2000 additions as our instrument; this supports a causal interpretation of our results. We corroborate the validity of our identification strategy by using a placebo test with firms that had a market cap rank between 2,900 and 3,100, but were eventually not added to the index.

Finally, we investigate the central assumption in Bolton, Scheinkman, and Xiong (2006) that price deviations from fundamentals are caused by market frictions such as differences of opinion or short-sales constraints. This assumption implies that temporary deviations in stock prices due to the in- and out-flow of short-term investors are stronger for stocks where information and trading frictions are more pronounced. We find empirical support for this prediction, showing that our misvaluation results only occur among firms that are initially followed by only few analysts (indicating a weaker information environment). Additionally, our results are stronger among stocks with larger disagreement among analysts. These findings corroborate that the short-term boost in stock prices is due to investors not fully incorporating the effects of investment cuts, and they highlight the importance of disagreement for the collective price impact of short-term trading.

Our paper contributes to a growing empirical literature that links corporate policies to either investor or managerial horizons. Consistent with our evidence, Bushee (1998) shows that large ownership by transient investors is associated with cuts to R&D spending. We complement Bushee (1998) by studying the effects of short-term investors on R&D as well as earnings and misvaluations, thereby testing the model predictions of Bolton, Scheinkman, and Xiong (2006), and by using index inclusions for identification. Derrien, Kecskes, and Thesmar (2015) find that when firms have lower value than predicted by fundamentals, greater long-term ownership is associated with more investment, more equity financing, and less payouts to shareholders. Harford, Kecskes, and Mansi (2017) measure investor horizon using fund turnover and find that firms with more long-term shareholders exhibit less fraud and empire building. Similarly, firms with more short-term investors do worse in takeovers as targets or acquirers (Gaspar, Massa, and Matos, 2005; Chen, Harford, and

Li, 2007). Ladika and Sautner (2017) show that a decrease in managerial horizon caused by accelerated option vesting leads to reductions in investment. Similarly, Edmans, Fang, and Lewellen (2017) document that imminent vesting of equity incentives is associated with lower investment spending.

2. Data

2.1 Data and Summary Statistics

We use institutional investor holdings data from the Thomson Financial CDA/Spectrum database of SEC 13F filings to identify short-term investors. All institutional investors with more than $100 million of securities under management are required to report their holdings to the SEC on form 13F. Holdings are reported quarterly and all common stock positions greater than 10,000 shares or $200,000 must be disclosed. Stock return data is obtained from CRSP and accounting data is from COMPUSTAT. Our analysis focuses on U.S. common stocks from 1985 to 2011. We use 13F data from 1980 onwards as we require at least five years of holdings data to calculate holding durations. We eliminate stocks with prices below $1. Further, we require stocks to be present in CRSP for at least two years before they are included in the sample. To eliminate sample bias, we require institutional investors to be present for two years before being included in the sample. We do this as new institutions have short past holding durations for stocks in their portfolios by construction. Table 1, Panel A provides summary statistics for our sample.

2.2 Measuring the Presence of Short-Term Investors

We use three proxies to measure the presence of short-term institutional investors. Our main proxy is the weighted-average length of time that institutional investors have held a stock in their portfolios ('Stock Duration'). The measure is calculated in two steps. First, we calculate for how long a stock has been included in an institutional portfolio at a given point in time, which is calculated at the stock-institution level as:

$$Duration_{i,j,T-1} = d_{i,j,T-1} = \sum_{t=T-W}^{T-1} \left(\frac{(T-t-1)\alpha_{i,j,t}}{H_{i,j} + B_{i,j}} \right) + \frac{(W-1)H_{i,j}}{H_{i,j} + B_{i,j}}$$

where

$B_{i,j}$ = percentage of shares of stock *i* bought by institution *j* between *t = T-W* and *t = T-1* (*t, T* are in quarters).

$H_{i,j}$ = percentage of shares outstanding of stock *i* held by institution *j* at time *t = T-W*.

$\alpha_{i,j,t}$ = percentage of shares outstanding of stock *i* bought or sold by institution *j* between time *t-1* and *t*, where $\alpha_{i,j,t} > 0$ for buys and < 0 for sells.

W = 20 quarters as very few stocks are held continuously for longer than five years.

Second, we compute Stock Duration at the stock level by averaging $Duration_{i,j,T-1}$ across all institutions currently holding the stock, using as weights each institution's holdings in the stock. Our measure takes into account tax selling and other temporary adjustments in portfolios because intermediate sells are cancelled by immediate buybacks, with only a small effect on the duration of current holdings. The limitation of our measure is that any round-trip trades within a quarter are ignored, as we only observe institutional holdings at the end of each quarter.

We employ two alternative measures to capture the presence of short-term investors. The first measure is the number of a firm's shares traded throughout the year, divided by the number of shares outstanding ('Share Turnover'). The second measure is ownership by transient investors ('Transient Investors'), introduced by Bushee (1998, 2001). Bushee classifies institutional investors into three groups: 'transient' institutions with high portfolio turnover and diversified portfolios; 'dedicated' institutions with low turnover and more concentrated portfolios; and 'quasi-indexer' institutions with low turnover and diversified portfolios. Using data from Brian Bushee's website, we measure a firm's ownership by transient institutions.

Table 1, Panel A shows that Stock Duration has a mean of 1.3 years in our sample.[7] Annual share turnover averages 1.26, and transient institutional investors own on average about 9.5% of shares outstanding.

[7] Stock Duration of a given firm over time is fairly instable and mean reverting, as suggested by a negative autocorrelation of -31% (not reported).

Appendix Table A-2 documents that the correlation between Stock Duration and Share Turnover equals -36%, while the one between Stock Duration and Transient Investors is -24%. These figures suggest that both alternative measures are related to, but also clearly distinct from, Stock Duration. The reason is that Stock Duration is measured at the institution-stock level, while Share Turnover is measured at the stock level, and Transient Investors at the institution level (before being aggregated across all institutions holding a stock). In other words, Transient Investors does not allow for heterogeneity in investment horizons across different stocks in a given institutional portfolio. In contrast, Stock Duration allows the same institution to be short-term for some but long-term for other stocks. Given that we only observe institutional portfolios at an aggregate level, with many portfolio managers within large institutions potentially having different investment horizons, this is a useful distinction. Transient Investors, however, has the advantage that it potentially better captures the typical intention of new stock positions than an institution's past holding period in a stock.

Stock Duration is different from Share Turnover because turnover does not incorporate which fraction of assets is turned over, while Stock Duration weighs the trading by the size of the assets affected by the trading. The advantage of Share Turnover is that it covers all trading in the stock, while Stock Duration only considers institutional stockholdings. However, this advantage has become less clear for the second part of our sample. First, the limitation to institutional stockholders has become less of a restriction over time as institutions have increased their equity ownership (see Figure 1). Second, Share Turnover has recently become dominated by high frequency traders, whose trading occurs at a substantially higher frequency than the valuation changes studied in our paper.

2.3 Russell 2000 Inclusions and Short-Term Investors

Investor horizon (or trading frequency) is an endogenous outcome variable, driven by firm fundamentals, investor characteristics or the market environment, which makes it challenging to estimate its causal effect on corporate policies or firm valuation. In particular, some unobservable variables (e.g., information or news) may affect investment decisions or firm valuation, and—at the same time—the decision

by short-term investors to invest in certain firms. To mitigate the concern that our results are affected by such endogeneity, we consider changes in the presence of short-term investors that occur for reasons that are arguably unrelated to those unobservables that may also drive corporate policies and firm valuation.

In particular, we exploit Russell 2000 inclusions 'from below', which are events where firms are newly added to the Russell 2000 index because their market cap rank has increased over the past year. These events neither affect firm fundamentals nor provide new information to the market as membership in the index is predictable. The reason for this predictability is that index membership is based on a simple firm-size rule such that firms ranked between number 1,000 and 3,000 by market cap at the end of May are included in the index. We exploit that Russell 2000 additions are accompanied with significant buying and selling by investors that track the index, causing an increase in the presence of short-term investors. Our identifying assumption is that variation in Stock Duration (and our alternative proxies) is driven by the index inclusions themselves, rather than by differences in firm policies or valuations. In particular, we assume that it is largely random whether stocks are just above or below the inclusion cutoffs (Chang, Hong, and Liskovich, 2015). As typical in the literature, we do not look at index *exclusions*, which are often due to information-related events (e.g., Shleifer, 1986; Harris and Gurel, 1986).

Appendix Table A-3 shows that our identification strategy should have sufficient power, as there are about 300 index inclusions 'from below' per year. This is different for index inclusion 'from above' (additions of firms previously in the Russell 1000, but whose market cap rank declined), which occur with a frequency of only about 50 stocks per year.

The use of index inclusions 'from below' is further motivated by Figure 2, which plots changes in our proxies for the presence of short-term investors as well as institutional ownership and analyst coverage in three-year windows around Russell 2000 inclusions from below (left charts) or above (right charts). Panel A shows that Stock Duration sharply decreases when a firm is newly added to the index from below. Specifically, holding durations decrease from about 1.25 years (two years before index inclusion) to only slightly above one

year (in the inclusion year), corresponding to a reduction by almost 30%. The figure also illustrates that the drop in investor horizon is mean-reverting after the index inclusion, implying that short-term investors gradually exit firms that have been in the index for about two years. Neither the drastic reduction in Stock Duration around the index inclusion, nor its strong subsequent reversal, are present for stocks added from above.

Newly added firms further experience an increase in Institutional Ownership (Panel B), Share Turnover (Panel C), and Transient Investors (Panel D) when added to the Russell 2000 from below. Finally, Panel E shows that the information environment of firms added to the Russell 2000 from below changes, as such firms see a sharp increase of almost 50% in analyst coverage (from four to six analysts over two years). This is different for firms added to the index from above; such firms experience a relatively small drop in analysts only. While our main results are identified from Russell 2000 additions from below, we verify that results are robust once we also include additions from above.

A concern to using Russell 2000 inclusions is that such index additions may reduce Stock Duration, but this reduction could be due to the arrival of many (inherently) long-term investors. We mitigate this concern by showing in Appendix A-7 that results are robust to holding constant ownership by short-term (long-term) institutional investors, and by reporting results for alternative proxies for the presence of short-term investors.

Table 2 establishes that index inclusions are a relevant instrument for holding durations (we discuss potential violations of the exclusion restriction below). We regress Stock Duration on R2000 Inclusion, which is a dummy that equals 1 if a firm is newly added to the index from below in a particular year. While the regressions in Column (1) and (2) only include this dummy variable, those in Column (3) and (4) additionally control for firm characteristics that may be additional drivers of holding durations. As index inclusion is determined by a firm's market cap, we control in the first and second stage for a firm's market cap rank (we present below placebo tests to ensure that our 2SLS results are not driven by size effects).

Table 2 shows across all specifications that holding durations decrease sharply once a firm is added to the Russell 2000. In economic terms, we find in Column (4) that Stock Duration decreases by around 0.2 years (or about 30% of the variable's standard deviation) in the year of index inclusion. This effect is highly statistically significant, and robust to controlling for the ownership by institutional investors and firm characteristics. (Appendix Table A-4 shows that our results are robust when using inclusions from both below and above.) In terms of instrument strength, all *F*-Statistics on our instrument are substantially above the threshold of 10 that is commonly used to evaluate instrument strength (Staiger and Stock, 1997). We use the fitted values of Stock Duration from Column (3) (Column (4)) of Table 2 for our 2SLS methodology in settings with year-fixed effects (firm-fixed effects). Instrumented Stock Duration has a standard deviation of 0.22 in both specifications and we use this value to calculate the economic magnitude of effects estimated in the second-stage regressions below.

Table 8 reports in Column (1) first-stage regressions for our two alternative measures of investor horizon. These regressions show that index inclusions have similarly strong effects on Share Turnover and Transient Investors; both measures increase significantly as a result. Taken together, these analyses suggest large and largely exogenous changes in the presence of short-term investors around index inclusions.

3. Main Results

3.1 Short-term Investors and R&D Expenditures

We first study whether firms with more short-term investors reduce long-term investment, which we proxy using R&D expenditures. We focus on R&D as these are discretionary long-term investments that contemporaneously depress earnings. Reducing R&D can therefore immediately lead to higher current earnings, which can boost the stock price in the short term if information asymmetry exists and investors or analysts use income-based multiples that translate higher earnings into higher equity valuations. This assumption is plausible as there is evidence that stock markets are unable to properly value R&D investments

(Cohen, Diether, and Malloy, 2013). This implies that markets may not fully incorporate the consequences of investment cuts. In addition, R&D expenditures typically yield benefits only many years into the future and beyond the horizon of short-term investors. Therefore, the model by Bolton, Scheinkman, and Xiong (2006) implies that short-term investors may pressure executives to reducing R&D to surprise the market with higher earnings, and markets may not be able to immediately determine that such R&D reductions are detrimental to long-term firm value.

Table 3 formally examines whether firms spend less on R&D in the presence of short-term investors. The regressions in Column (1) to (2) are OLS regressions, while those in Columns (3) to (4) are 2SLS regressions using Russell 2000 inclusion as the instrument for holding durations. Our dependent variable is the *change* in R&D from the last year [t-1] to the current year [t]. We study changes in R&D as our prediction is that the presence of short-term investors is associated with investment cuts. Looking at changes further prevents us from capturing any systematic differences in R&D levels across firms, which may attract certain investors. Our regressions include current and past values of Stock Duration, to capture any potential reversals in investment. We control for firm characteristics that are likely drivers of investment decisions.

The OLS regressions show in Column (1) that firms reduce R&D investment in the presence of short-term investors, as reflected in the statistically significant and positive coefficient on Stock Duration. Importantly, Column (2) shows that the reduction in R&D associated with short-term investors reverses in the next year, suggesting that firms only temporarily cut investment and subsequently increase it again. The estimated magnitudes are meaningful. Column (2) suggest that a standard-deviation decrease in Stock Duration (0.69 years) is associated with a decrease in Δ R&D/Assets of (0.004*0.69=) 0.28%, which equals 7% of the variable's standard deviation (coefficients reported in the table are multiplied by 100). This decrease is followed by an increase in Δ R&D/Assets that is economically almost identical to the previous decrease.

To address the possibility that our results are driven by unobserved variables, we next estimate in Columns (3) and (4) 2SLS regressions that use Russell 2000 inclusion events to instrument for changes in Stock

Duration. The regressions show that we continue to find that the presence of short-term investors causes reductions in R&D. The 2SLS coefficient in Column (4) suggests that a standard-deviation decrease in instrumented Stock Duration is associated with a reduction in Δ R&D/Assets of (0.028*0.22=) 0.62% or 16% of the variable's sample standard deviation. As in the OLS estimates, this reduction in R&D is followed by an increase in R&D that is economically almost identical to the decrease in the period before.

The estimated economic magnitude for the 2SLS procedure is larger than that in the corresponding OLS models. The reason is that our 2SLS method identifies the Local Average Treatment Effect ('LATE'), which is the effect of changes to Stock Duration for the subset of 'marginal' firms that were added to the Russell 2000 and saw a particularly large shock to investor horizon.[8] In contrast, the OLS estimator captures the association of shortening investor horizons among the average sample firm (see Angrist and Pischke, 2009).

As a robustness check, we provide in Appendix Table A-5 results of OLS regressions for two subsamples: firm-years with and without Russell 2000 inclusions. This approach is useful as it combines the easy-to-interpret OLS approach with the benefits of the stronger identification from Russell inclusions. As expected, Columns (1) and (2) show that the OLS results in Table 3 are concentrated among firm-years where index inclusions take place; both the contemporaneous positive and the predictive negative relation between Stock Duration and R&D are several magnitudes larger in firm-years with index inclusions. This further corroborates that the negative association between R&D and Stock Duration likely reflects a causal effect that stems from the arrival of short-term investors.[9]

3.2 Short-term Investors, Earnings, and Earnings Surprises

[8] The 2SLS strategy estimates the LATE if the treatment effect is heterogeneous across sample firms. This may be the case if firms newly added to the Russell 2000 have stronger incentives to react to pressures of new investors.

[9] We discuss results for our alternative proxies for investor horizons below. As a further robustness check, Appendix Table A-6 shows that our results are robust to controlling for Fund Turnover and Fund Duration. 'Fund Turnover' is the weighted average turnover of the institutional investors that are holding a given stock, calculated using changes in quarterly holdings over the past four quarters (e.g., Gaspar, Massa, and Matos, 2005; Gaspar et al., 2013). 'Fund Duration' measures how long the institutions holding a stock have currently held U.S. equities in their portfolios. As shown in Appendix Figure 2, both of these fund-level variables show substantially less variation around Russell inclusions and are therefore less suited for our identification strategy.

In the theoretical model of Bolton, Scheinkman, and Xiong (2006), short-term investors pressure managers to cut investment with the objective to report higher current earnings. These temporarily inflated earnings are misinterpreted by some investors, leading to temporary boosts in the stock price. Short-term investors can benefit from temporarily inflated valuations, if they exit the firm shortly afterwards. Thus, linking the presence of short-term investors to reported earnings (and valuations) is an important element in testing the economic mechanism in Bolton, Scheinkman, and Xiong (2006).

Table 4 provides regressions of changes in earnings (net income) as well as earnings surprises on Stock Duration. Earnings surprises are measured using a dummy variable that equals one if reported earnings per share are above the analyst consensus forecast. We again report OLS and 2SLS regressions. Consistent with the previously documented reduction in R&D spending, we find that earnings temporarily increase in the presence of short-term investors. These results hold independently of whether we use OLS models in Columns (1) and (2) or the 2SLS estimator in Columns (5) and (6). The results also closely mirror the reversal in R&D expenses, as earnings increase only temporarily and then decrease again in the subsequent year.

In terms of economic magnitudes, Column (1) indicates that a standard-deviation decrease in Stock Duration is associated with an increase in Δ Earnings/Assets of (0.015*0.69=) 1%, which equals 6% of its sample standard deviation.[10] This decrease is followed by a reduction in earnings in the year immediately thereafter which is almost identical to the increase in the period before. The 2SLS estimates are again larger, as they capture the local effect for firms newly added to the Russell 2000. Column (6), for example, shows that such firms saw an increase in the Δ Earnings/Assets by (0.145*0.22=) 3.2% or 16% of the variable's standard deviation, and a decrease in the change in earnings next year of similar magnitude.

[10] As we did for R&D expenditures, we provide for robustness in Appendix Table A-5, Columns (3) and (4) OLS regressions for firm-years with and without Russell 2000 inclusions. Again, we find that the OLS results are concentrated among firm-years where an index inclusion takes places. Appendix Table A-6 shows that our results are again also robust to controlling for Fund Turnover or Fund Duration.

The regressions in Columns (3) to (4) and (7) to (8) show that these changes in earnings have an effect on earnings surprises, as we find that firms are much more likely to beat the forecasts of financial analysts after the arrival of short-term investors. This is consistent with short-term investors triggering managers to engage in myopic actions to avoid that earnings fall short of analysts' expectations, or to even exceed their expectations. Our results again hold both for OLS and 2SLS regressions. Moreover, we continue to find a reversal in the effects of Stock Duration for the earnings-surprise variable. The 2SLS estimates in Column (7) indicate again a meaningful effect, as a standard-deviation reduction in holding durations is associated with an increase in the probability of an earnings surprise of (0.150*0.22=) 3.3%.

3.3 Short-term Investors and Misvaluation

We next consider in Table 5 whether the presence of short-term investors is associated with temporary distortions to the valuation of a firm's equity. We first estimate in Columns (1) and (2) OLS regressions that relate Stock Duration to the equity valuation of a firm, which we proxy by the market-to-book ratio. We include in all regressions year-fixed effects as well as a set of firm characteristics that may be related to equity valuations. We show results with and without firm-fixed effects.

The results in Table 5 indicate that Stock Duration has both a significantly negative contemporaneous and a significantly positive predictive association with equity valuation. This reversal pattern is consistent with temporary price distortions that are related to the presence of short-duration investors. Specifically, the strong negative contemporaneous association indicates that stock prices go up (down) while short-term institutional investors are buying (selling). In terms of economic magnitudes, using Column (1), a standard-deviation decrease in Stock Duration is associated with an increase in the market-to-book ratio of (0.192*0.69=) 13%, which translates into an average percentage change in equity valuations of (13%/2.6=) 5%, when calculated relative to mean market-to-book ratio. This contemporaneously negative association is followed by a strong predictive and positive association between firm valuation and Stock Duration. A standard-deviation decrease in holding duration this year is associated with a decrease in next year's market-to-book ratio of (0.125*0.69=)

8.6%, using the estimates in Column (1). The estimates in Column (2) show that this valuation decrease is associated with yet another decrease in the market-to-book ratio in the second year following the duration shock. This implies that the market-to-book ratio converges (almost) back to its initial level in the two years following the change in holding duration.

To address the possibility that these results reflect stock selection by short-term investors, we estimate in Columns (3) and (4) 2SLS regressions using Russell 2000 inclusion events as the instrument. The estimates show that both the contemporaneous negative and the predictive positive relation between Stock Duration and equity valuation are robust to accounting for the endogeneity in Stock Duration. In terms of economic magnitudes, the 2SLS estimates in Column (3 show that firms that saw a negative one-standard-deviation shock to their holding durations as they were added to the index experienced an increase in equity valuations of (5.2*0.22=) 1.14 or 41% of the variable's standard deviation. The associated decrease in valuations in next period equals (3.53*0.22=) 0.78.[11] Together with our previous findings, this indicates that the arrival of short-term investors and the associated reductions in R&D lead to temporary misvaluation.[12]

Figure 3, Panel A complements this analysis by showing the evolution of market-to-book ratios around Russell 2000 inclusions 'from below' (this figure is akin to a reduced-form regression). Consistent with the results in Table 5, the figure shows a strong increase in valuation in the year in which a stock is added to the index. This increase in equity valuation then entirely dissipates over the next three years, providing again strong evidence that the initial increase reflected misvaluation. Note that this pattern also strongly resembles the reversal pattern for Stock Duration around index inclusions, as documented in Figure 2, Panel A. Figure 3, Panel B shows that we cannot detect a similar valuation reversal for stock added to the index 'from above.'

[11] This lagged LATE effect does not fully compensate for the contemporaneous increase in valuations, as estimated in our OLS regressions. This asymmetry in the estimated LATEs indicates that the net effect on equity valuations remain somewhat positive for an extended period of time among those firms that were newly added to the index.

[12] We show again in Columns (5) and (6) of Appendix Table A-5 that our OLS results are concentrated among firm-years with index inclusions.

(The difference across the two panels in Figure 3 corresponds to the differences in the evolution of Stock Duration around the two types of index inclusions that we observed in Figure 2.)

3.4 Role of Information Environment and Disagreement

A critical assumption in Bolton, Scheinkman, and Xiong (2006) is that temporary deviations in stock prices from fundamentals due to the in-flow and out-flow of short-term investors are stronger for stocks where information frictions and disagreement are more pronounced. If the short-term boost in stock prices is due to investors not fully incorporating the effects of myopic investment cuts, then the documented effects of short-term investors should be weaker among firms where investors are better informed. As a proxy for the strength of the information environment we use the number of analysts covering a stock. We use this measure as analyst reports may inform the market that current reductions in R&D only temporarily increase earnings, while being detrimental to firm value in the long-run. Additionally, when analyst coverage is high managers are less likely to succeed in hiding the long-term costs of myopic behavior from investors (Yu, 2008).

In Columns (1) through (4) of Table 6 we re-estimate our regressions on samples partitioned by analyst coverage. We split our sample into firms with below- and above-median analyst coverage in a given year. This sample split is likely to generate meaningful differential effects of holding durations, as the median number of analysts is eleven in the high-analyst coverage sample, but only three in the low-analyst coverage sample. Despite these differences in analyst coverage, Stock Duration is similar across both samples, with medians (standard deviation) of 1.31 (0.59) years in the low-coverage subsample, and 1.38 (0.50) years in the high-coverage subsample, respectively.[13]

As predicted by Bolton, Scheinkman, and Xiong (2006), we find in Table 6 that the previously documented valuation effects are concentrated among firms that are covered by fewer analysts. This finding

[13] Both median values are above the sample median of 1.29 years reported in Table 1, as analyst coverage is available for a subset of sample firms only, such that Stock Duration is generally lower for firms not covered by analysts.

supports the notion that stock price deviations from fundamentals, triggered through the arrival of short-horizon investors, are larger when information frictions are more important.

Next, in Columns (5) through (8) of Table 6 we estimate our regressions on two additional subsamples that aim at capturing a critical prediction of Bolton, Scheinkman, and Xiong (2006), namely that overvaluation effects are larger if disagreement about a stock is more prevalent. We follow related literature and measure disagreement using dispersion in analysts' earnings forecasts (Diether, Malloy, and Scherbina, 2002). Consistent with the prediction of Bolton, Scheinkman, and Xiong (2006), results are larger among firms that face greater disagreement among analysts.

3.5 Placebo Tests for the Identification from Russell 2000 Reconstitutions

Our identification exploits situations where firms are newly added to the Russell 2000 because their market cap ranks increased over the past year. Our identifying assumption is that variation in holding durations is driven by index inclusions rather than differences in firm policies or values. A potential concern to our analysis is that some of our results may be affected by (non-linear) firm-size effects due the market-cap-based rule of index inclusions. Specifically, there may be economic shocks that are particular to firms with a market cap rank around 3,000, and these economic shocks, rather than the index inclusions themselves, could drive our results, violating the exclusion restriction for our instrument.

To address this concern, Table 7 provides placebo tests where we instrument Stock Duration using a dummy variable that equals 1 for firms with a market cap rank between 2,900 and 3,100. Crucially, when constructing this variable, we *exclude* those firms that were eventually added to the Russell 2000. The advantage of this approach is that it creates a placebo instrument, which captures counterfactual firms that were not added to the index, but are very similar in size to those that were. If we were to continue finding significant results using this placebo instrument, this would raise doubts about whether our instrument satisfies the exclusion restriction.

The results in Table 7 show across all previously studied dependent variables that we cannot detect any significant effects of Stock Duration once we use our placebo instrument. These findings provide us with further comfort regarding the validity of our identification strategy.

3.6 Alternative Measures for the Presence of Short-term Investors

Stock Duration has the advantage that it allows any given institutional investor to be short-term in some stocks and long-term in others, for example because investments are made by different portfolio managers with heterogeneous investment horizons. However, the intended or expected holding period may be better captured by an institutional-level measure than by an institutional-stock level measure. Institutional-level measures, such as Transient Investors, proxy for the general tendency of an institution to hold stocks for short versus long periods, which could potentially better capture the typical intention of new stock positions.

To analyze whether our specific measure of investor horizon leads to effects that differ from those of alternative measures, we report in Table 8 regressions that use Share Turnover (Panel A) and Transient Investors (Panel B) instead of Stock Duration. The first-stage regressions in Columns (1) show that both alternative measures also indicate an increase in the presence of short-term investors around Russell inclusions. The subsequent regressions show that the effects of investor horizons on investment, earnings, and equity valuations are similar once we consider these alternative measures. This indicates that our results are robust to alternative proxies for the presence of short-term investors, which mitigates concerns about the limitations of Stock Duration.

4. Conclusion

We provide evidence that the presence of short-term investors is associated with cuts to long-term investment in order to generate earnings surprises, leading to temporary boosts in the stock price. Short-term investors benefit from temporarily inflated stock prices, as they subsequently leave the firm so that only long-

term shareholders suffer from the reduction in long-term investment and equity value. Our findings are consistent with the model in Bolton, Scheinkman, and Xiong (2006).

We first show that firms with more short-term investors reduce long-term investment, which we proxy using R&D expenditures. The reductions in R&D are reversed when the inflow of short-term investors also reverses, confirming that the cuts were only transitory. We then show that the arrival of new investors is reflected not only in reduced R&D spending, but also translates into higher earnings and even earnings surprises. This is plausible as the theory in Bolton, Scheinkman, and Xiong (2006) implies that short-term investors pressure managers to cut investment with the objective to inflate earnings. These inflated earnings are likely misinterpreted by investors, as we document that after short-term investors move into particular stocks their equity valuations substantially increase relative to fundamentals. Finally, we provide evidence supporting a critical assumption in Bolton, Scheinkman, and Xiong (2006), namely that the documented stock price deviations from fundamentals are caused by information frictions and differences of opinion.

A challenge to any analysis of the effects of investor horizons is that changes in horizon may be endogenous. To address this challenge, we employ an identification strategy that instruments the presence of short-term investors using Russell 2000 inclusions. These are events that neither directly affect future firm growth opportunities nor provide new information to the market as such reconstitutions are predictable. However, the presence of short-term investors increases sharply for stocks newly added to the Russell 2000 'from below,' reflecting the significant entry of many new investors.

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Figure 1: Stock Duration and Institutional Ownership over Time

This table reports the evolution of Stock Duration (in years) and Institutional Ownership (in %) over time. The sample consists of U.S. firms from Compustat.

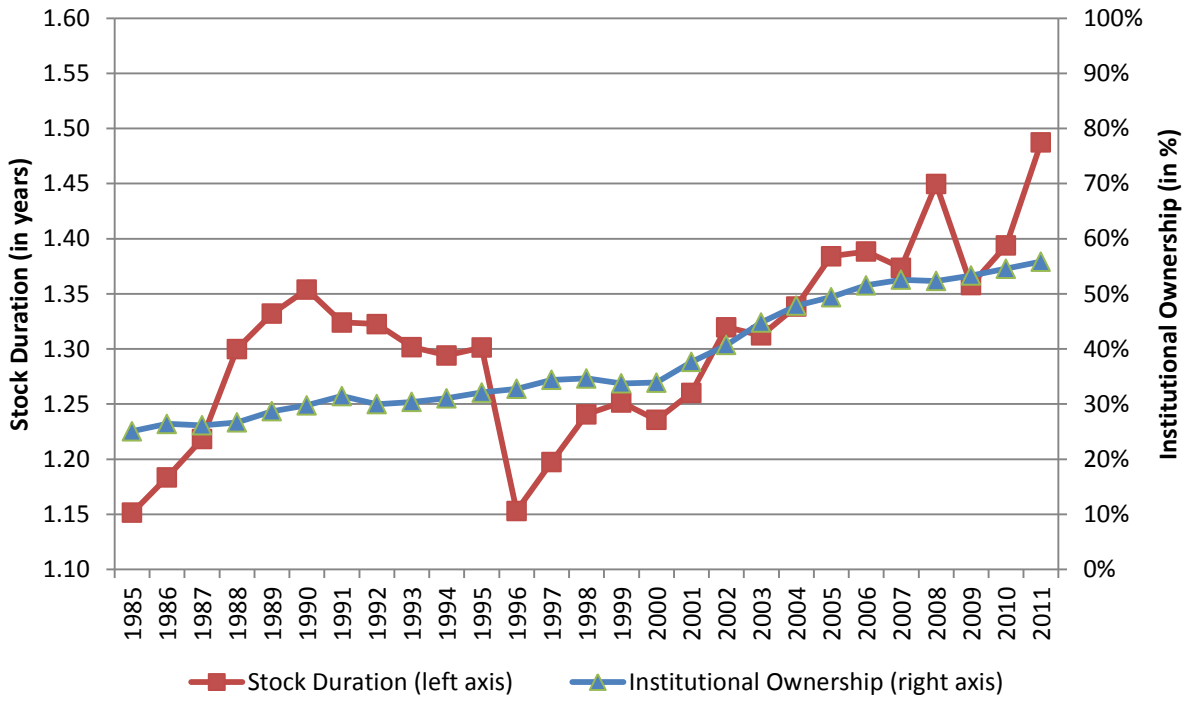
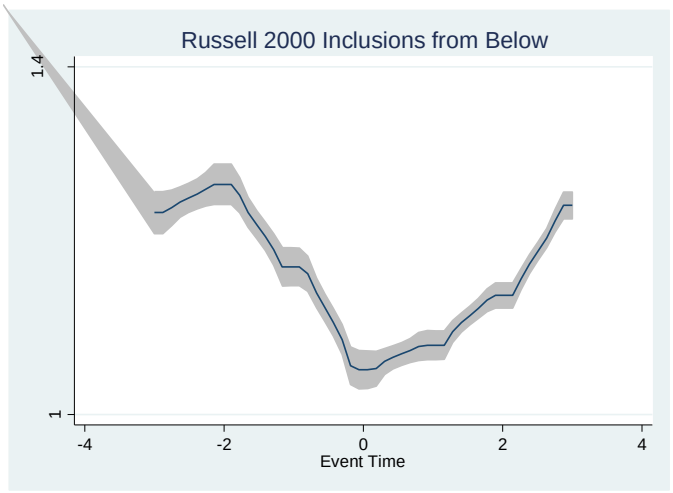
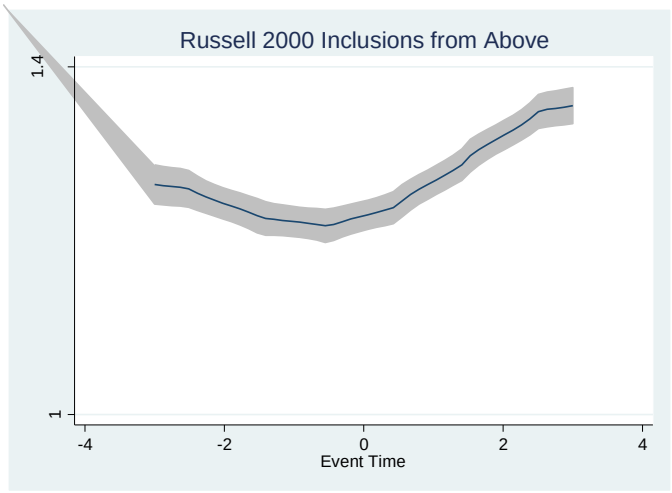


Figure 2: Firm Characteristics around Russell 2000 Index Inclusion

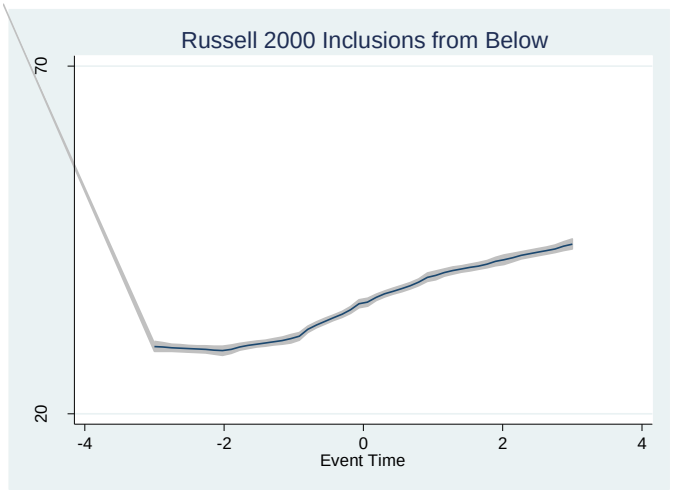
These figures report the evolution of Stock Duration (Panel A), Institutional Ownership (Panel B), Share Turnover (Panel C), Transient Investors (Panel D), and Analyst Coverage (Panel E) in the three years around Russell 2000 inclusions. We contrast Russell 2000 inclusions from below (left charts) with inclusions form above (right charts). We report mean values as well as standard errors around the mean. The sample consists of U.S. firms from Compustat.

Panel A: Stock Duration





Panel B: Institutional Ownership



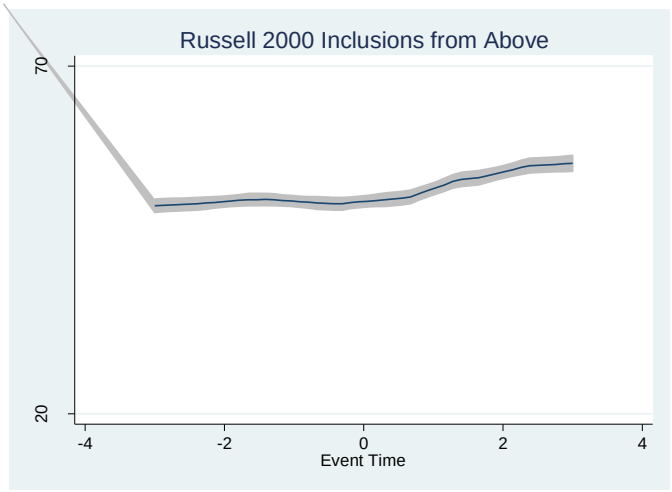
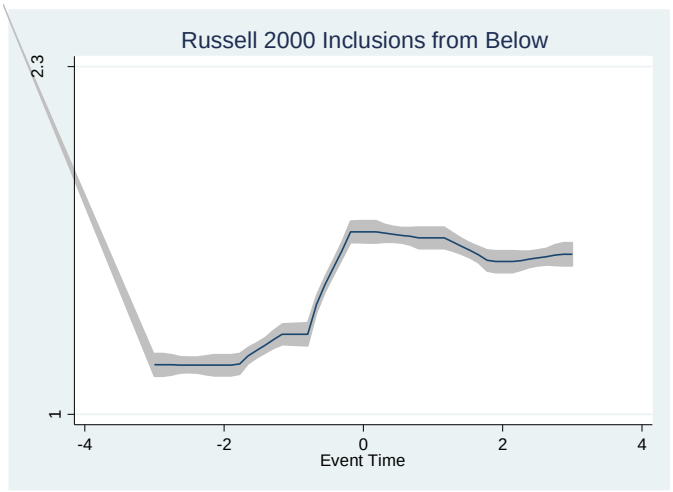
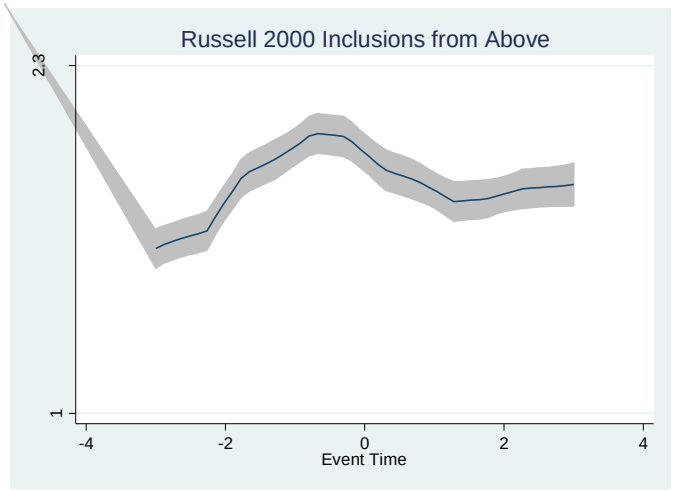


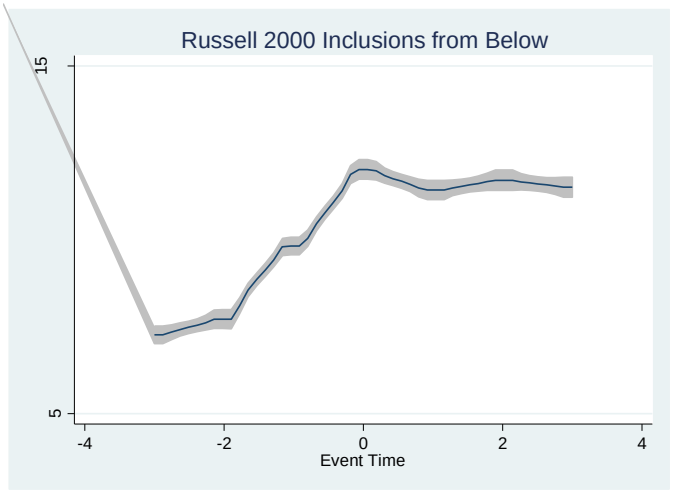
Figure 2 (continued)

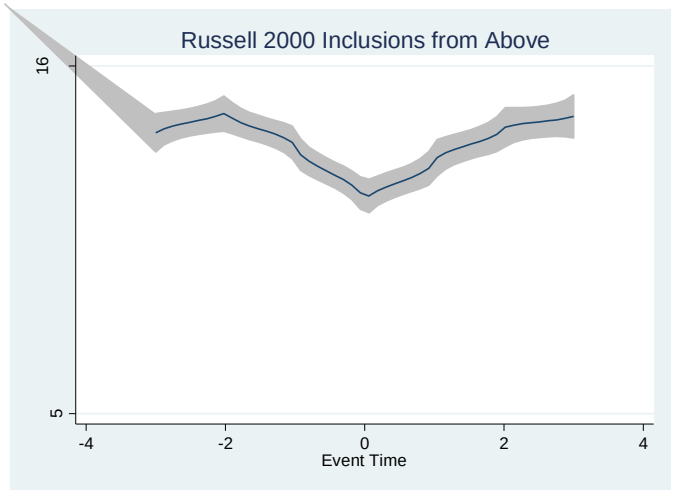
Panel C: Share Turnover



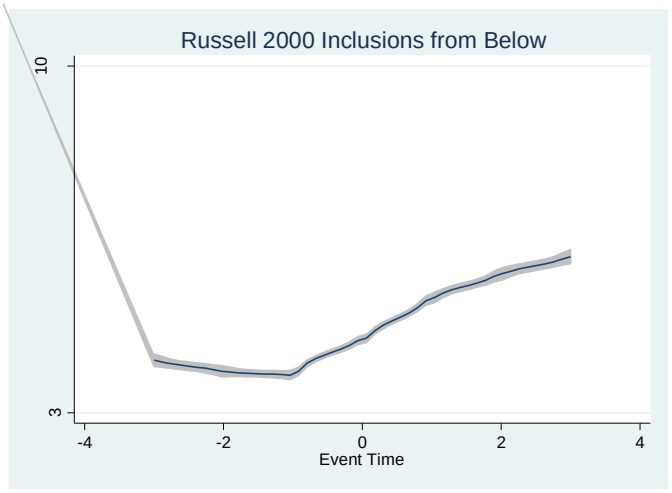


Panel D: Transient Investors





Panel E: Analyst Coverage



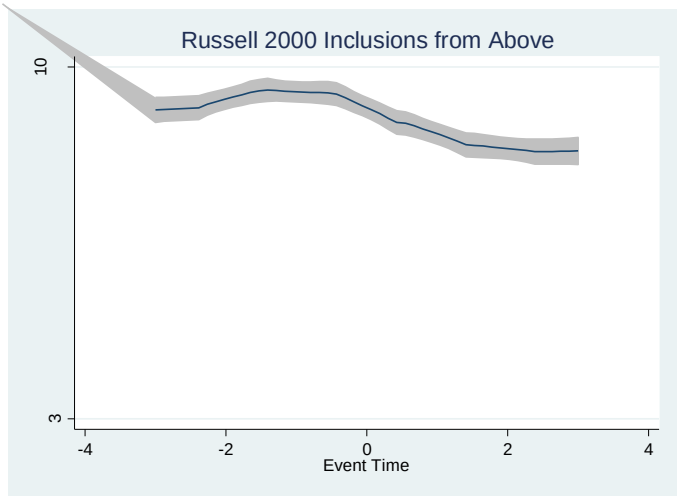
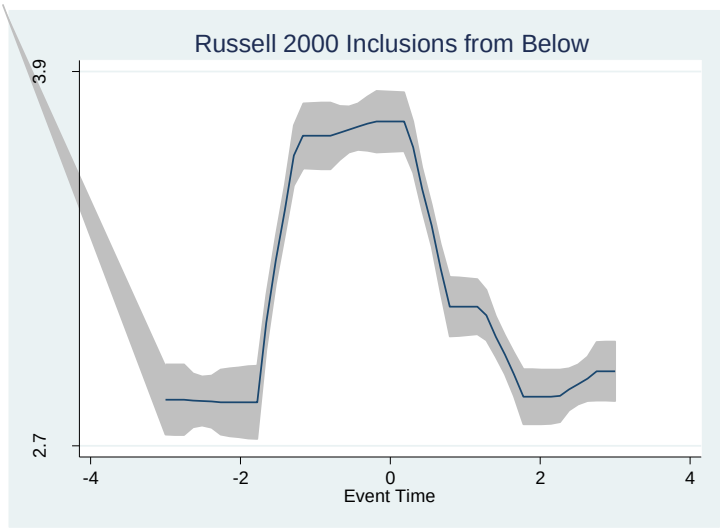


Figure 3: Misvaluation around Russell 2000 Index Inclusion

These figures report the evolution of the market-to-book ratios (M/B Ratio) in the three years around Russell 2000 inclusions. We contrast Russell 2000 inclusions from below (Panel A) with those from above (Panel B). We report mean values as well as standard errors around the mean. The sample consists of U.S. firms from Compustat.

Panel A: Russell 2000 Inclusions from Below



Panel B: Russell 2000 Inclusions from Above

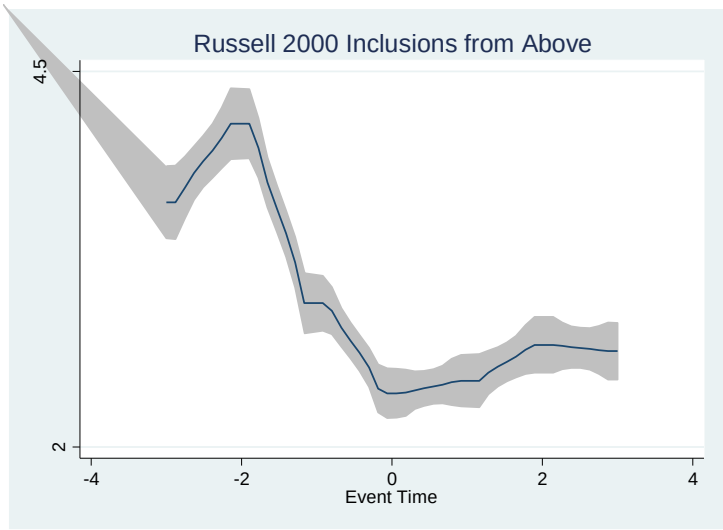


Table 1: Summary Statistics

This table reports summary statistics of the firms in the sample. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. Observations are at the annual level.

Variable	Mean	Median	STD	25%	75%	Obs.
Stock Duration (in years)	1.30	1.29	0.69	0.83	1.76	106645
Share Turnover	1.26	0.77	1.40	0.37	1.59	122522
Transient Investors (in %)	9.53	6.29	10.00	1.70	14.10	117289
Fund Turnover	0.29	0.27	0.12	0.21	0.34	128696
Fund Duration (in years)	1.68	1.66	0.34	1.46	1.88	106645
R2000 Inclusion	0.07					129037
R2000 Member	0.37					129037
R1000 Member	0.20					129037
Institutional Ownership (in %)	36.83	31.84	27.40	12.59	58.51	129031
Analyst Coverage	8.05	6.00	6.88	3.00	11.00	62452
Analyst Forecast Dispersion	0.09	0.03	0.20	0.01	0.07	62452
M/B Ratio	2.64	1.71	3.02	1.10	2.88	121869
R&D/Assets	0.04	0.00	0.09	0.00	0.03	125447
Δ R&D/Assets	0.001	0.000	0.039	0.000	0.000	114674
Earnings/Assets	-0.02	0.02	0.20	-0.01	0.06	125323
Δ Earnings/Assets	-0.01	0.00	0.15	-0.02	0.01	114500
Earnings Surprise	0.50					70495
Capex/Assets	0.05	0.04	0.06	0.01	0.07	107851
PPE/Assets	0.22	0.13	0.23	0.03	0.33	123787
Leverage	0.21	0.16	0.20	0.04	0.32	124193
Sales Growth	0.20	0.09	0.55	-0.01	0.25	121607
Log(Assets)	5.84	5.75	2.13	4.24	7.26	125447

Table 2: Stock Duration and Russell 2000 Inclusion: First-Stage Regressions

This table examines whether firms that are added to the Russell 2000 experience a reduction in Stock Duration. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. *F-Statistic* is the Kleibergen-Paap (2006) *F*-Statistic of our instrument. *# Events* is the number of inclusion events. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Stock Duration**			
Model:	**OLS**			
	(1)	(2)	(3)	(4)
R2000 Inclusion	-0.242***	-0.194***	-0.212***	-0.179***
	(-23.01)	(-21.66)	(-20.76)	(-21.03)
Market Cap Decile			-0.014***	-0.031***
			(-4.44)	(-8.51)
Institutional Ownership			0.001***	-0.004***
			(4.48)	(-11.12)
Sales Growth			-0.153***	-0.077***
			(-24.55)	(-14.77)
PPE/Assets			0.421***	0.446***
			(15.80)	(8.58)
Log(Assets)			0.092***	0.062***
			(17.89)	(7.08)
Leverage			-0.204***	0.017
			(-8.14)	(0.57)
Capex/Assets			-1.190***	-0.648***
			(-15.62)	(-8.98)
R&D/Assets			0.410***	0.543***
			(7.88)	(6.76)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	Yes	No	Yes
Obs.	106645	106645	87708	87708
Adj. R-sq.	0.006	0.006	0.104	0.088
# Events (R2000 Inclusion)	5468	5468	4162	4162
F-Statistic (R2000 Inclusion)	529.3	469.4	430.9	442.3

Table 3: Short-term Investors and R&D Expenditures

This table examines whether firms with more short-term investors reduce R&D expenditures. The regressions in Columns (1) to (2) are OLS regressions, while those in Columns (3) to (4) are 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. The sample consists of US firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. The reported coefficients on the Stock Duration variables are multiplied by 100. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ R&D/Assets**			
Model:	**OLS**		**2SLS**	
	(1)	(2)	(3)	(4)
Stock Duration (x100)	0.121***	0.429***	2.054***	2.894***
	(7.74)	(11.62)	(5.06)	(5.38)
Stock Duration [t-1] (x100)		-0.406***		-2.749***
		(-11.04)		(-5.26)
Market Cap Decile	-0.000	0.000	-0.000	0.000**
	(-0.00)	(0.06)	(-1.41)	(1.98)
Institutional Ownership	-0.000***	-0.000***	-0.000***	-0.000***
	(-4.79)	(-5.06)	(-5.77)	(-3.57)
Sales Growth	-0.006***	-0.006***	-0.002**	-0.005***
	(-8.42)	(-8.28)	(-2.31)	(-5.67)
PPE/Assets	0.002***	0.002***	-0.003**	0.002*
	(5.92)	(6.40)	(-2.36)	(1.72)
Log(Assets)	-0.001***	-0.000***	-0.002***	-0.000*
	(-5.80)	(-3.46)	(-6.40)	(-1.89)
Leverage	0.000	0.001**	0.003***	0.002
	(0.53)	(2.06)	(2.81)	(1.61)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	100568	91914	100568	91914
Adj. R-sq.	0.010	0.013		

Table 4: Short-term Investors, Earnings, and Earnings Surprises

This table examines whether firms with more short-term investors report higher earnings and are more likely to beat analysts' earnings forecasts ('earnings surprise'). The regressions in Columns (1) to (4) are OLS regressions, while those in Columns (5) to (8) are 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ Earnings/Assets**		**Earnings Surprise**		**Δ Earnings/Assets**		**Earnings Surprise**	
Model:	**OLS**		**OLS**		**2SLS**		**2SLS**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Duration	-0.001	-0.015***	-0.023***	-0.041***	-0.080***	-0.145***	-0.107**	-0.150**
	(-1.08)	(-12.75)	(-4.74)	(-6.13)	(-7.45)	(-9.47)	(-2.26)	(-2.37)
Stock Duration [t-1]		0.019***		0.026***		0.177***		0.162**
		(15.64)		(4.11)		(11.96)		(2.37)
Market Cap Decile	0.003***	0.003***	0.022***	0.022***	0.002***	0.001***	0.021***	0.021***
	(14.14)	(12.02)	(11.35)	(11.06)	(7.75)	(3.15)	(14.37)	(13.34)
Institutional Ownership	0.000***	0.000***	0.002***	0.002***	0.000***	0.000***	0.002***	0.002***
	(4.97)	(4.42)	(14.00)	(13.16)	(6.72)	(2.65)	(16.11)	(15.47)
Sales Growth	0.068***	0.070***	0.038***	0.044***	0.055***	0.070***	0.022**	0.043***
	(29.56)	(27.42)	(6.04)	(6.23)	(19.92)	(25.03)	(2.01)	(4.44)
PPE/Assets	0.022***	0.017***	0.020	0.014	0.057***	0.003	0.058**	0.001
	(9.78)	(7.55)	(1.14)	(0.81)	(10.58)	(0.69)	(2.25)	(0.04)
Log(Assets)	-0.005***	-0.005***	-0.017***	-0.018***	0.002*	-0.006***	-0.009*	-0.021***
	(-13.25)	(-13.01)	(-4.93)	(-5.24)	(1.69)	(-6.57)	(-1.85)	(-4.83)
Leverage	-0.020***	-0.019***	-0.104***	-0.099***	-0.036***	-0.013***	-0.122***	-0.090***
	(-8.24)	(-7.89)	(-6.17)	(-5.54)	(-9.90)	(-3.63)	(-7.52)	(-5.53)
Capex/Assets	-0.219***	-0.191***	-0.293***	-0.270***	-0.318***	-0.120***	-0.422***	-0.205**
	(-19.53)	(-16.50)	(-5.09)	(-4.38)	(-17.36)	(-6.51)	(-4.70)	(-2.34)
R&D/Assets	-0.193***	-0.179***	-0.019	-0.030	-0.161***	-0.163***	-0.011	-0.012
	(-24.24)	(-21.15)	(-0.54)	(-0.80)	(-14.25)	(-13.75)	(-0.36)	(-0.37)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	86597	78782	52090	48056	86597	78782	52090	48056
Adj. R-sq.	0.093	0.101	0.039	0.039				

Table 5: Short-term Investors and Misvaluation

This table examines whether the presence of short-term investors is associated with misvaluation. The regressions in Columns (1) to (2) are OLS regressions, while those in Columns (3) to (4) are 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is included in the Russell 2000 index from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**M/B Ratio**			
Model:	**OLS**		**2SLS**	
	(1)	(2)	(3)	(4)
Stock Duration	-0.192***	-0.184***	-5.198***	-4.846***
	(-9.27)	(-8.54)	(-10.14)	(-10.45)
Stock Duration [t-1]	0.125***	0.109***	3.535***	3.238***
	(6.12)	(5.63)	(5.65)	(6.08)
Stock Duration [t-2]		0.046**		0.082
		(2.33)		(0.25)
Market Cap Decile	0.995***	0.943***	0.864***	0.816***
	(46.02)	(42.23)	(44.14)	(42.57)
Institutional Ownership	0.011***	0.011***	0.002	0.001
	(9.07)	(8.58)	(1.09)	(0.82)
Sales Growth	0.295***	0.256***	0.075**	0.043
	(8.79)	(6.92)	(2.15)	(1.21)
PPE/Assets	-1.198***	-1.178***	-0.410*	-0.428**
	(-5.23)	(-4.80)	(-1.85)	(-1.97)
Log(Assets)	-1.867***	-1.844***	-1.626***	-1.604***
	(-34.14)	(-31.43)	(-42.65)	(-41.54)
Leverage	5.643***	5.581***	5.516***	5.468***
	(27.09)	(25.11)	(46.25)	(44.99)
Capex/Assets	1.189***	1.123***	1.035**	0.993**
	(3.81)	(3.39)	(2.29)	(2.33)
R&D/Assets	1.381***	1.685***	0.344**	0.708***
	(6.46)	(7.25)	(2.15)	(4.31)
Earnings/Assets	6.754***	7.203***	7.844***	8.510***
	(11.92)	(11.51)	(20.23)	(20.95)
R2000 Member [t-1]	0.211***	0.234***	0.695***	0.713***
	(5.36)	(5.62)	(7.77)	(9.19)
R1000 Member [t-1]	-0.183***	-0.093	0.465***	0.552***
	(-2.79)	(-1.34)	(3.93)	(5.09)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	76390	69210	76390	69210
Adj. R-sq.	0.251	0.245		

Table 6: Effects of Short-term Investors: Information Environment and Disagreement

This table examines whether the effect of short-term investors on misvaluation is related to the information environment and disagreement about a stock. In Columns (1) to (4) we separate the sample based on whether Analyst Coverage is above or below the sample median for a given year. In Columns (5) to (8) we separate the sample based on whether Analyst Forecast Dispersion is above or below the sample median for a given year. We report both OLS regressions and 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**M/B Ratio**							
Model:	**OLS**		**2SLS**		**OLS**		**2SLS**	
Sample:	**Analyst Coverage**		**Analyst Coverage**		**Analyst Forecast Dispersion**		**Analyst Forecast Dispersion**	
	Low	**High**	**Low**	**High**	**High**	**Low**	**High**	**Low**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Duration	-0.262***	0.043	-4.472***	1.027	-0.338***	0.036	-5.919***	-2.085***
	(-6.42)	(0.57)	(-5.86)	(0.34)	(-6.07)	(0.66)	(-4.63)	(-3.25)
Stock Duration [t-1]	0.150***	0.141**	3.411***	-2.032	0.180***	0.074	3.717**	2.422***
	(4.16)	(2.05)	(3.94)	(-0.63)	(3.70)	(1.43)	(2.54)	(2.92)
Market Cap Decile	1.104***	1.130***	0.952***	1.129***	1.169***	1.005***	1.023***	0.999***
	(29.10)	(26.88)	(24.77)	(38.64)	(28.81)	(24.82)	(25.31)	(42.44)
Institutional Ownership	0.013***	0.001	-0.001	0.000	0.012***	0.005*	-0.004	0.003
	(6.78)	(0.36)	(-0.20)	(0.01)	(5.64)	(1.65)	(-1.05)	(1.46)
Sales Growth	0.283***	0.257***	0.083	0.211**	0.261***	0.305***	0.046	0.220**
	(3.55)	(3.07)	(1.25)	(2.25)	(3.76)	(2.84)	(0.65)	(2.32)
PPE/Assets	-1.182***	-0.341	-0.097	0.203	-1.281***	-0.626	0.512	-0.803*
	(-3.52)	(-0.54)	(-0.22)	(0.46)	(-3.05)	(-1.14)	(1.05)	(-1.76)
Log(Assets)	-2.407***	-2.581***	-2.234***	-2.439***	-2.702***	-2.249***	-2.505***	-2.268***
	(-22.79)	(-18.63)	(-28.62)	(-23.48)	(-23.21)	(-17.07)	(-30.08)	(-25.66)
Leverage	6.054***	7.503***	5.972***	7.326***	7.329***	6.523***	7.522***	6.481***
	(17.13)	(14.49)	(25.17)	(34.89)	(18.10)	(12.05)	(30.79)	(30.21)
Capex/Assets	0.100	-0.423	-0.090	-1.476	-0.467	0.128	-1.112	0.910
	(0.19)	(-0.64)	(-0.11)	(-1.26)	(-0.93)	(0.17)	(-1.28)	(1.29)
R&D/Assets	1.746***	3.954***	-0.045	4.021***	0.917**	7.981***	-0.375	7.418***
	(4.64)	(6.11)	(-0.10)	(14.95)	(2.57)	(8.90)	(-0.83)	(19.12)
Earnings/Assets	5.362***	8.063***	5.904***	8.246***	4.209***	8.960***	4.901***	9.344***
	(5.41)	(5.31)	(8.57)	(11.62)	(4.39)	(5.90)	(7.00)	(11.72)
R2000 Member [t-1]	0.045	-0.272*	0.675***	-0.382	0.015	0.215***	0.598**	0.562***
	(0.73)	(-1.78)	(4.28)	(-1.18)	(0.22)	(2.65)	(2.51)	(4.00)
R1000 Member [t-1]	-0.204	-0.366**	0.665***	-0.519	-0.289**	0.089	0.364	0.449***
	(-1.54)	(-2.25)	(2.80)	(-1.56)	(-2.54)	(0.78)	(1.22)	(2.88)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	17922	19653	17922	19653	18604	18971	18604	18971
Adj. R-sq.	0.334	0.355			0.334	0.361		

Table 7: Placebo Tests for Russell 2000 Instrument

This table provides a placebo tests for our instrument. All regressions are 2SLS regressions that instrument *Stock Duration* using a dummy variable that equals 1 if a firm's market capitalization rank is between 2,900 and 3,100, but the firm was not added to the Russell 2000 from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ R&D/Assets**	**Δ Earnings/Assets**	**Earnings Surprise**	**M/B Ratio**
Model:	**2SLS**	**2SLS**	**2SLS**	**2SLS**
	(1)	(2)	(3)	(4)
Stock Duration	-0.017	0.008	-0.015	5.517
	(-0.73)	(0.12)	(-0.05)	(1.38)
Stock Duration [t-1]	0.015	0.015	-0.063	0.965
	(0.66)	(0.26)	(-0.26)	(0.33)
Market Cap Decile	-0.000	0.003***	0.022***	1.163***
	(-0.66)	(3.61)	(9.44)	(10.81)
Institutional Ownership	-0.000	0.000*	0.002***	0.039***
	(-1.40)	(1.94)	(4.88)	(3.77)
Sales Growth	-0.007***	0.074***	0.036	0.707***
	(-4.72)	(13.54)	(0.64)	(3.61)
PPE/Assets	0.003*	0.009	0.042	-4.173***
	(1.70)	(0.73)	(0.32)	(-3.99)
Log(Assets)	-0.000	-0.007***	-0.013	-2.204***
	(-0.54)	(-2.60)	(-0.51)	(-11.00)
Leverage	0.001	-0.015**	-0.114*	5.871***
	(0.96)	(-2.26)	(-1.71)	(31.64)
Capex/Assets		-0.170***	-0.377	5.313***
		(-4.16)	(-0.81)	(3.70)
R&D/Assets		-0.187***	-0.038	5.956***
		(-10.08)	(-0.82)	(6.12)
R2000 Member [t-1]				3.231***
				(3.55)
R1000 Member [t-1]				0.185
				(0.46)
Earnings/Assets				-0.414
				(-0.79)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	Yes
Obs.	91914	78782	48056	76390

Table 8: Alternative Measures for the Presence of Short-term Investors

This table uses Share Turnover (Panel A) and Transient Investors (Panel B) as a proxy for the presence of short-term investors. The regressions in Column (1) examine whether firms that are added to the Russell 2000 experience a reduction in these measures of investor horizon (first-stage regressions). The regressions in Columns (2) to (5) relate our alternative proxies for the presence of short-term investors to R&D expenditures, earnings, and misvaluation. We report both OLS regressions and 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Panel A: Share Turnover

Dependent Variable:	**Share Turnover**	**Δ R&D/Assets**		**Δ Earnings/Assets**		**M/B Ratio**	
Model:	**OLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
R2000 Inclusion	0.328***						
	(16.81)						
Share Turnover		-0.004***	-0.009***	0.007***	0.048***	0.210***	1.960***
		(-13.15)	(-4.66)	(6.30)	(5.98)	(16.41)	(12.66)
Share Turnover [t-1]		0.005***	0.017***	-0.013***	-0.116***	-0.116***	-1.363***
		(15.51)	(7.12)	(-12.72)	(-12.26)	(-9.96)	(-3.60)
Market Cap Decile	0.117***	0.000	-0.001***	0.004***	0.008***	1.023***	0.901***
	(17.14)	(0.90)	(-3.18)	(14.25)	(8.45)	(57.98)	(52.05)
Institutional Ownership	0.018***	-0.000***	-0.000***	0.000***	0.001***	0.006***	-0.002
	(42.10)	(-4.22)	(-4.74)	(10.20)	(8.20)	(6.28)	(-1.33)
Sales Growth	0.322***	-0.005***	-0.005***	0.059***	0.059***	0.308***	-0.012
	(24.21)	(-7.42)	(-5.72)	(23.73)	(16.71)	(10.76)	(-0.35)
PPE/Assets	-0.782***	0.002***	0.005***	0.026***	-0.014**	-1.341***	-0.266*
	(-17.46)	(6.28)	(6.47)	(9.05)	(-2.03)	(-10.43)	(-1.83)
Log(Assets)	-0.164***	-0.001***	0.001**	-0.006***	-0.012***	-1.514***	-1.880***
	(-18.47)	(-5.85)	(2.39)	(-11.72)	(-8.78)	(-47.66)	(-21.31)
Leverage	0.220***	-0.000	-0.001	-0.048***	-0.037***	5.246***	5.633***
	(5.08)	(-0.21)	(-1.27)	(-14.44)	(-7.46)	(32.14)	(49.57)
Capex/Assets	3.035***			-0.245***	-0.074**	1.549***	-0.167
	(20.74)			(-17.43)	(-2.52)	(5.68)	(-0.40)
R&D/Assets	2.076***			-0.222***	-0.035	6.405***	7.501***
	(17.93)			(-22.74)	(-1.41)	(17.06)	(25.26)
Earnings/Assets						0.555***	0.079
						(3.29)	(0.34)
R2000 Member [t-1]						0.282***	0.575***
						(8.33)	(3.89)
R1000 Member [t-1]						-0.335***	0.345
						(-5.57)	(1.31)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	Yes	Yes
Obs.	99606	102781	102781	89048	89048	85357	85357
adj. R-sq	0.257	0.021		0.064		0.299	

Table 8 (continued)

Panel B: Transient Investors

Dependent Variable:	Transient Investors	Δ R&D/Assets		Δ Earnings/Assets		M/B Ratio	
Model:	OLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
R2000 Inclusion	1.995***						
	(22.92)						
Transient Investors		-0.0003***	-0.0004	0.002***	0.007***	0.024***	0.738***
		(-11.60)	(-1.11)	(17.84)	(4.73)	(16.29)	(5.35)
Transient Investors [t-1]		0.0004***	0.002***	-0.002***	-0.020***	-0.014***	-0.894***
		(14.36)	(4.80)	(-21.07)	(-10.07)	(-11.17)	(-3.22)
Market Cap Decile	0.231***	0.000***	-0.000	0.005***	0.005***	1.056***	0.487***
	(8.66)	(2.65)	(-0.67)	(15.30)	(8.48)	(58.53)	(4.31)
Institutional Ownership	0.271***	-0.000***	-0.000***	0.000***	0.003***	0.002*	-0.046
	(125.62)	(-6.65)	(-5.29)	(7.10)	(8.05)	(1.80)	(-1.43)
Sales Growth	1.229***	-0.004***	-0.006***	0.050***	0.054***	0.310***	-0.139
	(26.86)	(-6.40)	(-6.48)	(20.35)	(16.64)	(11.02)	(-1.43)
PPE/Assets	-2.569***	0.001***	0.003***	0.031***	-0.009	-1.394***	-1.123*
	(-11.83)	(3.81)	(4.95)	(11.12)	(-1.55)	(-11.15)	(-1.70)
Log(Assets)	-0.747***	-0.001***	-0.000	-0.006***	-0.008***	-1.599***	-0.462
	(-18.90)	(-9.27)	(-0.38)	(-11.70)	(-7.22)	(-48.79)	(-1.35)
Leverage	1.034***	-0.001	-0.003***	-0.042***	-0.022***	5.504***	4.848***
	(5.02)	(-1.23)	(-3.42)	(-12.90)	(-4.72)	(32.97)	(13.96)
Capex/Assets	6.718***			-0.270***	-0.078***	1.629***	10.398***
	(11.36)			(-19.36)	(-3.05)	(6.09)	(3.33)
R&D/Assets	0.480			-0.260***	-0.194***	6.193***	9.339***
	(1.18)			(-27.31)	(-14.74)	(16.72)	(8.37)
Earnings/Assets						0.889***	0.562
						(5.45)	(1.50)
R2000 Member [t-1]						0.253***	2.373***
						(8.24)	(3.91)
R1000 Member [t-1]						-0.312***	3.947***
						(-5.69)	(3.96)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	Yes	Yes
Obs.	97465	98829	98829	86946	86946	83502	83502
adj. R-sq	0.606	0.014		0.069		0.3239	

Appendix Table A-1: Definitions of Variables

This table provides definitions of the variables used in the empirical analysis.

Variable	Definition
Stock Duration	Weighted average time that a stock has been in the portfolios of the institutional investors holding a stock, weighted by the amount the institution has invested in the stock.
Share Turnover	Number of a firm's shares that are traded throughout the year divided by the number of shares outstanding.
Transient Investors	Percentage ownership of transient institutional investors. The measure was introduced by Bushee (1998, 2001), whose methodology is based on factor and clustering analysis to classify institutional investors into three groups: 'transient' investors with high portfolio turnover and diversified portfolios; 'dedicated' institutions with low turnover and more concentrated portfolio holdings; and 'quasi-indexer' institutions with low turnover and diversified portfolio holdings. We obtain the institutional investor classification data from Brian Bushee's website and calculate the percentage of a firm's ownership by transient institutional investors.
Fund Duration	Weighted average of the average holding duration of all of the U.S. equities in the portfolios of the institutions holding a stock, weighted by the amount the institution has invested in the stock. The average holding duration of all of the stocks in an institution is calculated by weighting the holding duration of each individual stock in the institution's holding reports, weighted by the amount the institution is currently investing in the stock.
Fund Turnover	Weighted average of the turnover of institutional investors holding a stock. Institutional turnover is calculated using changes in the quarterly holdings over the past four quarters. The stock-level weights are calculated using the current holdings in the stock in each institutional portfolio.
Institutional Ownership	Percentage ownership by institutional investors.
Short-Term Institutional Ownership	Percentage of stocks held by short-term institutional investors. Short-term institutional investors rank in the bottom tercile across all institutional investors in terms of Fund Turnover.
Long-Term Institutional Ownership	Percentage of stocks held by short-term institutional investors. Short-term institutional investors rank in the top tercile across all institutional investors in terms of Fund Turnover.
R2000 Inclusion	Dummy variable that equals one if a firm is newly added to the Russell 2000 index from below, and 0 otherwise.
Any R2000 Inclusion	Dummy variable that equals one if a firm is included from below or above into the Russell 2000 index, and 0 otherwise.
Market Cap Decile	Decile in which a firm ranks in a given year with regards to its market capitalization in the sample.
Analyst Coverage	Number of analysts following a firm.
Analyst Forecast Dispersion	Ratio of the standard deviation of analysts' next fiscal year earnings forecast divided by the mean forecast.
M/B Ratio	The market value of equity over the book value of equity.
R&D/Assets	R&D expenditures over total assets.
Δ R&D/Assets	Year-on-year change in R&D expenditures over total assets from [t-1] to [t].
Earnings/Assets	Net income before extraordinary items over total assets.
Δ Earnings/Assets	Year-on-year change in net income before extraordinary items over total assets from [t-1] to [t].
Earnings Surprise	Dummy variable that equals one if reported EPS is more than the mean analyst consensus forecast for the fiscal year, and 0 otherwise.
Capex/Assets	Capital expenditures over total assets.
PPE/Assets	Net property, plant, and equipment (PPE) over total assets.
Leverage	Debt over total assets.
Sales Growth	Year-on-year change in sales from [t-1] to [t], divided by sales in [t-1].
Assets	Total assets of a firm.
R2000 Member	Dummy variable that equals one if a firm is a member of the Russell 2000 index, and 0 otherwise.
R1000 Member	Dummy variable that equals one if a firm is a member of the Russell 1000 index, and 0 otherwise.

Appendix Table A-2: Correlations

This table provides correlations of the main variables used in the empirical analysis. Variables are defined in Appendix Table A-1.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Stock Duration	(1)	1.00																
Share Turnover	(2)	-0.36	1.00															
Transient Investors	(3)	-0.24	0.40	1.00														
Fund Turnover	(4)	-0.51	0.30	0.33	1.00													
Fund Duration	(5)	0.62	-0.22	-0.40	-0.78	1.00												
Institutional Ownership	(6)	0.08	0.37	0.59	0.02	-0.01	1.00											
Analyst Coverage	(7)	0.14	0.15	0.10	-0.14	0.15	0.27	1.00										
M/B Ratio	(8)	-0.07	0.14	0.12	0.13	-0.09	0.07	0.15	1.00									
R&D/Asses	(9)	-0.14	0.21	0.05	0.17	-0.14	-0.06	-0.04	0.27	1.00								
Δ R&D/Assets	(10)	0.03	-0.04	-0.05	-0.05	0.04	-0.03	-0.01	-0.05	0.22	1.00							
Earnings/Assets	(11)	0.07	-0.07	0.05	-0.09	0.04	0.15	0.15	0.01	-0.50	-0.22	1.00						
Δ Earnings/Assets	(12)	-0.01	0.00	0.09	0.08	-0.05	0.04	0.01	0.08	-0.09	-0.44	0.44	1.00					
Earnings Surprise	(13)	-0.01	0.08	0.14	0.05	-0.04	0.13	0.05	0.05	0.02	-0.02	0.09	0.09	1.00				
Capex/Assets	(14)	-0.11	0.02	-0.03	0.06	-0.12	-0.08	0.09	0.05	-0.06	0.03	0.07	-0.05	-0.04	1.00			
PPE/Assets	(15)	0.06	-0.12	-0.08	-0.06	0.01	-0.08	0.13	-0.06	-0.20	0.02	0.07	-0.02	-0.04	0.68	1.00		
Leverage	(16)	0.05	-0.10	-0.04	-0.05	0.01	-0.01	0.04	0.00	-0.25	-0.01	-0.06	-0.03	-0.05	0.12	0.34	1.00	
Sales Growth	(17)	-0.19	0.14	0.08	0.17	-0.18	-0.03	-0.02	0.18	0.13	-0.08	0.01	0.20	0.04	0.09	-0.04	-0.02	1.00
Log(Assets)	(18)	0.35	0.03	0.09	-0.26	0.35	0.37	0.58	-0.08	-0.34	-0.02	0.16	0.02	0.06	-0.17	0.01	0.25	-0.13

Appendix Table A-3: Index Inclusions

This table reports statistics on the number of firms added to the Russell 2000 from below. The sample consists of U.S. firms from Compustat. Observations are at the annual level.

Year	R2000 Inclusion		Sample
	# Events	% Firm-Years	Total Firm-Years
1985	160	6%	3157
1986	231	7%	3540
1987	290	8%	3910
1988	311	8%	3940
1989	207	6%	3844
1990	189	5%	3815
1991	342	12%	3918
1992	366	9%	4676
1993	340	7%	5399
1994	390	7%	5715
1995	328	6%	5822
1996	409	7%	6257
1997	418	7%	6336
1998	400	7%	6269
1999	372	7%	6070
2000	487	9%	5978
2001	460	10%	5361
2002	363	9%	5103
2003	268	7%	4876
2004	335	8%	4760
2005	283	7%	4717
2006	271	7%	4600
2007	251	6%	4439
2008	265	7%	4373
2009	278	8%	4130
2010	230	6%	4076
2011	196	6%	3956

Appendix Table A-4: Robustness Check: Russell 2000 Inclusion from Below and Inclusion from Above

This table examines in Column (1) whether firms that are added to the Russell 2000 from above or below experience a reduction in Stock Duration. *Any R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from above or below. Columns (2) to (5) provide 2SLS regressions that instrument *Stock Duration* using *Any R2000 Inclusion*. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Stock Duration**	**Δ R&D/Assets**	**Δ Income/Assets**	**Earnings Surprise**	**M/B Ratio**
Model:	**OLS**	**2SLS**			
	(1)	(2)	(3)	(4)	(5)
Any R2000 Inclusion	-0.162***				
	(-22.57)				
Stock Duration		0.028***	-0.112***	-0.086	-5.276***
		(4.77)	(-7.08)	(-1.15)	(-8.62)
Stock Duration [t-1]		-0.031***	0.136***	0.131	4.027***
		(-4.93)	(8.23)	(1.56)	(5.22)
Market Cap Decile	-0.033***	0.000**	0.002***	0.022***	0.867***
	(-8.88)	(2.42)	(4.54)	(13.39)	(39.82)
Institutional Ownership	-0.004***	-0.000***	0.000***	0.002***	0.004**
	(-11.26)	(-3.15)	(3.18)	(16.50)	(2.39)
Sales Growth	-0.079***	-0.006***	0.070***	0.050***	0.091**
	(-15.06)	(-6.94)	(27.14)	(5.63)	(2.52)
PPE/Assets	0.451***	0.003***	0.007*	-0.012	-0.529**
	(8.67)	(3.30)	(1.78)	(-0.58)	(-2.33)
Log(Assets)	0.065***	-0.000	-0.006***	-0.024***	-1.638***
	(7.44)	(-0.89)	(-7.58)	(-6.13)	(-39.25)
Leverage	0.017	0.001	-0.015***	-0.085***	5.522***
	(0.57)	(1.09)	(-4.45)	(-5.44)	(44.75)
Capex/Assets	-0.650***		-0.139***	-0.162**	1.357***
	(-9.02)		(-8.29)	(-1.97)	(2.76)
R&D/Assets	0.550***		-0.167***	-0.016	7.927***
	(6.86)		(-14.51)	(-0.46)	(19.22)
Earnings/Assets					0.371**
					(2.22)
R2000 Member [t-1]					0.732***
					(6.93)
R1000 Member [t-1]					0.517***
					(3.73)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	No	No	No	Yes
Obs.	87708	90576	77666	47375	75244

Appendix Table A-5: Robustness Check: Firm-Years with and without Russell 2000 Inclusions

This table provides robustness checks for our main results by separating the sample into firm-years with and without Russell 2000 inclusions from below. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ R&D/Assets**		**Δ Earnings/Assets**		**M/B Ratio**	
Model:	**OLS**		**OLS**		**OLS**	
Sample:	Firm-Years with R2000 Inclusion	Firm-Years without R2000 Inclusion	Firm-Years with R2000 Inclusion	Firm-Years without R2000 Inclusion	Firm-Years with R2000 Inclusion	Firm-Years without R2000 Inclusion
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Duration	0.010***	0.003***	-0.051***	-0.016***	-0.830***	-0.154***
	(3.20)	(8.13)	(-4.26)	(-9.40)	(-3.95)	(-7.52)
Stock Duration [t-1]	-0.009***	-0.004***	0.034***	0.019***	0.517***	0.099***
	(-3.25)	(-9.56)	(3.57)	(11.56)	(3.51)	(4.82)
Market Cap Decile	-0.002	-0.000	0.013*	0.007***	1.496***	0.980***
	(-1.24)	(-0.94)	(1.95)	(9.26)	(11.51)	(46.01)
Institutional Ownership	-0.000*	-0.000**	0.000	-0.000***	0.005	0.010***
	(-1.73)	(-2.15)	(0.50)	(-3.26)	(0.74)	(7.86)
Sales Growth	-0.002	-0.006***	0.055***	0.066***	0.400*	0.334***
	(-0.48)	(-6.76)	(4.25)	(19.27)	(1.76)	(9.74)
PPE/Assets	0.051***	0.029***	0.011	-0.014	-1.414	-1.226***
	(3.36)	(12.43)	(0.14)	(-1.41)	(-1.12)	(-5.51)
Log(Assets)	-0.013***	-0.004***	-0.065***	-0.025***	-2.955***	-1.827***
	(-2.66)	(-7.76)	(-4.48)	(-11.99)	(-10.30)	(-33.26)
Leverage	0.011	0.004**	0.060	-0.084***	8.584***	5.390***
	(0.68)	(2.12)	(0.98)	(-10.48)	(8.53)	(25.79)
Capex/Assets			-0.310*	-0.328***	2.281	1.206***
			(-1.84)	(-15.00)	(1.26)	(3.85)
R&D/Assets			-1.005***	-0.846***	2.515	5.129***
			(-5.69)	(-24.32)	(0.82)	(9.72)
R2000 Member [t-1]					0.074	0.439***
					(0.68)	(9.26)
R1000 Member [t-1]						0.080
						(1.14)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	4470	87444	3653	76051	3530	73670
Adj. R-sq.	0.087	0.017	0.166	0.089	0.422	0.240

Appendix Table A-6: Robustness Check: Controlling for Fund Turnover and Fund Duration

This table provides a robustness test by reporting results that control for Fund Turnover and Fund Duration in our main regression specification. All regressions are 2SLS regressions that instrument *Stock Duration* using *R2000 Inclusion*, which equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ R&D/Assets**		**Δ Earnings/Assets**		**Beat**		**M/B Ratio**	
Model:				**2SLS**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Duration	0.029***	0.028***	-0.129***	-0.126***	-0.123	-0.119*	-5.063***	-4.504***
	(4.92)	(5.11)	(-7.44)	(-7.95)	(-1.63)	(-1.81)	(-10.95)	(-11.90)
Stock Duration[t-1]	-0.028***	-0.028***	0.184***	0.181***	0.160**	0.158**	3.367***	2.858***
	(-5.08)	(-5.15)	(11.63)	(11.83)	(2.20)	(2.25)	(5.35)	(5.08)
Fund Turnover	0.018**		-0.051*		0.100		-5.393***	
	(2.01)		(-1.90)		(0.63)		(-8.21)	
Fund Turnover [t-1]	-0.014*		0.178***		0.112		2.454***	
	(-1.70)		(7.20)		(0.70)		(2.94)	
Fund Duration		-0.007**		0.022**		-0.047		2.172***
		(-2.09)		(2.11)		(-0.80)		(10.04)
Fund Duration [t-1]		0.008**		-0.072***		-0.054		-1.271***
		(2.56)		(-7.66)		(-0.95)		(-3.98)
Controls as in Table 3-5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	No	Yes	Yes
Obs.	91914	90045	78782	77478	48056	47278	76390	75059

Appendix Table A-7: Robustness Check: Controlling for Short-Term and Long-Term Institutional Ownership

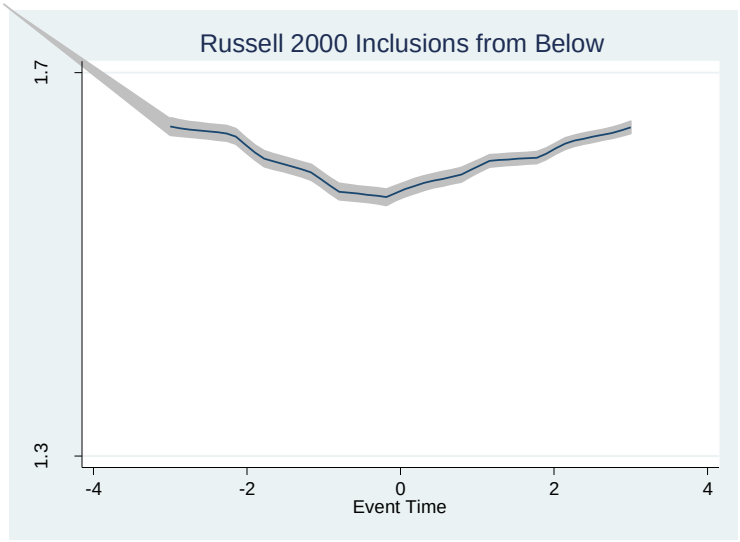
This table provides a robustness test by reporting results that control for short-term and long-term institutional ownership in our main regression specification. We report both OLS regressions and 2SLS regressions. 2SLS regressions instrument *Stock Duration* using *R2000 Inclusion*. *R2000 Inclusion* equals 1 if a firm is added to the Russell 2000 index from below, and 0 otherwise. The sample consists of U.S. firms from Compustat. Observations are at the annual level. All variables are winsorized at 1%. Variables are defined in Appendix Table A-1. *t*-statistics, calculated based on robust standard errors clustered at the firm level, are reported in parentheses. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively.

Dependent Variable:	**Δ R&D/Assets**		**Δ Earnings/Assets**		**Beat**		**M/B Ratio**	
Model:	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Duration	0.004***	0.032***	-0.018***	-0.203***	-0.197***	-0.197***	-0.147***	-5.010***
	(10.72)	(4.47)	(-10.94)	(-7.42)	(-2.67)	(-2.67)	(-7.33)	(-10.08)
Stock Duration[t-1]	-0.004***	-0.026***	0.023***	0.224***	0.146**	0.146**	0.132***	2.951***
	(-11.16)	(-4.58)	(14.37)	(9.64)	(2.05)	(2.05)	(6.55)	(5.12)
Short-Term Institutional Ownership	-0.000*	0.000***	0.001***	-0.001	0.001	0.001	0.023***	-0.044***
	(-1.90)	(2.60)	(9.93)	(-1.60)	(1.15)	(1.15)	(9.78)	(-6.39)
Long-Term Institutional Ownership	0.000***	-0.000	-0.000***	-0.000	0.002	0.002	-0.003	0.031***
	(4.65)	(-0.78)	(-3.35)	(-0.83)	(1.53)	(1.53)	(-1.64)	(8.21)
Controls as in Table 3-5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	No	Yes	Yes
Obs.	91914	90045	78782	77478	48056	47278	76390	75059

Appendix Figure 1: Fund Duration and Fund Turnover around Russell 2000 Index Inclusion

These figures report the evolution of Fund Duration (Panel A) and Fund Turnover (Panel B) in the three years around Russell 2000 inclusions. We report mean values as well as standard errors around the mean. The sample consists of U.S. firms from Compustat.

Panel A: Fund Duration



Panel B: Fund Turnover