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

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July 2016

Abstract

This paper shows that an inflow of short-term institutional investors pressures firms to cut R&D investment to report higher earnings and to generate positive earnings surprises, and also leads to temporary boosts in firm valuations. When these 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 institutions and a permanent increase in institutional ownership and analyst coverage.

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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 investments, 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 may rationally pressure executives to generate positive earnings surprises through investment cuts, which subsequently lead to temporary boosts in the stock price.[2] Short-term investors benefit from such temporarily inflated valuations, as their short horizons ensure that they exit the firm shortly afterwards. As a result, only long-term shareholders eventually suffer from the reduction in investment, which

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

[2] Bolton, Scheinkman, and Xiong (2006) argue that executives, incentivized 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 temporary inflations in the stock price. Nevertheless, they provide cuts to R&D and earnings manipulation as specific examples of such value-destroying activity.

the theory argues is only gradually reflected in firm valuations due to limited arbitrage (caused by differences of opinion and short-sales constraints).[3] Our empirical analyses directly test the model's predictions regarding all three outcome variables, namely how short-term investors are related to long-term investments, short-term earnings and earnings surprises, as well as any reversals in firm valuations.

We provide three main contributions. First, we provide empirical evidence consistent with the predictions from Bolton, Scheinkman, and Xiong (2006, henceforth BSX), using a novel proxy for the presence of short-term institutional investors, who have come to be the dominant force in U.S. equity markets. Second, we address the central challenge of causality by using plausibly exogenous variation in the presence of short-term investors arising from Russell 2000 index inclusions, which we document result in sharp inflows, followed by similar outflows, of short-term investors. Third, we show that our firm valuation results are stronger for firms with fewer analysts and larger differences of opinion, consistent with the importance of the information environment and disagreement for the collective price impact of short-term institutional trading (see also Cremers, Pareek, and Sautner (2016)).

Our empirical proxy for the presence of short-term investors is a new measure of the stock holding duration of institutional investors. This measure, called Stock Duration, was introduced in Cremers and Pareek (2015) and is calculated as the weighted-average length of time that institutional investors have held a stock in their portfolios. The measure is based on quarterly 13F holding reports and weighted by the dollar amount invested across all institutions

[3] Other model 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 against the wishes of shareholders.

currently holding a stock. Stock Duration allows any given institutional investor to be short-term in some stocks and long-term in others; for example because investments within a particular institution are made by different portfolio managers with heterogeneous investment horizons.[4]

A challenge to any analysis of the effects of investor horizons on corporate polices or firm valuations is that changes in investor horizon are endogenous and depend, for example, on a firm's investment opportunities and information environment. We therefore employ an identification strategy that exploits plausibly exogenous variation in holding durations. Specifically, we instrument Stock Duration using new 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). However, index inclusions have shown to be accompanied with significant buying by funds tracking the index (Lynch and Mendenhall (1997)). 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 2SLS identification strategy is similar to Aghion, Van Reenen, and Zingales (2013), who use S&P 500 inclusions as an instrument for changes in institutional ownership. Similar approaches have been used by Greenwood (2008) for the Nikkei 225 and Chang, Harrison, and Liskovich (2015) for the Russell indexes. Note that our approach does not use Russell 2000 *membership* as the instrument (as, for example, in Appel, Gormely, and Keim (2016) or Crane, Michenaud, and Weston (2016)), but rather the specific *event* where a firm gets newly added to the index.

[4] Accounting for this is important as one can only observe institutional holdings at an aggregate institution level if one uses 13Fs. Existing measures such as the classification of institutions as 'transient' (Bushee (1998)), institutional fund turnover or stock turnover do not account for differences in holding durations among stocks within institutional portfolios.

We document that Stock Duration *decreases* sharply—but only temporarily—for stocks newly added to the Russell 2000 'from below.'[5] 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. The subsequent significant decrease in holding duration reflects the entry of many new investors. In economic terms, the average Stock Duration decreases by a substantial 15% from the year before a firm has been added to the index to the year of index inclusion, subsequently reverting back to the old mean within three years. Russell 2000 inclusions from below are further accompanied by large and permanent increases in institutional ownership and analyst coverage, which increases liquidity, eases short-sales constraints, and improves market efficiency (e.g., Boehmer and Kelley (2009); Chang, Dasgupta, and Hilary (2006); Cremers, Pareek, and Sautner (2016)). This supports that Russell 2000 inclusions provide a relevant instrument for temporary changes of the presence of short-term investors, and for longer-term changes in a stock's market environment.

We first study whether firms spend less on R&D, our proxy for long-term investments, 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. In particular, as R&D spending is expensed directly on a firm's income statement, a reduction in these discretionary expenditures allows the firm to report higher current earnings. This can boost the firm's stock price in the short term, if e.g. investors naïvely use earnings-based multiples to derive their estimate of firm value or

[5] We show that our results are robust when using inclusions from both below and above. Nevertheless, we focus in most tests on inclusion from below as they are more than five times as frequent, and trigger larger reductions and a stronger reversal in Stock Duration. We do not look at index exclusions as they are usually due to information-related events, such as bankruptcies, mergers, or acquisitions (e.g., Shleifer (1986); Harris and Gurel (1986)).

misinterpret positive earnings surprises that result from R&D cuts.[6] Therefore, any pressure from short-term investors may cause executives to reduce R&D to report higher earnings, and markets may not be able to immediately determine whether such R&D reductions are suboptimal due to asymmetric information.[7]

We document that firms cut R&D spending, report higher earnings, and generate positive earnings surprises when short-term investors enter as shareholders. We study changes (rather than levels) in R&D and earnings to ensure that our results do not capture any systematic differences in the level of R&D or earnings across firms, which may cause certain investors to buy their shares. The magnitudes of the estimated effects are economically meaningful. For example, a standard-deviation decrease in Stock Duration is associated with a reduction in R&D expenditures of 0.28%, which corresponds to 6% of the standard deviation of the change in R&D (which equals 0.044). Furthermore, we show that the increased presence of short-term investors tends to be temporary only and reverses after a few years. Consistent with this pattern, we find that both R&D expenses and earnings reverse when the inflow of short-term investors also reverses, confirming that the effects from temporary increases in short-term investors are only transitory.

We then show that these changes in the presence of short-term investors are related to firm valuations. As short-term investors move *en masse* into particular stocks, their equity market valuations increase substantially relative to fundamentals—but only temporarily.

[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.

[7] 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.

Contemporaneously, a standard-deviation decrease in Stock Duration (0.7 years) is associated with an increase in the market-to-book ratio of 13%. More importantly, this large valuation increase is followed by a predictable decline in the market-to-book ratio. Economically, a standard-deviation decrease in Stock Duration this year is associated with a decrease in next year's market-to-book ratio of 9%. The market-to-book ratio then reverses back to its initial level over the subsequent year. This predictable reversal is consistent with the previous valuation increase reflecting overvaluation. Taken together, our investment, earnings, and valuation results support the theory in BSX.

We find these results both in OLS regressions and in the 2SLS framework that uses Russell 2000 index additions as our instrument. This supports a causal interpretation of our results, indicating that they are unlikely to be driven primarily by changes in firm-specific or systematic risk that may cause short-term investors to appear, affect firm investment policies, and change valuations.

We corroborate the validity of this identification strategy using a placebo test that addresses the potential concern that the exclusion restriction of our instrument is violated and some of our 2SLS results driven by firm-size effects due the market-cap-based rule of index inclusions.[8] To address this concern, we run placebo tests where we now instrument Stock Duration using a dummy variable that equals 1 for firms with a market cap rank between 2,900 and 3,100, but exclude those firms that were eventually added to the index. The advantage of this approach is that it creates a pseudo-instrument, which captures variation in Stock Duration

[8] Our identification strategy exploits situations where firms were newly added to the Russell 2000 index because their market cap rank increased over the past year. Russell Inc. does not provide information on the market cap used to rank stocks to arrange index reconstitutions, so we follow Chang, Hong, and Liskovich (2015) and predict market cap ranks using publicly available data.

at firms that were *not* added to the index, but that are very similar in size to those firms that were included. This approach is similar to the methodology in Chang, Hong, and Liskovich (2015), as it contrasts our results with counterfactual firms that would have been added to the index had their market caps been only slightly different. We cannot detect any effects of Stock Duration once we use this placebo instrument.

Finally, we investigate the critical assumption in BSX that stock price deviations from fundamentals are caused by market frictions such as differences of opinion and short-sales constraints. This assumption implies that temporary deviations in stock prices due to the in-flow and out-flow of short-term investors are stronger for stocks where information and trading frictions are more pronounced. We document empirical support for this prediction by showing that our misvaluation results only occur among firms that are initially followed by only few analysts—i.e., we cannot detect misvaluation effects in the sample of firms with significant analyst coverage. This corroborates the idea that the short-term boost in stock prices is due to investors not fully incorporating the effects of investment cuts, as these effects are weaker among firms with a stronger information environment. Additionally, we show that our results are substantially stronger among stocks with larger disagreement among financial analysts, as predicted by BSX.

Our paper contributes to a growing empirical literature that links corporate policies to either investor or managerial horizons. Bushee (1998) finds that large ownership by institutions that have high portfolio turnover and engage in momentum trading is associated with lower R&D spending. Derrien, Kecskes, and Thesmar (2015) find that when firms have lower value than predicted by fundamentals, greater long-term investor ownership is associated with more

investment, more equity financing, and less payouts to shareholders.[9] Harford, Kecskes, and Mansi (2016) measure investor horizon using fund turnover and find that firms with more long-term shareholders exhibit better governance (e.g., less fraud and empire building). Polk and Sapienza (2009) find that firms cater in their investment behavior to the tastes of short-term investors. Similarly, firms with more short-term investors, proxied by higher institutional turnover, do worse in takeovers as targets or acquirers (Gaspar, Massa, and Matos (2005); Chen, Harford, and Li (2007)). Ladika and Sautner (2016) show that a sharp decrease in managerial horizon caused by accelerated stock option vesting led to reductions in investment. Edmans, Fang, and Lewellen (2016) also focus on executive horizons and document that imminent vesting of equity incentives is associated with lower investment spending.

Section 2 explains the data and construction of Stock Duration. Section 3 provides our empirical results, and Section 4 concludes.

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 create our Stock Duration measure. 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

[9] Asker, Farre-Mensa, and Ljungqvist (2015) find that public firms not only invest less, but are also less sensitive to investment opportunities than private firms, especially in industries where stock prices are most sensitive to earnings news (see also Gao, Hsu, and Li (2015)).

2011. We use 13F data from 1980 onwards as we require at least five years of holdings data to calculate Stock Duration. 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 a 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 firms included in our study.

2.2 Measuring Stock Duration

Using the methodology introduced in Cremers and Pareek (2015), we calculate the holding duration of each stock for every institutional investor by calculating a weighted-measure of buys and sells by an institutional investor, weighted by the duration for which the stock was held. For each stock in a given institution's portfolio, the holding duration measure is calculated by looking back over the full time period since that particular stock has been held continuously in the portfolio. Intuitively, our variable measures how long a $1 investment in a stock has on average been in an institution's portfolio at a particular point in time.

The calculation of the duration for stock *i* that is included in the institutional portfolio *j* at time *T-1*, for all stocks *i* = 1 … I and all institutional investors *j* = 1 … J, is given by:

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

where

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

$\alpha_{i,j,t}$ = percentage of total 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.

We choose *W* = 20 quarters, as very few stocks are held continuously for longer than five years. If stock *i* is not included in institutional portfolio *j* at time *T-1*, then $Duration_{i,j,T-1} = 0$. 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.

Next, we compute Stock Duration at the individual stock level by averaging institutional stock level $Duration_{i,j,T-1}$ over all institutions currently holding the stock, using as weights each institution's total current holdings in the stock. Table 1, Panel A shows that Stock Duration has a mean (median) of 1.3 (1.29) years across the sample. Stock Duration is fairly instable and mean reverting, as suggested by a negative autocorrelation of -31% (not reported).

Figure 1 reports the evolution of Stock Duration and institutional investor holdings from 1985 to 2011. The average Stock Duration equals less than 1.2 years in 1985, and increases by about 25% to 1.5 years in 2011. Stock Duration has increased in the late 1980s, and saw a drop

in the second half of the 1990s. Since then durations have become longer again (see further Cremers and Pareek (2016)).

We employ for comparison three other measures of institutional investor horizon. The first alternative measure is 'Share Turnover,' defined as the number of shares that are traded divided by the number of shares outstanding. The second measure was introduced by Bushee (1998, 2001), who classifies institutional investors into three groups: 'transient' institutions 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 classification data from Brian Bushee's website and create a variable that measures the percentage of a firm's ownership by transient institutional investors ('Transient Investors') as an alternative proxy for ownership by short-horizon investors. Table 1, Panel A shows that transient institutional investors on average own about 10% of outstanding shares. The third measure is 'Institutional Turnover' which is used, for example, by Gaspar, Massa, and Matos (2005) and Gaspar et al. (2013). The variable is defined as the weighted average turnover of the institutional investors that are holding a given stock. It 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. The variable has a mean (median) of 0.29 (0.27) for our sample.

Appendix Table A-2 shows that the correlation between Stock Duration and Share Turnover equals -36%, the one between Stock Duration and Transient Investors is -24%, and that between Institutional Turnover and Stock Duration equals -51%. These figures suggest that all three 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 the other two measures are calculated at the institution-level, before they are aggregated across all institutions holding a stock. As a result, the last two alternative measures do not allow for heterogeneity in the investment horizon across different stocks in a given institutional portfolio. In contrast, Stock Duration is allowing the same investor 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 an important distinction.

Relatedly, Stock Duration is also different from Share Turnover and Institutional Turnover because both turnover measures do not incorporate which fraction of investor assets is turned over, while Stock Duration weighs the trading by the size of the assets affected by the trading.[10] The main advantage of Share Turnover is that it covers all trading in the stock, while Stock Duration only considers institutional stockholdings rather than all 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 institutional investors have increased their ownership in stocks (see Figure 1). Second, Share Turnover has become more dominated by high frequency traders over time, whose trading occurs at a substantially higher frequency than the valuation changes studied in this paper.

2.3 Russell 2000 Inclusions and Stock Duration

[10] As a simple illustration, a fund may hold 90% of the assets close-to permanently, and have a 1000% turnover of the remaining 10% of transient assets (roundtrip trade about every 25 days), generating a 100% overall turnover rate. This fund's Stock Duration would remain high, with a weight of 90% on the duration of the permanent assets and of only 10% on the short duration of the transient assets.

Trading frequency (or holding horizon) is an endogenous outcome variable, driven by firm fundamentals, investor characteristics and the market environment, which makes it challenging to estimate the causal effects of investor horizons on corporate policies and firm valuation.[11] To mitigate the concern that our results are affected by such endogeneity, we consider changes in holding durations that occur for reasons that are arguably unrelated to unobservables that may also drive corporate policies and firm valuation. Specifically, we look at Russell 2000 inclusions 'from below', i.e., situations 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 Russell 2000 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 June are included in the index. A similar 2SLS identification strategy, using S&P 500 inclusion events, has recently been used in Aghion, van Reenen, and Zingales (2013). Note that our approach does not use general Russell 2000 membership as the instrument (as, for example, in Appel, Gormely, and Keim (2016)), but rather the specific event where a firm gets newly added to the index.

We exploit that Russell 2000 additions are accompanied with significant buying and selling by investors that track the index. Our identifying assumption in these tests is that variation in Stock Duration is driven by the index inclusions themselves rather than by differences in firm policies or firm valuations. In particular, we assume that it is largely random whether stocks are just above or below the index-inclusion cutoffs (e.g., Chang, Hong, and

[11] 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.

Liskovich (2015)). Table 1, Panel B shows that this identification strategy should have sufficient power as there are about 300 index inclusions per year. This is different for index inclusion 'from above' (i.e., Russell 2000 additions of firms previously included in the Russell 1000, but whose market capitalization ranking declined), which occur with a frequency of only about 50 per year. Additionally, we cannot find significant changes in Stock Duration as well as institutional ownership and analyst coverage for stocks added to the Russell 2000 'from above' (see below). While our main results rely only on Russell 2000 additions from below, we verify that results are robust once we also include additions from above. As typical in the literature, we do not look at index *exclusions*, as these are often due to information-related events, such as bankruptcies, mergers, or acquisitions (e.g., Shleifer (1986); Harris and Gurel (1986)).

To motivate the use of our instrument, Figure 2, Panel A plots changes in Stock Duration in a three-year window around Russell 2000 inclusions from below (left chart) or above (right chart). The figure shows a sharp reduction in Stock Duration when a firm is newly added to the index from below. Holding durations decrease from about 1.25 years two years before the inclusion to only slightly above one year in the inclusion year itself, which corresponds to a reduction by almost 30%. The figure also illustrates that the drop in investor horizon is mean-reverting after the inclusion, implying that short-term investors gradually exit the firm once it has been in the index for about two years. Neither the drastic reduction in Stock Duration around the inclusion event, nor its strong subsequent reversal, are present for stocks that are added to the index from above.

Newly added firms further experience an increase in institutional ownership (Figure 2, Panel B) and share turnover (Figure 2, Panel C) when added from below. These effects are more

permanent as both variables do not show the mean-reverting pattern that we can detect for Stock Duration. Finally, we see that the information environment of firms newly added to the Russell 2000 from below changes, as such firms see a sharp increase of almost 50% in analyst coverage (on average from four to six analysts over two years). The change in the information environment is quite different for firms added to the index from above, who on average experience a relatively small drop in analysts only (Figure 2, Panel D).

Table 2 provides a more formal analysis to establish that index inclusions are a relevant instrument for holding durations. We regress Stock Duration on 'R2000 Inclusion,' which is a dummy variable 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. All regressions include year-fixed effects, and we show specifications both without and with firm-fixed effects.

Table 2 shows across all specifications that Stock Duration decreases sharply once a firm is added to the Russell 2000 index. 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 also highly statistically significant, and it is robust to controlling for the ownership by institutional investors and other firm controls. In terms of instrument strength, we find that all *F*-Statistics on our instrument are large and 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 Columns (3) and (4) of Table 2 for our 2SLS methodology in settings with industry- and firm-fixed effects, respectively. 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.

Taken together, the analyses in Figure 2 and Table 2 suggest that changes in Stock Duration around index inclusions are, at least in part, exogenous and driven by trading pressure. We subsequently exploit this exogenous variation in Stock Duration in regressions which link Stock Duration with long-term investment, earnings, and firm valuations. Appendix Table A-3 shows that our results are robust when using inclusions from both below and above as our instrument.

3. Main Results

3.1 Stock Duration 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 expenditures as these are discretionary long-term investments that contemporaneously depress earnings. (In contrast, capital expenditures do not directly affect net income.) Reducing R&D expenditures 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 firm valuations. At the same time, 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 market 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 BSX 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 these R&D reductions are detrimental to long-term firm value.

Table 3 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 Stock Duration. Our dependent variable is defined as 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 cuts in longer-term investments. Looking at changes further avoids that our results capture any systematic differences in the level of R&D across firms, which may cause certain investors to buy their shares. We control for firm characteristics that are likely drivers of firms' investment decisions, such as firm size, investment opportunities, sales growth, and leverage.

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 relation between the change in R&D and 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. In fact, our estimates indicate that the effects of contemporaneous and lagged Stock Duration almost exactly offset each other. The estimated economic magnitudes are meaningful. The OLS regressions in Column (2) suggest that a standard-deviation decrease in Stock Duration (0.7 years) is associated with a decrease in Δ R&D/Assets of (0.004*0.7=) 0.28%, which equals 6% of its sample 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 decrease in the period before.

To address the possibility that our results are driven by unobserved variables such as investment opportunities that may affect both Stock Duration and R&D spending, 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 arrival of short-term investors causes changes in investment decisions, both in terms of statistical significance and in terms of the reversal in R&D spending. The estimated 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 (0.020*0.22=) 0.44% or 10% 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.

Note that the estimated economic magnitude for the 2SLS procedure is somewhat larger than that in the corresponding OLS models in Columns (1) and (2). The reason is that our 2SLS procedure identifies the Local Average Treatment Effect ('LATE'), which is the effect of changes to Stock Duration on R&D for the subset of 'marginal' firms that were added to the Russell 2000 and saw a particularly large shock to investor horizon.[12] In contrast, the OLS estimator captures the association of shortening investor horizons among the average sample firm (see Angrist and Pischke (2009)).

[12] The 2SLS estimations estimate 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 the pressures of newly-arriving investors.

As a robustness check, we provide in Appendix Table A-4 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 the Russell inclusions. As expected, Columns (1) and (2) of Appendix Table A-4 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 reflect a causal effect that stems from the arrival of short-term investors.

3.2 Stock Duration, Earnings, and Earnings Surprises

In the theoretical model of BSX, short-term investors pressure managers to cut investment with the objective to report higher current earnings. These temporarily higher 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 after R&D cuts have been implemented and higher earnings reported. Thus, linking the presence of short-term investors to reported earnings is an important element in testing the economic mechanism in BSX.

Table 4 provides regressions of changes in earnings (net income) and of 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 mirror the previously documented reversal in R&D expenses, as earnings increase only temporarily and decrease again in the subsequent year.[13] 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 (0.014*0.7=) 1%, which equals 6% of its sample standard deviation. This decrease is followed by a reduction in earnings in the year immediately after which is almost identical to the increase in the period before. Our 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 (0.11*0.2=) 2.2% or 13% of the variable's standard deviation, and a decrease in the change in earnings next period that is of similar magnitude.

The regressions in Columns (3) to (4) and (7) to (8) show that these changes in earnings influence analysts, as we find that firms are more likely to beat the forecasts of financial analysts after the arrival of short-term investors. This is consistent with the presence of short-term investors triggering managers to engage in myopic actions to avoid that earnings fall short of analysts' expectations or to exceed their expectations. Our results again hold both for OLS regressions and when we instrument for changes in holding durations using Russell 2000 index additions. Moreover, we continue to find a reversal in the effects of Stock Duration also for the

[13] As we did for R&D expenditures, we provide for robustness in Appendix Table A-4, Columns (3) and (4), OLS regressions for two subsamples: 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; both the contemporaneous positive and the predictive negative relation between Stock Duration and earnings changes are several magnitudes larger in firm-years with index inclusions.

earnings-surprise variable. The 2SLS estimates in Column (7) indicate again an economically meaningful effect, as a standard-deviation reduction in holding duration is associated with an increase in the probability of an earnings surprise of (0.158*0.2=) 3.5%.

3.3 Stock Duration 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) to (3) 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 further 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. First, 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 (3), a standard-deviation decrease in Stock Duration is associated with an increase in the market-to-book ratio of (0.194*0.7=) 14%, which translates into an average percentage change in equity valuations of (14%/2.8=) 4.9%, when calculated relative to mean market-to-book ratio. Second, this contemporaneously negative association is followed by a strong predictive and positive association between 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 (0.129*0.7=) 9%, using the estimates in Column (3). The estimates in Column (4), which include an additional lag of Stock Duration, show that this decrease in Stock Duration is associated with yet another decrease in the market-to-book ratio in the second year following the shock of (0.05*0.7=) 3.5%. This shows 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 our results reflect stock selection by short-term investors rather than the effects of investor horizon, we next estimate in Columns (5) to (8) 2SLS regressions using Russell 2000 inclusion events as an instrument. The estimates show that both the contemporaneous negative and the predicate 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 (8), for example, shows that firms that saw a negative one-standard-deviation shock to their holding duration as they were added to the index experienced an increase in equity valuation of (5.2*0.22=) 1.14 or 41% of the variable's standard deviation. The associated decrease in valuations in next period equals (3.14*0.22=) 0.69.[14] This suggests that these associations are unlikely to be driven primarily by unobservable variables such as changes in risk or systematic news exposures that are strongly time-varying and used by short-term investors for purposes of stock selection. Together with our previous

[14] 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.

findings, this indicates that the arrival of short-term investors and the associated reductions in R&D lead to temporary misvaluation.[15]

Figure 3, Panel A complements this analysis by showing the evolution of market-to-book ratios around the inclusion of stocks to the Russell 2000 from below. 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 three years after the inclusions, providing again strong evidence that the initial increase reflected misvaluation. The pattern also strongly resembles the reversal pattern for Stock Duration around index inclusions from below, 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. 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.

Overall, our results are consistent with the view that short-term investors pressure firms to cut long-term investment, which leads to temporary boosts in earnings and hence to higher short-term valuations. These findings support the theory proposed in BSX.

3.4 Role of Information Environment and Disagreement

A critical assumption in BSX is that temporary deviations in stock prices due to the in-flow and out-flow of short-term investors are stronger for stocks where information and trading frictions are more pronounced. In particular, if the short-term boost in stock prices is due to investors not fully incorporating the effects of myopic investment cuts, then the documented

[15] We show again in Columns (5) and (6) of Appendix Table A-4 that our OLS results are concentrated among firm-years with index inclusions.

effects of short-term investors may 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 the stock, as analyst coverage may reduce information asymmetry. For example, analyst reports may inform the market that current reductions in R&D may temporarily increase income, but could be detrimental to firm value in the long-run. Furthermore, there is evidence that when analyst coverage is high, managers may be less likely to succeed in hiding the long-term costs of myopic behavior from investors (see Yu (2008)).

In Columns (1) through (4) of Table 6 we re-estimate our OLS and 2SLS specifications on samples partitioned by analyst coverage. We split our sample into firms with below- and above-median analyst coverage in a given calendar year. This sample split is likely to generate meaningful differential effects of holding durations, as the median number of analysts is 11 in the high-, but only three in the low-analyst coverage sample. Despite these differences in analyst coverage, Stock Duration is very similar across both samples, with medians (standard deviation) of 1.31 (0.59) years in the low- and 1.38 (0.50) years in the high-coverage subsamples, respectively.[16] As predicted by BSX, we find that the previously documented valuation effects are concentrated among firms that are covered by only few analysts. This finding 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.

Finally, in Columns (5) through (8) of Table 6 we re-estimate our regressions on two additional subsamples to measure a critical prediction of BSX, namely that overvaluation effects

[16] 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. This indicates that Stock Duration is generally lower for firms not covered by analysts at all.

are much larger if disagreement about a stock is more prevalent. We follow related literature and measure differences of opinions about a stock using dispersion in analysts' earnings forecasts (e.g., Diether, Malloy, and Scherbina (2002)). Consistent with the prediction of BSX, we find that the valuation effects are concentrated among firms that face greater disagreement among analysts.

3.5 Placebo Tests for the Identification from Russell 2000 Reconstitutions

Our identification strategy exploits situations where firms were newly added to the Russell 2000 because their market cap rank increased over the past year. We argue that these events neither affect firm fundamentals nor provide new information to the market, as membership in the Russell 2000 is predictable. Our identifying assumption is that variation in holding durations is driven by index inclusions and not by differences in firm policies or values. A potential concern for our analysis is that some of our results may be affected by 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, with these economic shocks rather than the index inclusions potentially driving our results.

To address this concern, Table 7 provides a placebo test where we now 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 pseudo 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

pseudo 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 effects of Stock Duration once we use the placebo instrument. These findings provide us with further comfort regarding the validity of our identification strategy.

3.6 Alternative Holding Horizon Measures

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. Accounting for this may be important as one can only observe institutional holdings at an aggregate institution level if one uses 13Fs. Existing measures such as the classification of institutions as 'transient' or institutional fund turnover do not account for differences in holding durations among stocks within institutional portfolios. As explained above, an important difference between Share Turnover and Stock Duration is that turnover does not incorporate which fraction of the assets is turned over, while Stock Duration weighs the trading by the size of the assets affected by the trading.

However, Stock Duration also has some limitations. In particular, it only considers *institutional* stockholdings rather than total stockholdings, though this has become less of a restriction over time (see Figure 1). Further, 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 Institutional Turnover and 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 than the institution's past holding period in that particular stock.

To analyze whether our specific measure of investor horizon leads to effects that differ from those of alternative measures, we report in Appendix Table A-5 regressions similar to those in Table 2 through Table 5, but we now use Institutional Turnover, Transient Investors, and Share Turnover instead of Stock Duration. The first-stage regressions in Panel A show that all three alternative measures also indicate a reduction in investor horizons around Russell inclusions. The subsequent results in Panels B though D show that the previously documented effects of investor horizon are similar once we use these alternative measures. This indicates that our main results are robust to various alternative proxies for the presence of short-term investors, which mitigates the concerns about the limitations of Stock Duration.

4. Conclusion

We provide evidence that the presence of short-term investors is associated with cuts in long-term investment 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).

Our proxy for the presence of short-term investors is Stock Duration, which is a new measure of the holding durations of institutional investors. A challenge to any analysis of the

effects of investor horizons is that changes in horizon may be endogenous and can depend, for example, on a firm's investment opportunities or information environment. To address this challenge, we employ an identification strategy that instruments Stock Duration 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, Stock Duration *decreases* sharply for stocks newly added to the Russell 2000 'from below,' reflecting the significant entry of many new investors.

We first show that firms with more short-term investors reduce long-term investment, which we proxy using R&D expenditures. R&D is particularly susceptible to myopia because managers generally have broad leeway to quickly reduce or postpone R&D investment to boost current earnings. Furthermore, we find that 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 reduce investment with the objective to inflate earnings. These inflated earnings are likely misinterpreted by investors, as we document that after short-term investors move *en masse* into particular stocks their equity market valuations substantially increase relative to fundamentals. Finally, we provide evidence that supports a critical assumption in Bolton, Scheinkman, and Xiong (2006), namely that stock price deviations from fundamentals are caused by market frictions and differences of opinion.

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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 %) from 1985 to 2011. The sample consists of U.S. firms from Compustat.

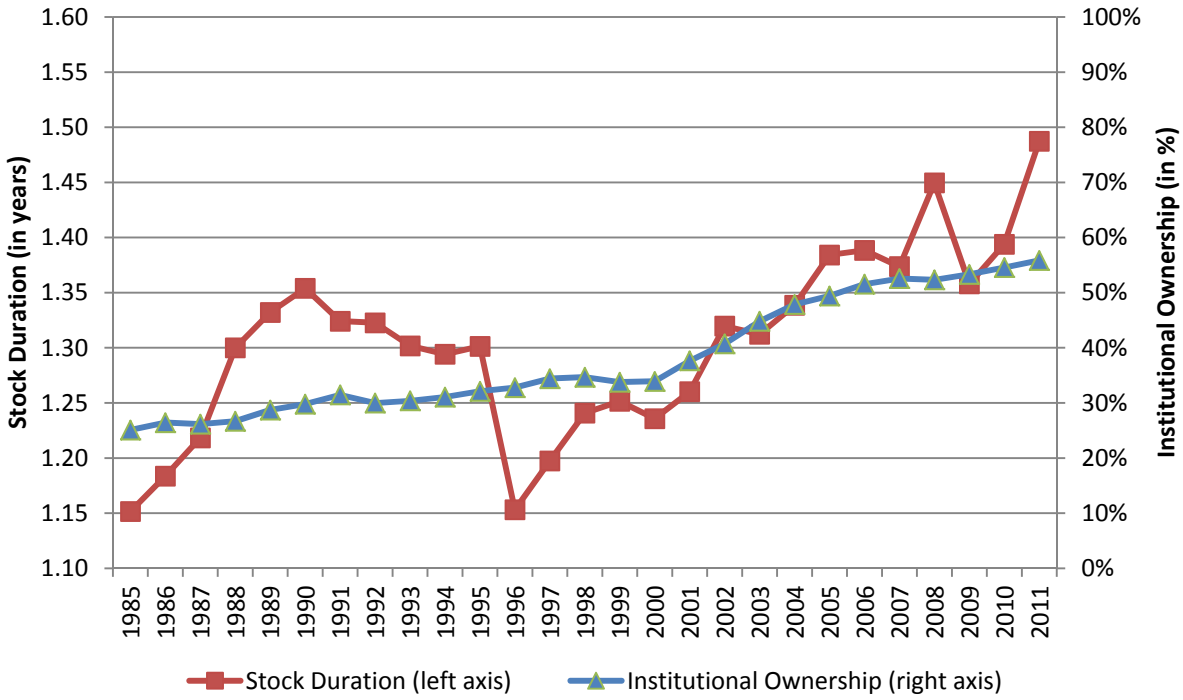
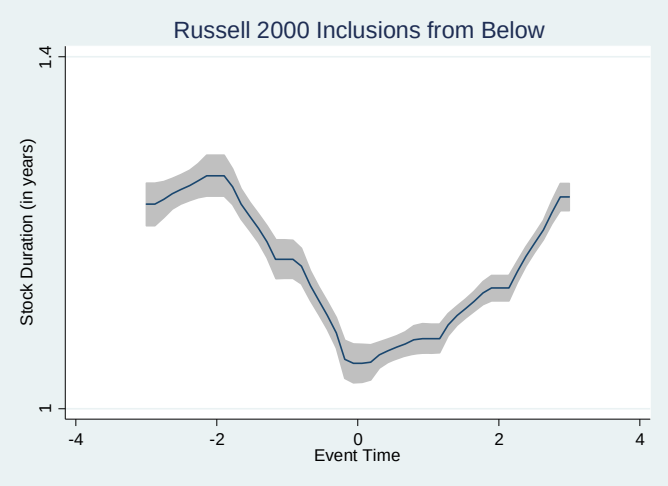
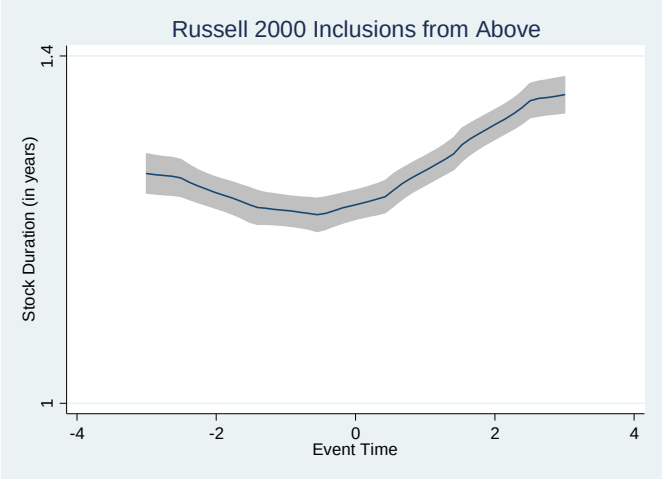


Figure 2: Firm Characteristics around Russell 2000 Index Inclusion

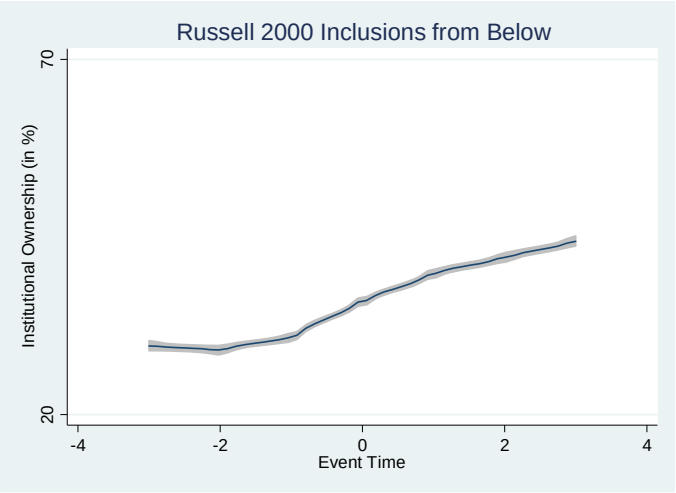
These figures report the evolution of Stock Duration (Panel A), Institutional Ownership (Panel B), Share Turnover (Panel C), and Analyst Coverage (Panel D) in the three years around Russell 2000 inclusions. We contrast Russell 2000 inclusions from below with inclusions form above. We report mean values as well as standard errors around the mean. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011.

Panel A: Stock Duration





Panel B: Institutional Ownership



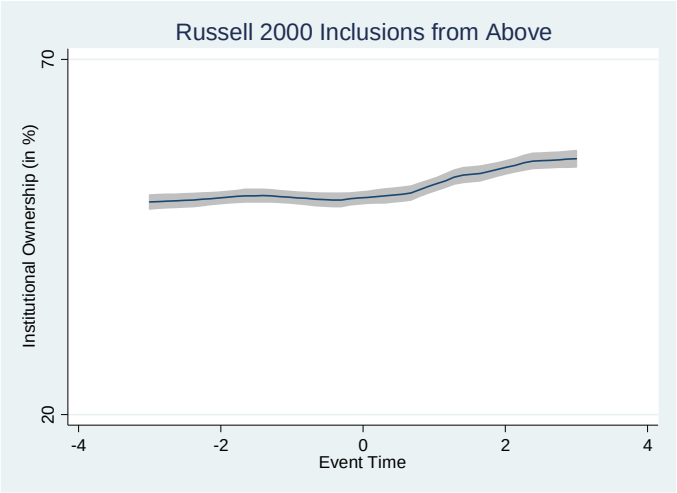
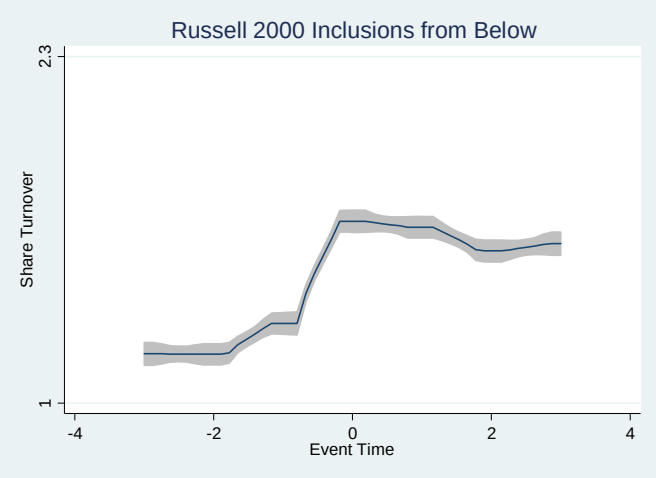
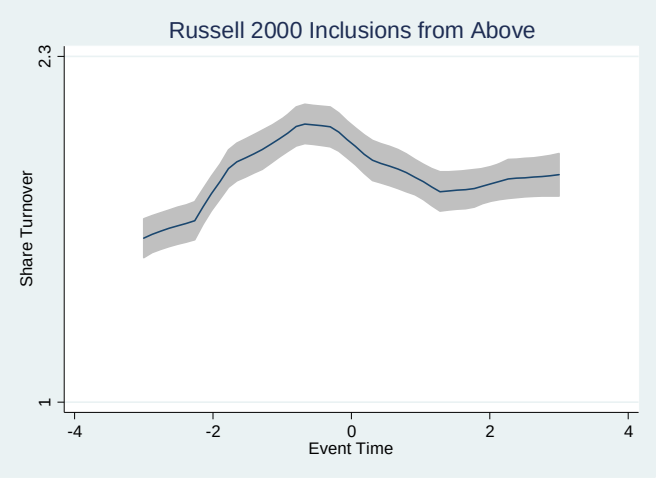


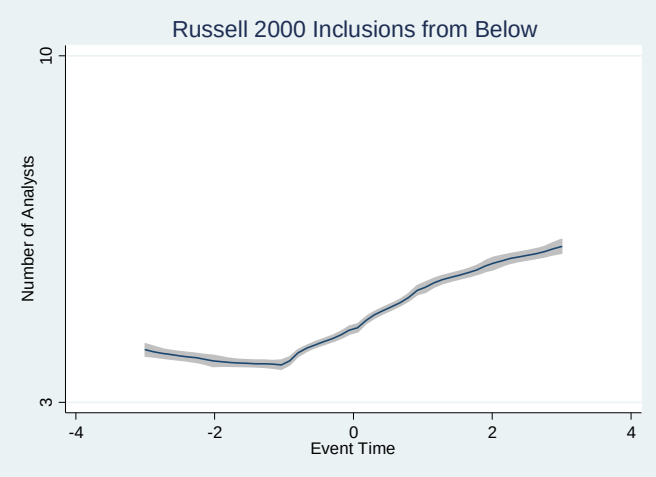
Figure 2 (continued)

Panel C: Share Turnover





Panel D: Analyst Coverage



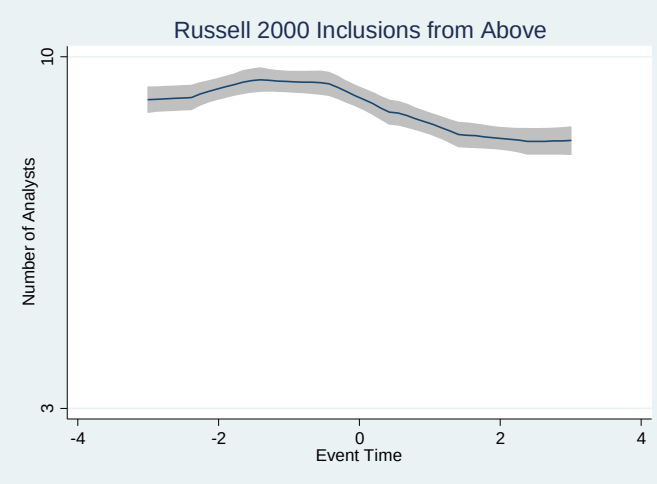
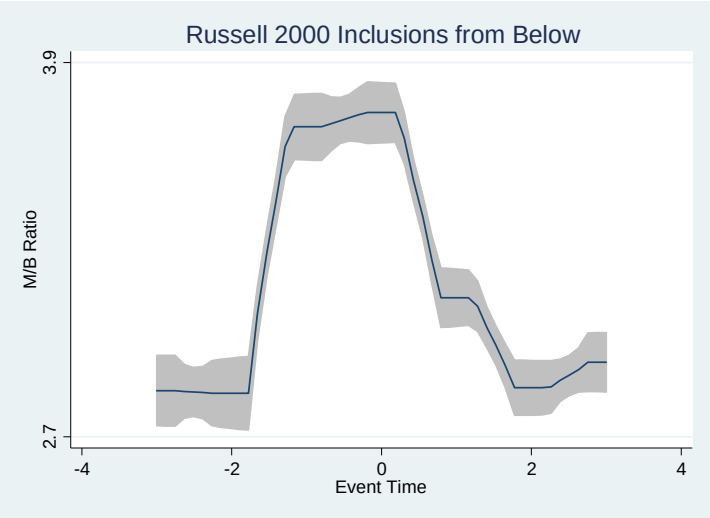


Figure 3: Misvaluation around Russell 2000 Index Inclusion

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. The sample period is 1985 to 2011.

Panel A: Russell 2000 Inclusions from Below



Panel B: Russell 2000 Inclusions from Above

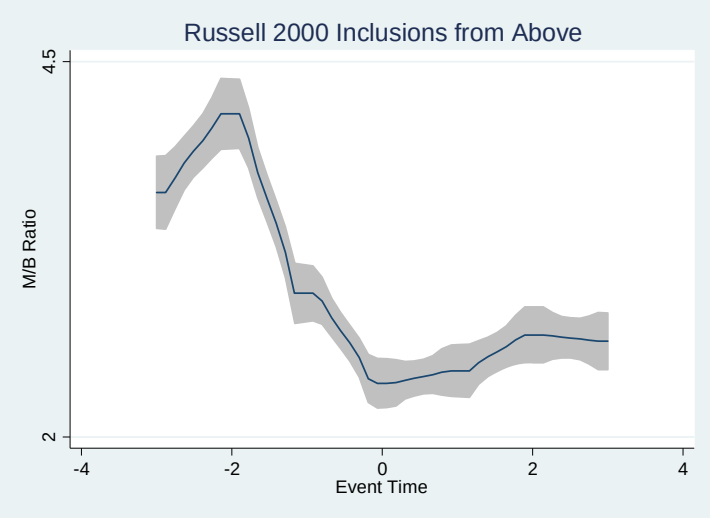


Table 1: Summary Statistics

Panel A reports summary statistics of the firms in the sample. Panel B reports statistics on the number of firms added to the Russell 2000 from below. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. Observations are at the annual level.

Panel A: Firm Characteristics

Variable	Mean	Median	STD	25%	75%	Obs.
Stock Duration (in years)	1.30	1.29	0.68	0.83	1.75	92874
Transient Investors (in %)	9.86	6.63	10.20	1.85	14.58	103125
Institutional Turnover	0.29	0.27	0.12	0.22	0.34	112325
Share Turnover	1.33	0.83	1.45	0.40	1.69	106781
R2000 Inclusion	0.08					112647
R2000 Member	0.37					112647
R1000 Member	0.19					112647
Institutional Ownership (in %)	37.75	33.26	27.61	13.20	59.90	112643
Analyst Coverage	8.04	6.00	6.85	3.00	11.00	55082
Analyst Forecast Dispersion	0.096	0.030	0.204	0.012	0.079	55082
M/B Ratio	2.80	1.79	3.25	1.13	3.07	107090
R&D/Assets	0.04	0.00	0.09	0.00	0.04	110591
Δ R&D/Assets	0.001	0.000	0.044	0.000	0.000	99818
Earnings/Assets	-0.03	0.02	0.22	-0.02	0.07	110471
Δ Earnings/Assets	-0.009	0.000	0.170	-0.029	0.019	99648
Earnings Surprise	0.51					61970
Capex/Assets	0.06	0.04	0.06	0.02	0.07	100960
PPE/Assets	0.25	0.17	0.24	0.05	0.37	109513
Leverage	0.21	0.17	0.21	0.03	0.33	109728
Sales Growth	0.22	0.10	0.60	-0.01	0.26	107765
Log(Assets)	5.60	5.46	2.07	4.06	6.98	110591

Panel B: Russell 2000 Inclusions

Year	R2000 Inclusion		Sample
	# Events	% Firm-Years	Total Firm-Years
1985	160	6%	2867
1986	231	7%	3170
1987	290	8%	3475
1988	311	9%	3456
1989	207	6%	3348
1990	189	6%	3301
1991	342	10%	3419
1992	366	9%	4122
1993	340	7%	4761
1994	390	8%	5073
1995	328	6%	5190
1996	409	7%	5636
1997	418	7%	5721
1998	400	7%	5608
1999	372	7%	5353
2000	487	9%	5241
2001	460	10%	4686
2002	363	8%	4392
2003	268	7%	4137
2004	335	8%	4083
2005	283	7%	4016
2006	271	7%	3885
2007	251	7%	3734
2008	265	7%	3679
2009	278	8%	3491
2010	230	7%	3455
2011	196	6%	3348

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. *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. The sample period is 1985 to 2011. 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	-0.267***	-0.205***	-0.213***	-0.176***
	(-26.88)	(-24.67)	(-21.52)	(-21.15)
Market Cap Decile			-0.017***	-0.035***
			(-5.43)	(-9.65)
Institutional Ownership			0.001***	-0.003***
			(2.60)	(-11.21)
Sales Growth			-0.142***	-0.071***
			(-24.33)	(-14.70)
PPE/Assets			0.408***	0.442***
			(15.65)	(8.74)
Log(Assets)			0.096***	0.063***
			(19.37)	(7.21)
Leverage			-0.212***	0.012
			(-8.93)	(0.41)
Capex/Assets			-1.174***	-0.645***
			(-15.58)	(-9.03)
R&D/Assets			0.381***	0.524***
			(7.62)	(6.75)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	Yes	No	Yes
Obs.	92874	92874	81856	81856
Adj. R-sq.	0.007	0.007	0.102	0.089
# Events (R2000 Inclusion)	4582	4582	3863	3863
F-Statistic (R2000 Inclusion)	722.6	608.7	463.1	447.3

Table 3: Stock Duration 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 (4) 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. The sample consists of US firms from Compustat. The sample period is 1985 to 2011. 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)	0.128***	0.422***	1.233**	1.976***
	(6.95)	(11.05)	(2.43)	(2.66)
Stock Duration [t-1] (x100)		-0.401***		-1.756***
		(-10.52)		(-2.62)
Market Cap Decile	-0.001***	-0.001***	-0.001***	-0.000**
	(-6.53)	(-5.58)	(-5.84)	(-2.10)
Institutional Ownership	-0.000***	-0.000***	-0.000***	-0.000***
	(-7.74)	(-7.22)	(-6.58)	(-4.17)
Sales Growth	-0.006***	-0.006***	-0.004***	-0.006***
	(-7.56)	(-7.50)	(-3.34)	(-5.55)
PPE/Assets	0.002***	0.002***	-0.000	0.002**
	(5.12)	(5.98)	(-0.33)	(2.38)
Log(Assets)	-0.001***	-0.001***	-0.002***	-0.001***
	(-9.18)	(-6.96)	(-5.20)	(-4.01)
Leverage	0.001	0.002***	0.002**	0.002**
	(1.19)	(2.64)	(2.10)	(2.25)
R2000 Member [t-1]	0.005***	0.005***	0.004***	0.003***
	(12.21)	(10.29)	(7.14)	(4.08)
R1000 Member [t-1]	0.011***	0.010***	0.010***	0.008***
	(13.96)	(12.22)	(11.39)	(6.91)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	88727	80073	88727	80073
Adj. R-sq.	0.014	0.017		

Table 4: Stock Duration, 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. The sample period is 1985 to 2011. 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	-0.000	-0.014***	-0.025***	-0.041***	-0.039***	-0.110***	-0.089*	-0.158**
	(-0.79)	(-11.69)	(-5.26)	(-6.17)	(-3.33)	(-5.65)	(-1.88)	(-2.01)
Stock Duration [t-1]		0.018***		0.024***		0.138***		0.179**
		(14.83)		(3.77)		(7.38)		(2.02)
Market Cap Decile	0.007***	0.006***	0.030***	0.030***	0.006***	0.004***	0.029***	0.028***
	(18.52)	(16.35)	(13.68)	(13.29)	(14.60)	(6.46)	(15.40)	(11.88)
Institutional Ownership	0.000***	0.000***	0.002***	0.002***	0.000***	0.000***	0.002***	0.002***
	(10.45)	(9.20)	(12.80)	(12.00)	(9.31)	(4.23)	(13.17)	(11.80)
Sales Growth	0.065***	0.068***	0.029***	0.034***	0.059***	0.069***	0.017*	0.035***
	(27.70)	(25.85)	(4.84)	(5.10)	(20.98)	(24.24)	(1.68)	(3.65)
PPE/Assets	0.023***	0.018***	0.015	0.010	0.040***	0.005	0.044*	-0.011
	(9.77)	(7.58)	(0.90)	(0.57)	(7.13)	(1.01)	(1.71)	(-0.43)
Log(Assets)	-0.003***	-0.003***	-0.009***	-0.011***	0.000	-0.005***	-0.004	-0.015***
	(-6.53)	(-6.94)	(-2.88)	(-3.21)	(0.34)	(-4.83)	(-0.75)	(-3.08)
Leverage	-0.024***	-0.023***	-0.115***	-0.112***	-0.032***	-0.017***	-0.129***	-0.100***
	(-8.76)	(-8.39)	(-7.31)	(-6.66)	(-8.08)	(-4.49)	(-7.84)	(-5.83)
Capex/Assets	-0.214***	-0.189***	-0.277***	-0.255***	-0.262***	-0.134***	-0.376***	-0.173*
	(-18.66)	(-15.92)	(-4.87)	(-4.19)	(-13.72)	(-7.32)	(-4.19)	(-1.87)
R&D/Assets	-0.189***	-0.178***	-0.002	-0.014	-0.176***	-0.172***	0.003	0.000
	(-23.03)	(-20.51)	(-0.06)	(-0.38)	(-15.55)	(-14.60)	(0.11)	(0.01)
R2000 Member [t-1]	-0.025***	-0.021***	-0.014*	-0.015*	-0.023***	-0.011***	-0.013*	-0.002
	(-18.90)	(-16.09)	(-1.80)	(-1.82)	(-16.03)	(-5.10)	(-1.94)	(-0.19)
R1000 Member [t-1]	-0.048***	-0.042***	-0.089***	-0.092***	-0.046***	-0.027***	-0.089***	-0.072***
	(-21.14)	(-19.02)	(-6.94)	(-6.74)	(-20.32)	(-8.16)	(-7.71)	(-4.37)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	80839	73024	48229	44209	80839	73024	48229	44209
Adj. R-sq.	0.100	0.107	0.040	0.040				

Table 5: Stock Duration and Misvaluation

This table examines whether the presence of short-term investors is associated with misvaluation. 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 included in the Russell 2000 index from below. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. 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)	(5)	(6)	(7)	(8)
Stock Duration	-0.016	-0.146***	-0.194***	-0.187***	-6.269***	-8.911***	-5.602***	-5.198***
	(-0.64)	(-6.09)	(-8.83)	(-8.16)	(-15.83)	(-13.28)	(-9.64)	(-10.29)
Stock Duration [t-1]		0.211***	0.129***	0.115***		5.707***	3.550***	3.142***
		(8.23)	(5.88)	(5.50)		(8.76)	(4.86)	(5.55)
Stock Duration [t-2]				0.047**				0.008
				(2.22)				(0.02)
Market Cap Decile	1.024***	0.981***	1.044***	0.990***	0.905***	0.809***	0.890***	0.851***
	(51.60)	(47.69)	(46.14)	(42.37)	(52.29)	(38.42)	(39.50)	(38.05)
Institutional Ownership	-0.003***	-0.003***	0.012***	0.012***	-0.001	-0.006***	0.001	0.001
	(-3.04)	(-3.51)	(9.41)	(8.92)	(-1.42)	(-6.45)	(0.66)	(0.56)
Sales Growth	0.536***	0.539***	0.276***	0.237***	-0.427***	-0.103	0.044	0.028
	(15.89)	(14.60)	(8.03)	(6.18)	(-5.59)	(-1.45)	(1.18)	(0.73)
PPE/Assets	-1.750***	-1.779***	-1.190***	-1.168***	0.976***	-0.657***	-0.237	-0.117
	(-17.85)	(-17.28)	(-5.11)	(-4.67)	(4.87)	(-3.67)	(-0.94)	(-0.46)
Log(Assets)	-1.215***	-1.178***	-1.958***	-1.943***	-0.633***	-0.875***	-1.691***	-1.702***
	(-41.24)	(-37.83)	(-34.03)	(-31.29)	(-14.85)	(-23.26)	(-38.97)	(-38.44)
Leverage	4.124***	4.029***	5.977***	5.939***	2.606***	3.269***	5.818***	5.853***
	(26.54)	(24.35)	(27.07)	(25.16)	(16.40)	(20.36)	(43.53)	(42.41)
Capex/Assets	3.260***	3.466***	1.113***	1.044***	-4.763***	0.836	0.711	0.580
	(9.97)	(9.90)	(3.45)	(3.06)	(-7.56)	(1.35)	(1.37)	(1.19)
R&D/Assets	6.006***	6.330***	6.845***	1.676***	7.791***	7.264***	7.931***	0.548***
	(16.11)	(15.48)	(11.75)	(6.95)	(22.42)	(19.47)	(18.99)	(2.98)
Earnings/Assets	-0.632***	-0.494**	1.359***	7.310***	-0.711***	-1.075***	0.197	8.535***
	(-3.12)	(-2.15)	(6.12)	(11.39)	(-4.09)	(-5.22)	(1.11)	(19.51)
R2000 Member [t-1]	0.705***	0.719***	0.219***	0.251***	0.985***	1.412***	0.729***	0.727***
	(16.00)	(15.23)	(5.16)	(5.56)	(17.59)	(16.66)	(6.73)	(7.95)
R1000 Member [t-1]	-0.430***	-0.328***	-0.189***	-0.081	0.027	0.670***	0.514***	0.591***
	(-5.72)	(-4.18)	(-2.71)	(-1.09)	(0.30)	(5.32)	(3.67)	(4.65)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Obs.	77983	70480	70480	63484	77983	70480	70480	61785
Adj. R-sq.	0.322	0.318	0.245	0.240				

Table 6: Effects of Stock Duration: 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. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. 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. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. 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)	(5)
Stock Duration	-0.042	0.089	0.119	4.124	5.707
	(-1.15)	(0.96)	(0.35)	(1.09)	(1.28)
Stock Duration [t-1]	0.044	-0.065	-0.093	3.212	1.108
	(1.17)	(-0.73)	(-0.28)	(0.88)	(0.36)
Market Cap Decile	-0.002**	0.008***	0.032***	1.053***	1.241***
	(-2.12)	(3.93)	(6.09)	(13.37)	(9.55)
Institutional Ownership	-0.000***	0.000***	0.002***	-0.003	0.040***
	(-3.04)	(3.97)	(4.86)	(-1.55)	(3.55)
Sales Growth	-0.007***	0.073***	0.046	1.528***	0.662***
	(-3.81)	(13.38)	(1.21)	(6.77)	(3.21)
PPE/Assets	0.002	0.013	-0.004	-4.828***	-4.264***
	(0.72)	(1.00)	(-0.04)	(-8.21)	(-3.70)
Log(Assets)	-0.001	-0.005*	-0.014	-1.814***	-2.314***
	(-1.27)	(-1.89)	(-0.71)	(-14.90)	(-10.10)
Leverage	0.002	-0.019**	-0.106**	5.797***	6.262***
	(0.92)	(-2.55)	(-2.11)	(16.21)	(29.08)
Capex/Assets		-0.184***	-0.214	12.887***	5.469***
		(-4.14)	(-0.60)	(6.60)	(3.60)
R&D/Assets		-0.194***	-0.027	-0.429	3.300***
		(-10.64)	(-0.60)	(-1.21)	(3.20)
R2000 Member [t-1]	0.009***	-0.030***	-0.026	4.657***	6.145***
	(2.59)	(-3.52)	(-0.89)	(9.46)	(6.09)
R1000 Member [t-1]	0.016***	-0.056***	-0.108**	0.569*	0.234
	(3.18)	(-4.32)	(-2.42)	(1.66)	(0.53)
Earnings/Assets				-0.456	-0.417
				(-0.89)	(-0.70)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	Yes
Obs.	80073	73024	44209	70670	70670

Appendix Table A-1: Definitions of Variables

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

Variable	Definition
Stock Duration (in years)	The weighted average time that a stock has been in the portfolios of institutional investors holding that stock.
R2000 Inclusion	A dummy that equals one if a firm is newly added to the Russell 2000 index from below.
Any R2000 Inclusion	A dummy that equals one if a firm is included from below or above into the Russell 2000 index.
Market Cap Decile	The decile in which a firm ranks in a given year with regards to its market capitalization in the sample.
Institutional Turnover	The weighted average of the turnover of institutional investors holding a given stock. Institutional Turnover is calculated using changes in the quarterly holdings over the past 4 quarters. The stock-level weights are calculated using the current holdings in the stock in each institutional portfolio.
Transient Investors (in %)	The 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.
Share Turnover	The number of a firm's shares that are traded throughout the year divided by the number of shares outstanding.
Institutional Ownership (in %)	The percentage ownership by institutional investors.
Analyst Coverage	The number of analysts following a firm.
Analyst Forecast Dispersion	The 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	The 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	The year-on-year change in net income before extraordinary items over total assets from [t-1] to [t].
Earnings Surprise	A dummy that equals one if reported EPS is more than the mean analyst consensus forecast for the fiscal year.
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	The 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	A dummy that equals one if a firm is a member of the Russell 2000 index.
R1000 Member	A dummy that equals one if a firm is a member of the Russell 1000 index.

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)
Stock Duration	(1)	1.00															
Transient Investors	(2)	-0.24	1.00														
Institutional Turnover	(3)	-0.51	0.32	1.00													
Share Turnover	(4)	-0.36	0.40	0.30	1.00												
Institutional Ownership	(5)	0.08	0.59	0.02	0.36	1.00											
Analyst Coverage	(6)	0.14	0.10	-0.14	0.15	0.26	1.00										
M/B Ratio	(7)	-0.07	0.12	0.13	0.14	0.07	0.15	1.00									
R&D/Asses	(8)	-0.14	0.05	0.16	0.21	-0.07	-0.05	0.26	1.00								
Δ R&D/Assets	(9)	0.03	-0.05	-0.05	-0.04	-0.03	-0.01	-0.05	0.23	1.00							
Earnings/Assets	(10)	0.08	0.05	-0.10	-0.07	0.15	0.15	0.00	-0.51	-0.23	1.00						
Δ Earnings/Assets	(11)	-0.01	0.09	0.08	0.00	0.04	0.01	0.08	-0.09	-0.44	0.44	1.00					
Earnings Surprise	(12)	-0.01	0.14	0.05	0.08	0.14	0.04	0.05	0.01	-0.02	0.09	0.09	1.00				
Capex/Assets	(13)	-0.09	-0.05	0.04	0.01	-0.09	0.10	0.03	-0.09	0.03	0.07	-0.05	-0.05	1.00			
PPE/Assets	(14)	0.10	-0.10	-0.09	-0.15	-0.10	0.14	-0.09	-0.25	0.02	0.07	-0.01	-0.05	0.66	1.00		
Leverage	(15)	0.07	-0.05	-0.06	-0.12	-0.02	0.04	0.00	-0.27	-0.01	-0.06	-0.03	-0.06	0.12	0.35	1.00	
Sales Growth	(16)	-0.19	0.08	0.17	0.15	-0.03	-0.02	0.17	0.13	-0.08	0.00	0.20	0.04	0.08	-0.05	-0.03	1.00
Log(Assets)	(17)	0.34	0.10	-0.26	0.04	0.39	0.60	-0.06	-0.33	-0.03	0.18	0.02	0.07	-0.11	0.10	0.29	-0.12

Appendix Table A-3: Robustness Checks: 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 (6) provide 2SLS regressions that instrument *Stock Duration* using *Any R2000 Inclusion*. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. 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 Earnings/Assets**	**Earnings Surprise**	**M/B Ratio**	
Model:	**OLS**	**2SLS**				
	(1)	(2)	(3)	(4)	(5)	(6)
Any R2000 Inclusion	-0.158***					
	(-22.88)					
Stock Duration		0.023***	-0.088***	-0.192**	-8.832***	-5.394***
		(3.31)	(-4.92)	(-2.30)	(-13.30)	(-8.85)
Stock Duration [t-1]		-0.023***	0.102***	0.233**	6.859***	3.701***
		(-3.38)	(5.62)	(2.52)	(10.25)	(5.02)
Market Cap Decile	-0.036***	-0.000	0.004***	0.027***	0.806***	0.901***
	(-10.06)	(-1.61)	(7.70)	(11.23)	(38.38)	(38.95)
Institutional Ownership	-0.004***	-0.000***	0.000***	0.002***	-0.007***	0.003*
	(-11.36)	(-3.99)	(5.36)	(12.28)	(-6.68)	(1.88)
Sales Growth	-0.073***	-0.006***	0.068***	0.035***	0.050	0.064*
	(-14.98)	(-6.23)	(25.43)	(4.05)	(0.77)	(1.74)
PPE/Assets	0.447***	0.003***	0.012***	-0.021	-1.186***	-0.328
	(8.83)	(3.37)	(2.96)	(-0.94)	(-7.44)	(-1.38)
Log(Assets)	0.066***	-0.001***	-0.004***	-0.017***	-0.977***	-1.716***
	(7.59)	(-4.22)	(-4.49)	(-3.96)	(-29.26)	(-38.51)
Leverage	0.012	0.002**	-0.020***	-0.095***	3.568***	5.840***
	(0.40)	(2.14)	(-5.71)	(-5.87)	(23.34)	(44.01)
Capex/Assets	-0.647***		-0.159***	-0.132	2.602***	0.913*
	(-9.07)		(-9.63)	(-1.58)	(4.55)	(1.84)
R&D/Assets	0.531***		-0.171***	0.009	7.047***	7.945***
	(6.85)		(-14.87)	(0.26)	(19.12)	(18.96)
Earnings/Assets		0.003***	-0.014***	-0.000	1.432***	0.725***
		(4.09)	(-6.80)	(-0.00)	(17.10)	(6.68)
R2000 Member [t-1]		0.007***	-0.031***	-0.067***	0.752***	0.514***
		(6.65)	(-9.66)	(-3.90)	(5.96)	(3.59)
R1000 Member [t-1]					-1.128***	0.265
					(-5.47)	(1.50)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	No	No	No	No	Yes
Obs.	81856	78788	71911	43530	69527	69527

Appendix Table A-4: Robustness Checks: 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. The sample period is 1985 to 2011. 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	0.012***	0.003***	-0.053***	-0.016***	-0.933***	-0.154***
	(3.18)	(7.59)	(-4.03)	(-8.89)	(-3.92)	(-7.13)
Stock Duration [t-1]	-0.010***	-0.004***	0.036***	0.018***	0.669***	0.101***
	(-2.93)	(-8.90)	(3.11)	(10.42)	(3.63)	(4.56)
Market Cap Decile	-0.003	-0.000**	0.015**	0.008***	1.571***	1.025***
	(-1.30)	(-2.15)	(2.07)	(10.37)	(11.40)	(46.11)
Institutional Ownership	-0.000*	-0.000***	0.000	-0.000	0.006	0.011***
	(-1.75)	(-3.30)	(0.42)	(-0.97)	(0.82)	(8.09)
Sales Growth	-0.002	-0.006***	0.051***	0.064***	0.364	0.315***
	(-0.34)	(-6.16)	(3.82)	(17.94)	(1.55)	(8.89)
PPE/Assets	0.051***	0.030***	0.025	-0.010	-1.386	-1.208***
	(3.12)	(12.10)	(0.27)	(-0.98)	(-1.06)	(-5.36)
Log(Assets)	-0.017***	-0.006***	-0.060***	-0.018***	-3.103***	-1.915***
	(-2.98)	(-9.85)	(-3.54)	(-8.18)	(-9.76)	(-33.05)
Leverage	0.013	0.005**	0.070	-0.093***	9.204***	5.721***
	(0.76)	(2.54)	(1.08)	(-10.77)	(8.80)	(25.77)
Capex/Assets			-0.321*	-0.322***	1.926	1.119***
			(-1.87)	(-14.25)	(1.02)	(3.47)
R&D/Assets			-1.013***	-0.858***	2.766	5.217***
			(-5.49)	(-24.31)	(0.88)	(9.67)
R2000 Member [t-1]	0.010**	0.007***	-0.038**	-0.040***	0.048	0.468***
	(2.17)	(9.75)	(-2.00)	(-12.93)	(0.21)	(9.18)
R1000 Member [t-1]		0.011***		-0.062***		0.097
		(10.84)		(-14.45)		(1.30)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3737	76336	3354	70498	3233	68153
Adj. R-sq.	0.105	0.020	0.178	0.097	0.421	0.234

Appendix Table A-5: Alternative Horizon Measures

This table uses Institutional Turnover, Transient Investors, and Share Turnover instead of Stock Duration as a proxy for investor horizon. Panel A examines whether firms that are added to the Russell 2000 experience a reduction in these measures of investor horizon (first-stage regressions). Panel B to D relate our alternative proxies for investor horizon to R&D expenditures, earnings, and misvaluation. The sample consists of U.S. firms from Compustat. The sample period is 1985 to 2011. 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: Russell 2000 Inclusion: First-Stage Regressions

Dependent Variable:	**Institutional Turnover**	**Transient Investors**	**Share Turnover**
Model:		**OLS**	
	(1)	(2)	(2)
R2000 Inclusion	0.023***	1.974***	0.537***
	(13.55)	(16.91)	(21.76)
Market Cap Decile	0.003***	0.617***	0.099***
	(6.76)	(18.84)	(13.15)
Institutional Ownership	0.001***	0.272***	0.015***
	(22.34)	(116.43)	(33.35)
Sales Growth	0.019***	1.164***	0.316***
	(18.70)	(22.16)	(22.15)
PPE/Assets	-0.034***	-2.191***	-0.843***
	(-10.21)	(-9.94)	(-18.22)
Log(Assets)	-0.007***	-0.782***	-0.187***
	(-10.15)	(-18.83)	(-19.65)
Leverage	0.021***	1.160***	0.220***
	(6.70)	(5.59)	(4.93)
Capex/Assets	0.132***	6.446***	3.002***
	(13.17)	(10.17)	(19.17)
R&D/Assets	0.078***	1.102***	1.847***
	(10.01)	(2.62)	(15.87)
R2000 Member [t-1]	-0.011***	-0.050	0.360***
	(-7.18)	(-0.46)	(18.40)
R1000 Member [t-1]	-0.033***	-2.835***	0.456***
	(-13.91)	(-14.15)	(11.74)
Year-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No
Obs.	89420	84012	89445
Adj. R-sq.	0.120	0.614	0.260
F-Statistic (R2000 Inclusion)	183.55	286.1	473.52

Appendix Table A-5 (continued)

Panel B: R&D Expenditures

Dependent Variable:	Δ R&D/Assets					
Model:	OLS			2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Institutional Turnover	-0.017***			0.198		
	(-8.08)			(0.93)		
Institutional Turnover [t-1]	0.021***			-0.064		
	(10.51)			(-0.52)		
Transient Investors		-0.000***			0.000	
		(-10.01)			(0.22)	
Transient Investors [t-1]		0.000***			0.002*	
		(13.29)			(1.72)	
Share Turnover			-0.004***			-0.010***
			(-12.71)			(-3.65)
Share Turnover [t-1]			0.004***			0.019***
			(14.63)			(3.98)
Controls as in Table 3	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	No
Obs.	96809	86658	90006	96809	86658	90006
Adj. R-sq.	0.0152	0.0172	0.0239			

Panel C: Earnings

Dependent Variable:	Δ Earnings/Assets					
Model:	OLS			2SLS		
	(7)	(8)	(9)	(10)	(11)	(12)
Institutional Turnover	0.119***			-5.235**		
	(12.77)			(-2.43)		
Institutional Turnover [t-1]	-0.110***			2.762**		
	(-12.67)			(2.20)		
Transient Investors		0.002***			0.010***	
		(15.22)			(3.07)	
Transient Investors [t-1]		-0.002***			-0.026***	
		(-19.17)			(-5.52)	
Share Turnover			0.006***			0.078***
			(5.51)			(6.17)
Share Turnover [t-1]			-0.012***			-0.170***
			(-11.14)			(-7.07)
Controls as in Table 4	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	No	No	No	No
Obs.	89176	80650	82851	89176	80650	82851
Adj. R-sq.	0.071	0.075	0.069			

Panel D: Misvaluation

Dependent Variable:	M/B Ratio					
Model:	OLS			2SLS		
	(13)	(14)	(15)	(16)	(17)	(18)
Institutional Turnover	1.799***			-94.292***		
	(14.42)			(-3.16)		
Institutional Turnover [t-1]	0.115			49.253***		
	(1.07)			(4.14)		
Transient Investors		0.025***			1.057***	
		(15.66)			(3.59)	
Transient Investors [t-1]		-0.014***			-1.271**	
		(-10.50)			(-2.33)	
Share Turnover			0.210***			2.026***
			(16.02)			(11.85)
Share Turnover [t-1]			-0.122***			-1.449***
			(-10.25)			(-3.29)
Controls as in Table 5	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	86143	78050	80022	86143	78050	80022
Adj. R-sq.	0.3099	0.3301	0.3041			