Characteristic-Based Expected Returns and Corporate Events*

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Abstract

We propose that expected returns estimated for the broad market based on observable firm characteristics provide a simple and useful benchmark for assessing whether returns to a given set of stocks are abnormal. To illustrate, we document that the apparently abnormal long-run returns after six important corporate events, including initial and seasoned public equity offerings, mergers and acquisitions, dividend initiations, share repurchases and stock splits, are substantially reduced or eliminated when actual event stock returns are compared to characteristic-based expected returns. A simple five-characteristic specification relying only on firm size, book-to-market ratio, profitability, asset growth, and return momentum performs as well as more complex specifications. This analysis supports the conclusion that returns after corporate events are largely explained by the return-relevant characteristics of the firms engaging in the events.

Keywords: benchmark returns, abnormal long-run returns, expected returns, firm characteristics.

JEL classification: G14; G30

1. Introduction

Numerous authors have examined long run returns to firms engaging in important corporate events. One frequently-used method to assess whether returns to these firms are abnormal is to compare long run "buy-and-hold" returns across event firms and control firms selected on the basis of firm characteristics such as market capitalization or market-to-book equity ratio. Another common method is to estimate "calendar time alphas", by regressing returns to a portfolio of event firms on market-based factors motivated by asset pricing models. While conclusions vary somewhat across methods and events, the literature reports considerable evidence of abnormal returns after corporate events.[1]

Each of these methods relies on assumptions regarding normal or benchmark returns. The use of control firms matched on firm characteristics such as size or market-to-book ratio relies on the evidence that these characteristics help to explain average returns in the overall stock market, but also implicitly makes the strong assumption that expected returns to event firms depend *only* on the characteristics used to select control firms. Similarly, calendar time portfolio methods implicitly assume that expected returns to event firms depend *only* on firm sensitivities to the factors employed in the regressions.

In practice, finance researchers have documented that average equity returns are related to a large number of observable variables. Haugen and Baker (1996) demonstrate that a set of forty six observable variables has significant forecast power for next month stock returns. Lewellen (2015) shows for a more recent sample that expected returns derived from cross-sectional regressions using fifteen firm characteristics predict well subsequent month actual returns. Harvey, Liu, and Zhu (2015) report that researchers have collectively documented over

[1] See, for example, Fama (1998), Loughran and Ritter (2000), Kothari and Warner (2007), and Bessembinder and Zhang (2013). We discuss the evidence on long-run stock returns after these events in section 3.1.

three hundred variables with apparently significant explanatory power for the cross-section of stock returns. Green, Hand, and Zhang (2014) report that twenty four "return predictive variables" forecast stock returns in multivariate cross-sectional regressions, each with t-statistics in excess of the 3.0 threshold recommended by Harvey, Liu, and Zhu (2015).

In this paper, we propose and evaluate a simple new approach to assessing whether the average returns realized by a set of securities are abnormal. In particular, we estimate expected returns for the full cross-section of stocks based on commonly-used characteristics. We then assess whether returns to event firms are abnormal by comparing event firm realized returns to characteristic-based expected returns for the same firms.

To illustrate the method, we compute average abnormal returns over thirty six and sixty month intervals after a set of important corporate events, including initial and secondary public equity offerings, mergers and acquisitions, dividend initiations, share repurchases and stock splits. Using standard methodology from the literature we are able to reproduce the findings of statistically significant abnormal long run event returns, even in our updated sample. However, when we estimate abnormal returns relative to characteristic-generated expected returns, we find that abnormal long horizon returns are either greatly reduced or are statistically insignificant for all six events.

These results hold for various set of firm characteristics, including the broad set of forty six characteristics studied by Haugen and Baker (1996), the reduced set of fourteen characteristics drawn from Lewellen (2015), and a simple set of only five characteristics (firm size, market-to-book ratio, profitability, momentum, and asset growth) that underlie the risk factors in important recent asset pricing models including Carhart (1997), Fama and French (2015) and Hou, Xue, and Zhang (2015).

It is important to note that the firm characteristics we rely on have been shown by earlier authors to have explanatory power for the entire cross-section of stocks, not just returns to the event firms we study. Further, our study includes more than twenty years of data subsequent to the period studied by Haugen and Baker (1996) and the key results we report continue to hold in the later sample. Observers may disagree as to whether the statistically significant relations between average returns and firm characteristics represent compensation for risk, mispricing, or some form of collective data snooping. Under any of these interpretations, our findings support the conclusion that the apparently abnormal long run returns to firms undergoing the six events we study are largely explained by the firms' observable characteristics and relations between characteristics and returns that apply to the entire market. Therefore, event-specific explanations are not required.

Of course, characteristic-based expected returns could not explain returns to event firms absent systematic differences in firm characteristics across event firms and non-event firms. We show that firms that engage in the six corporate events we study indeed differ from other firms in terms of key characteristics. In particular, firms engage in mergers and acquisitions, seasoned equity offerings, share repurchases and stock splits tend to be larger than non-event firms, while IPO firms tend to be smaller. With the exception of firms initiating dividends and share repurchases, event firms tend to have lower book-to-market ratios than non-event firms, and with the exception of firms announcing mergers and acquisitions and IPO firms, event firms tend to have higher recent returns. Firms initiating dividends and those announcing share repurchases and stock splits tend to be more profitable and have lower rates of asset growth, while firms issuing equity in both initial and secondary offerings tend to have higher levels of asset growth relative to non-event firms.

In addition to showing that the apparently anomalous returns after corporate events are substantially explained by characteristic-based expected returns, we focus attention on a research design issue that can be of first order importance, but is rarely discussed. Tests of whether abnormal returns differ from zero can focus on simple or continuously compounded (log) returns. Most tests using the calendar time portfolio method study simple returns. In contrast, tests that consider "buy-and-hold" returns implicitly focus on continuously compounded returns, because the buy-and-hold return will be equal across an event stock and its matched control stock only if the mean continuously compounded return is equal.

As is well known, the mean simple return to any stock exceeds the mean continuously compounded return as an increasing function of the return variance. We document that the variance of event-stock returns differs significantly from the variance of size-and-book-to-market matched control-stock returns for all six corporate events we study. The implication is that inference with regard to whether event firm returns are abnormal is likely to differ depending on whether researchers examine simple returns, as is typical when using the calendar time method, or when using continuously compounded returns, as is implicit when using the buy-and-hold return method. The characteristic-based method introduced here can be used either to model expected simple returns or expected log returns.

The method we propose to assess whether average returns to a set of event firms are abnormal is similar in intent to the selection of control stocks that are matched to the event firms in terms of observable characteristics such as size or market-to-book ratio, since these characteristics are typically chosen because they are known to be related to returns.[2] However,

[2]See, among many others, Loughran and Ritter (1995), Brav, Geczy, and Gompers (2000), and Eckbo, Masulis, and Norli (2007). In addition, some authors select matching firms based on a similar estimated propensity to engage in the event. Li and Zhao (2006) identify a matching firm for SEOs with the closest propensity score, based on firm size, book-to-market ratio, and prior stock returns, finding that SEOs and their matching firms have similar returns

our method can be used to control for as many observable characteristics as desired, while matching on a large number of characteristics is unlikely to be practical. Further, our approach is more direct, as we compare realized returns to estimates of expected returns for the same stocks. Also, since our proposed method focuses directly on average returns, it avoids statistical issues such as skewness and fat tails known to be problematic for BHAR studies. The method can also be readily adapted to provide equal weight to each event (as in the BHAR approach) or equal weight to each time period (as in the calendar time portfolio approach). Perhaps most important, the method is simple to implement, particularly if the set of characteristics is limited to the five (firm size, market-to-book ratio, asset growth, past returns, and profitability) characteristics that we show to work well in our sample.

2. Samples of Corporate Events

To illustrate the potential usefulness of characteristic-based benchmark returns, we consider six important corporate events, each of which has been found in earlier studies to be associated with abnormal post-event long-run stock returns. The events are mergers and acquisitions (M&As), seasoned equity offerings (SEOs), initial public offerings (IPOs), announcements of dividend initiations, share repurchase announcements, and stock split announcements. Fama (1998) summarizes the sometimes conflicting evidence regarding long-run stock returns after the six events. Bessembinder and Zhang (2013) examine four of these events (M&As, SEOs, IPOs, and dividend initiations), showing that event firms differ from size and market-to-book matched firms in terms of other characteristics, including idiosyncratic volatility, liquidity, and rates of asset growth. The conflicting evidence regarding the existence

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over one to three years after the SEO. Similarly, Petrova and Shafer (2010) find that acquirers and their propensity-score-matched control firms identified based firm size, book-to-market ratio, and ROA earn similar long-run returns.

of abnormal returns in combination with evidence that event firms are unusual in terms of characteristics known to be related to returns motivates our analysis of whether characteristic-based expected returns can explain realized returns after important corporate events. Since we examine returns over the thirty six months after each event we exclude from each sample any follow on announcement of the same event that occurs at the same firm within the thirty six months.

We obtain data on four of the six events from the SDC database, whose coverage starts in 1980. Therefore, we focus our analysis on the period 1980 to 2014. We identify firms engaging in mergers and acquisitions based on the criteria that the deal must be a merger (SDC form "M"), acquisition of majority interest ("AM"), acquisition of remaining interest ("AR"), or acquisition of partial interest ("AP"). Also, following Betton, Eckbo, and Thorburn (2008), we require the acquisition to be a control bid, i.e., the acquirer owns less than 50% of the target firm before the acquisition and intends to control the target. In addition, following Moeller, Schlingemann, and Stulz (2004) and Harford and Li (2007) we require that the transaction value must be more than $5 million and that the transaction value must be more than 5% of the acquirer's market capitalization before deal announcement, to exclude small transactions that will not have material impacts on the acquirer. Our sample contains 4,681 such mergers and acquisitions.

Our samples of SEOs and IPOs are also retrieved from the SDC database. Following Eckbo, Masulis, and Norli (2007), we exclude American Depository Receipts, Global Depository Receipts, unit offerings, financial firms (SIC codes between 6000 and 6999) and utilities (SIC between 4900 and 4999) from the sample of SEOs. Real Estate Investment Trusts, closed-end funds, and American Depository Receipts are excluded from the sample of IPOs, following Loughran and Ritter (1995). Our sample includes 7,128 SEOs and 10,438 IPOs.

We identify share repurchases from the SDC merger and acquisition database with deal form of "buyback." SDC might record multiple announcements of the same repurchase from different sources (Banyi, Dyl, and Kahle, 2008). Therefore, we only keep the first announcement if a firm announces multiple share repurchases in the same month. Our sample consists of 13,310 such share repurchase announcements.

We form our sample of dividend initiations following Michaely, Thaler, and Womack (1995) and Boehme and Sorescu (2002). Specifically, we identify cash dividends initiated between 1980 and 2014 from the CRSP daily event file, requiring that the security is common stock (share code 10 or 11) and has been listed in the CRSP database for more than two years, and that the frequency of cash dividend is monthly, quarterly, semiannual, annual, or unspecified. Our sample contains 1,475 such dividend initiations.

Finally, we identify announcements of stock splits from the CRSP distribution master file, based on distribution code "5523" and a split factor greater than 0.25 (corresponding to a five-for-four split). Our sample contains 8,147 stock splits to common stocks (share code 10 or 11) over the period 1980-2014.

Panel A of Table 1 reports the total number of events in the sample, while Panel B reports the number of events by year. The frequency of events varies significantly over time. For example, the number of M&As ranges between zero in 1983 to 348 in 1998, while that of stock splits ranges between 10 in 2009 and 553 in 1983.

3. Long-run stock returns of event firms relative to matched firms

We first verify that our sample of firms undergoing corporate events display long run returns that appear to be abnormal, as documented by other authors for earlier samples. To do

so, we report buy-and-hold abnormal returns (BHARs) measured for event firm *e* over *T* months after a corporate event at month 0 as:

$$BHAR_{eT} = \prod_{t=1}^{T}(1+r_{et}) - \prod_{t=1}^{T}(1+r_{ct}) = \exp\{\sum_{t=1}^{T}\ln(1+r_{et})\} - \exp\{\sum_{t=1}^{T}\ln(1+r_{ct})\},$$

where r_{et} and r_{ct} are the month *t* stock returns of the event firm and its matched control firm, respectively. Note that the BHAR for an event firm is zero if the mean log return is equal across the event firm and the control firm, implying that BHAR tests are equivalently tests regarding equality of mean log returns.

We identify matching firms on a monthly basis using methods similar to Loughran and Ritter (1995), Barber and Lyon (1997) and Eckbo, Masulis, and Norli (2000). For each event firm we select a matching control firm based on firm size. Brav, Geczy, and Gompers (2000) show that selecting a control firm based on both firm size and book-to-market ratio significantly reduces apparently abnormal long run returns in the cases of SEOs and IPOs. To assess the sensitivity of our results to this matching criterion, we identify a second matching control firm based on both size and book-to-market ratio.

For events other than IPOs, we select the size-matched control firm as that with the closest market capitalization at the end of the latest December before the event. To be included, the matching firm of a certain event must not be in our sample of the event during the six years around the event date. For IPOs, the size-matched firm has the closest but greater market capitalization at the end of the December after the IPO, following Loughran and Ritter (1995). The matching firm must have been publicly traded for more than three years.

The size and BM-matched control firms are selected in a similar way. For events other than IPOs, the matched firm is selected as the firm with the closest book-to-market ratio among firms with market capitalization between 70% and 130% of the event firm. Market capitalization

is measured as of the latest December prior to the deal. Following Eckbo, Masulis, and Norli (2000), the book equity is measured as of fiscal year *t*-1 if the event occurs in July to December of year *t*. Otherwise the book equity is from fiscal year *t*-2. This is to make sure that the BM ratio is known at the time of matching. Each IPO firm is matched with the firm having the closest BM with a greater market capitalization at the end of December following the IPO. The book equity is measured as of fiscal year *t*-1.

We then compare stock returns of event firms to matched firms over the 36 months following each event.[3] In addition to measuring buy-and-hold-abnormal returns (BHARs) over thirty six month periods, we estimate mean differences in log and simple returns over the 36 month horizon by OLS regressions of the monthly difference in stock return between the event firm and its matching firm on a constant, using two specifications. In the first we pool all observations and report the full sample coefficient on the constant, thereby placing equal weight on each event. In the second, we conduct cross-sectional (Fama-MacBeth, 1973) regressions each month, and report the time series average of the resulting coefficients.[4] The two methods differ only in the weights used to compute the means, as the pooled regressions place equal weight on each event while the Fama-MacBeth regressions effectively place less weight on observations that occur in periods with more events. Corporate events tend to cluster over time, possibly as a result of firms' efforts to time the market. Loughran and Ritter (2000) propose that tests that weight events equally are more likely to detect abnormal performance than tests that weight periods equally. We present both pooled and Fama-MacBeth regression results to assess robustness of results with regard to the issue.

[3] The event window is truncated if the event firm delists within 36 months. We exclude corporate events after 2011 from the BHAR analysis in order to examine 36-month BHARs. These events are included in all the other analyses.
[4] As stock returns are highly correlated across firms in each month, we follow Petersen (2009) in reporting standard errors clustered by time for the pooled regressions.

3.1 Differences in BHARs and log returns

In column (2) of Table 2 we report average BHARs for each of the six events. Panel A reports results when the control firm is selected based only on firm size, while Panel B reports results for size and book-to-market control firms. Consistent with the earlier literature and as discussed further below, these mean BHARs differ significantly from zero for all events. BHARs are negative for firms engaging in mergers and acquisitions, seasoned equity offerings, and initial public offerings, and are positive for firms initiating dividends, announcing share repurchases, and stock splits. Focusing first on Panel A, BHARs for the events with negative outcomes range from -26.26% for M&As to -39.39% for IPOs. BHARs for the events with positive outcomes range from 11.33% for stock splits to 15.49% for share repurchases. All BHARs are highly significant statistically, as the smallest absolute t-statistic is 4.45.

Comparing column (2) across Panels A and B of Table 2, we observe that, consistent with Brav, Geczy, and Gompers (2000), we generally find that BHARs are closer to zero when control firms are selected based on both size and market to book ratio for M&As, SEOs, IPOs, and dividend initiations. However, BHARs are actually slightly larger for share repurchases and stock splits on Panel B as compared to Panel A. Further, all BHARs remain statistically significant in our sample, even when control firms are selected based on both size and market to book ratio.

Bessembinder and Zhang (2013) note that while a test of whether mean log returns are equal across event and control firms is equivalently a test of whether BHARS are zero, BHARs are skewed and have fat tails, making statistical inferences less reliable, as documented by Barber and Lyon (1997), Lyon, Barber, and Tsai (1999) and Mitchell and Stafford (2000). In the second and third columns of Table 2 we report mean differences in log returns across event

and control firms, by the pooled and Fama-MacBeth methods, respectively. The associated t-statistics indicate that these mean returns differ significantly from zero in all cases. Figure 1 displays the pooled mean differential between event firm and control firm log returns from column (3) of Table 2, Panel A.

Focusing on Panel A of Table 2, the mean log return for firms conducting mergers and acquisitions is lower than for control firms by 0.80% per month in the pooled specification and by 0.50% in the Fama-MacBeth specification. A finding of long term underperformance for this sample is consistent with Loughran and Vijh (1997), Rau and Vermaelen (1998), and Betton, Eckbo, and Thorburn (2008). Firms engaging in SEOs have mean log returns that are 0.79 percent per month lower than control firms by the pooled method and 0.73% per month less by the Fama-MacBeth method. Finding negative abnormal long run returns for firms engaging in SEOs is consistent with Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Jegadeesh (2000), and Eckbo, Masulis, and Norli (2007).

For the IPO sample, the mean log return is 1.18% per month lower than for matched firms in the pooled sample and 1.02% lower by the Fama-MacBeth method. IPO firms underperform their matching firms by 40% over the three years after IPO, a result consistent with prior studies including Loughran and Ritter (1995) and Eckbo, Masulis, and Norli (2007).

In contrast, the evidence indicates higher returns to event firms for dividend initiations, share repurchases and stock splits. For the sample of dividend initiations the mean log returns is higher by 0.43% and 0.62% by the pooled and Fama-MacBeth methods. For firms that engage in share repurchases the average log return exceeds that of the control firm by 0.47% and 0.50% per month by the pooled and Fama-MacBeth methods, while for the stock split sample the mean log return to the event firm exceeds that to the control firm by 0.33% by both the pooled and

Fama-MacBeth methods. Finding positive abnormal long run returns to firms initiating dividends is consistent with Michaely, Thaler, and Womack (1995) and Boehme and Sorescu (2002), while our results with respect to share repurchases are consistent with Ikenberry, Lakonishok, and Vermaelen (1995) and Peyer and Vermaelen (2009). Finding positive abnormal returns after stock splits is consistent with Ikenberry, Rankine, and Stice (1996), Desai and Jain (1997), and Ikenberry and Ramnath (2002).

The results for BHARs and mean log returns reported on Table 2 show that we replicate in our updated sample the key findings from the prior literature. In particular, long run abnormal returns appear to be negative for firms engaging in M&As, IPOs, and SEOs, while long run abnormal returns appear to be positive for firms engaging in dividend initiations, share repurchases, and stock splits.

3.2 Differences in return volatility across event and matched control firms, and the use of mean simple returns to assess performance

We also report on Table 2 the average difference in the standard deviation of monthly returns for event firms vs. their matched control firms in the thirty six months after corporate events. While many researchers, including those referenced in the prior section, study BHARs after corporate events, others have studied simple returns, most often while implementing the calendar time portfolio method.[5] The research design choice to study simple versus log returns will be potentially important to the conclusions drawn when return volatilities differ across event and control firms.

The results on Table 2 indicate that returns to event firms are more volatile than returns to control firms in the cases of M&As, SEOs, and IPOs, while event firm returns are less volatile

[5]See, among others, Boehme and Sorescu (2002), Ikenberry and Ramnath (2002), Eckbo, Masulis, and Norli (2007), Betton, Eckbo, and Thorburn (2008), and Peyer and Vermaelen (2009).

than control firm returns in the cases of dividend initiations, share repurchases and stock splits. The differences in return volatilities across event and control firms are especially large for SEOs (4.23% per month) and IPOs (4.89% per month) when the match is based only on firm size. With one exception (stocks splits with size-based control firms) average volatilities differ significantly across event and control firms for all six events, whether matching firms are selected based on size or size and market to book.

As is well known, mean simple returns exceed mean log returns as a positive function of return variances. The larger return volatilities for event firms in the cases of M&As, SEOs, and IPOs therefore imply that these event firms will perform better relative to control firms when the focus is on simple as compared to log returns. Since these are firms with negative average BHARs, the implication is that measured abnormal returns will be less negative or potentially even positive when researchers study simple returns after M&As, SEOs, and IPOs. In contrast, the smaller return volatilities for event firms in the cases of dividend initiations, share repurchases and stock splits imply that these firms will perform worse relative to control firms when the focus is on simple returns rather than log returns. Since these are firms with positive average BHARs, the implication is that measured abnormal returns will be less positive or potentially even negative when researchers study simple returns after dividend initiations, share repurchases and stock splits.

Differences in mean simple returns across event and control stocks, also reported on Table 2, confirm this simple reasoning. The statistically and economically significant underperformance of M&A, SEO, and IPO firms apparent when focusing on log returns is reduced or eliminated when comparing average simple returns. For example, the pooled sample difference in log returns for SEO firms compared to size-based control firms is -0.79% per

month, while the corresponding pooled sample difference in mean simple returns is -0.22% per month, and is not statistically significant. The pooled sample difference in average log returns for IPO firms as compared to size-based control firms is -1.18% per month for IPO forms, compared to a corresponding difference in average simple returns of -0.33% per month, which is also not statistically significant.

Similarly, the economically and statistically significant positive abnormal returns to firms engaging in dividend initiations, share repurchases and stock splits observed when focusing on log returns is diminished or eliminated when focusing on simple returns. For example, the pooled mean difference in log returns for firms initiating dividends as compared to size-based control firms is 0.43% per month, as compared to a statistically insignificant 0.08% per month when focusing on average simple returns.

We do not take a stance as to whether researchers should study simple or log returns when assessing abnormal performance. Rather, our intent is to demonstrate that, since event firms tend to differ significantly from other firms in terms of return volatility, conclusions regarding the existence of abnormal returns will likely differ depending on the choice to study simple returns, as is typical in calendar time portfolio studies, versus log returns, as is implicit in studies that compute BHARs.

In addition, the results on Table 2 demonstrate that average abnormal returns are closer to zero for all six corporate events we study when the focus is on simple returns rather than log returns. In light of this observation we focus most of our attention in the remainder of this paper on the greater challenge, which is to explain the mean log returns to event firms.

4. Firm Characteristics and Expected Stock Return

We propose an alternative method to assess whether long-run returns to a set of stocks of interest are abnormal. We exploit the fact that returns are known to be related to a set of observable firm characteristics. In particular, we estimate expected returns on a monthly basis by simple cross-sectional regressions of returns on characteristics measured as of the prior month. We then assess whether returns are abnormal by comparing realized returns to characteristic-based expected returns for event stocks. As a robustness test we also compare realized returns across event stocks and control stocks selected based on similarity of the characteristic based expected returns. For researchers who prefer to study log returns the comparison is of actual log returns to expected log returns, while for researchers who prefer to study simple returns the comparison is of actual simple returns to expected simple returns.

Our proposed approach is similar in intent to the use of control firms that are matched to event firms based on firm characteristics. However, Bessembinder and Zhang (2013) document that event firms often differ significantly from other firms in terms of several characteristics. Attempts to match event and control firms in multiple dimensions are likely to lead to poor match quality as the number of matching characteristics increases. Our proposed method allows for differences between event and non-event firms in numerous characteristics, captured through a single metric, the characteristic-based expected return for the firm and month.

4.1 Firm characteristics that predict stock return

Haugen and Baker (1996) document that a set of forty six observable characteristics contains significant explanatory power for one-month ahead returns. We confirm this finding for our updated sample period, and also show that expected returns based on these characteristics can successfully explain the apparent abnormal returns to event firms. However, in the interest

of parsimony, we also consider smaller sets of characteristics, including fourteen characteristics selected based on the evidence reported by Lewellen (2015), and a set of only five characteristics selected based on their prominence in recent asset pricing research.

The forty six characteristics studied by Haugen and Baker (1996) relate to firm risk, liquidity, stock price level, firm growth potential, and prior stock returns. We provide in Appendix B detailed definitions of the characteristics. We also consider a reduced set of fourteen characteristics, drawn from the fifteen studied by Lewellen (2015). The exception is that we do not include stock issuance as a variable to estimate expected returns, because we intend to evaluate long-run stock returns after equity offerings. Appendix A defines the fourteen firm characteristics. Lewellen shows that these firm characteristics successfully predict future stock returns.

In addition, we study a subset of only five firm characteristics: firm size, book-to-market ratio, stock returns over the prior twelve months, profitability as measured by return on assets (ROA), and the firm's rate of investment as measured by year-on-year growth in total assets. These characteristics correspond to the risk factors in the recently proposed asset pricing models of Fama and French (2015) and Hou, Xue, and Zhang (2015), except that we include momentum based on the evidence in Carhart (1997) and subsequent studies, and exclude firm's beta on the market return. For brevity we refer to the forty six Haugen and Baker (1996) characteristics as the C46 model, to the fourteen characteristics drawn from Lewellen (2015) as the C14 model, and to the reduced set of five characteristics as the C5 model.

One advantage of the Haugen and Baker C46 variables is that their forecast power for the cross-section of stock returns was first documented in data spanning 1979 to 1993. Thus, the

success of the C46 in forecasting returns in the second half of our sample indicates that the results are unlikely to be attributable to collective data snooping.

Table 3 presents summary statistics regarding the firm characteristics, each measured on a monthly basis. Following Lewellen (2015), we winsorize each firm characteristic at the upper and lower 1% level in each month. Also following Lewellen (2015), we exclude firm months with missing firm size, book-to-market ratio, stock return momentum, ROA, or investment rate from analyses based on the C5 or C14 model, and exclude firms months with missing firm size, book-to-price ratio, momentum stock return over the prior 12 months, or ROA from analyses based on the C46 model. We focus on the period from January 1970 to December 2014 because our corporate event samples start in 1980 and in some specifications we rely on up to ten years of prior data to estimate stock returns.[6]

4.2 Expected stock returns

We estimate expected stock returns for each firm/month following the method of Haugen and Baker (1996) and Lewellen (2015). For each month *t*, we estimate a cross-sectional regression of firm stock returns on firm characteristics measured as of the end of month *t*-1. We then compute the average coefficient on each firm characteristic over the previous 12 months, and estimate the expected stock return in month *t* based on firm characteristics at the end of month *t*-1 and the average coefficients over months *t*-1 to *t*-12. (We assess sensitivity of results to averaging coefficients over longer horizons in Section 5.3.3 below). In order to make coefficients on firm characteristics comparable across characteristics and time, we normalize each firm characteristic in each month by subtracting the cross-sectional mean and dividing by the cross-sectional standard deviation. That is, all firm characteristics have mean of zero and variance of one. We implement this procedure for both simple and log returns. Following

[6] The Haugen-Baker 46 characteristics are not available until 1978.

Haugen and Baker (1996), we replace missing normalized characteristics with the sample mean, i.e., zero.

Table 4 reports average coefficients on the firm characteristics over the period January 1970 to December 2014. Panel A of Table 4 reports on the 5-characteristic and 14-characteristic models. In column (1), we observe that all characteristics except ROA in the C5 model are significantly associated with next-month simple stock returns. Simple stock returns are negatively associated with firm size and investment outlays, and positively associated with BM ratio, 12-month momentum return, and ROA. In column (3) we observe similar results for log returns, except that log returns are positively rather than negatively related to firm size and that the coefficient on ROA is significant.

Column (2) of Table 4 Panel A presents average coefficients on the C14 characteristics when forecasting simple returns. The C5 characteristics have the same sign as in column (1) and remain statistically significant. Six of the additional nine characteristics (accruals, idiosyncratic risk, illiquidity, leverage, market beta, and sales to price ratio) are also statistically significant, while the coefficients on three characteristics (dividend payout, long run prior return, and turnover rate) are insignificant. Column (4) reports corresponding results obtained when forecasting log returns. These are generally similar, except that the turnover ratio is significant while market beta becomes insignificant.

Panels B and C of Table 4 report average coefficients obtained when focusing on simple and log returns, respectively, for the forty six firm characteristics of Haugen and Baker (1996), supplemented by ten industry indicator variables also employed by them. Approximately half of the individual coefficients are significant, and the adjusted *R*-squared statistics of .077 for simple returns and .087 for log returns are higher than corresponding statistics for the C5 and C14

models. On balance, these results verify that the C5, C14, and C46 characteristics have statistically significant forecast power for next-month stock returns in our sample.

4.3 Do expected returns forecast actual returns?

We next assess the extent to which expected returns as described in the preceding section are successful in predicting actual returns. To do so, we first estimate cross-sectional regressions of actual returns on expected returns, on an individual stock basis. Results are reported on Panel A of Table 5. Ideal forecasts would yield a slope coefficient of one and an intercept equal to zero.

Focusing first on simple returns, estimated slope coefficients from the C5 and C14 models are 0.80 and 0.54 respectively, while the estimated slope coefficient from the C46 model is 0.47. Each slope coefficient differs significantly from zero, indicating significant forecast power, but each also differs significantly from one. The intercept for the C5 model does not differ significantly from zero, while that for the C14 model is marginally significant (t-statistic = 1.71) and that for the C46 model is significant (t-statistic = 2.56).

The models show greater success in forecasting log returns. Estimated slope coefficients when regressing actual log returns on expected log returns are 0.80, 0.75, and 0.64 for the C5, C14, and C46 models, respectively, and none of the three intercepts differ significantly from zero. On balance these results indicate that, while all three models of expected returns have forecast power for subsequent realized returns, the simple C5 model performs best as the estimated slope coefficient is closest to one and the estimated intercept is indistinguishable from zero for both simple and log returns.

To further asses the usefulness of these models in forecasting returns, we sort stocks into decile portfolios based on expected returns from each model, and then computed average

realized returns on both an equal and value-weighted basis for each portfolio.[7] Results for equal-weighted returns to portfolios formed based on predicted simple returns are reported on Panel B of Table 5, while Panel C reports corresponding results when stocks are assigned to portfolios based on expected log returns.

These results confirm that the characteristic-based models succeed in forecasting returns. The spread in realized returns for the highest expected return decile versus the lowest decile is always positive and statistically significant for the characteristic-based models. In Panel B for equal-weighted returns, the spread ranges from 3.31% per month for the C46 model to 2.51% per month for the C5 model. Corresponding results for value-weighted returns include spreads ranging from 1.53% for the C5 model to 1.63% for the C14 model. All return spreads are statistically significant at the .01 level. Results in Panel C for portfolios formed based on expected log returns are broadly similar.

We conclude from this analysis that the characteristic-based models have considerable empirical success in predicting stock returns. We next turn to the central issue addressed in this paper, whether expected returns derived from the characteristic-based models can explain returns in the months after corporate events.

5. Firm Characteristics and Abnormal Returns After Corporate Events

5.1 Differences in firm characteristics for event vs. non-event firms

The results reported in Section 4 verify that characteristic-based models have explanatory power in the full cross section of stocks. We are interested in assessing whether characteristic-based expected returns can help to explain the apparently abnormal returns in the months after

[7] Equal weighted means are adjusted for biases attributable to microstructure noise using the RW method of Asparouhova, Bessembinder, and Kalcheva (2013).

firms engage in important corporate events. For this explanation to be plausible, it must be the case that firms engaging in these events differ systematically from other firms in characteristics that are important in determining expected returns.

To assess whether this is the case, we report on Table 6 the average difference in the C5 characteristics over the thirty six months after the indicated event between firms that engage in each event and common stocks contained in the CRSP database that did not engage in the event. We normalize the characteristics by subtracting the mean and dividing by the standard deviation each month, so that each normalized characteristic has mean zero and standard deviation one for the full set of common stocks.

The results indicate that event firms do differ significantly from the broader set of stocks. In particular, firms engaging in mergers and acquisitions, seasoned equity offerings, share repurchases and stock splits tend to be larger than non-event firms, while IPO firms tend to be smaller. With the exception of firms initiating dividends and share repurchases, event firms tend to have lower book-to-market ratios than non-event firms, and with the exception of firms completing mergers and acquisitions and IPOs, event firms tend to have higher recent returns. Firms initiating dividends and those announcing share repurchases and stock splits tend to be more profitable, while those initiating dividends and those announcing share repurchases have lower asset growth. Firms issuing equity in both initial and seasoned offerings as well as firms announcing M&As and firms that split their stocks tend to have higher rates of asset growth relative to non-event firms.

These results are broadly consistent with prior studies. For example, Brav, Geczy, and Gompers (2000) show that firms have low BM ratios at the time of seasoned and initial equity offerings, and that IPOs are small firms. Lyandres, Sun, and Zhang (2008) show that both SEO

and IPO firms invest more than other firms. Levi, Li, and Zhang (2010) find that larger firms are more likely to initiate acquisitions.

5.2 The evolution of characteristics around corporate events

The characteristic-based method that we propose for establishing benchmark returns not only accommodates differences in characteristics for event firms vs. non-event firms at the time of the event, but also accommodates the evolution of characteristics though time. Figure 2 displays monthly averages of the C5 characteristics across event firms from 36 months before to 36 months after the event month.

Notably, book-to-market ratios tend to increase in the months following the corporate events, for all events except share repurchases. The increases are most notable for firms engaging in SEOs and IPOs, but are also substantial for M&A firms and firms announcing stock splits. Closely related, momentum, measured by returns from months t-12 to t-2 decreases markedly after the events for firms splitting stocks and those engaging in SEOs. Profitability, as measured by return on assets, initially increases and then decreases after the events for firms that split their stock, initiate dividends, and engage in SEOs, while profitability slowly declines after the event for firms repurchasing shares. The rate of asset growth accelerates markedly for about eighteen months after the event for M&A and SEO firms, before the growth rate subsequently declines. For IPO firms the rate of asset growth is markedly high from 12 months (when it can first be measured) to 18 months after the event, after which the rate of growth declines dramatically.

On balance the results displayed on Figure 2 indicate that the extent to which event firms differ from non-event firms in terms of the C5 characteristics changes substantially in the months

following the events. The empirical method we propose always focuses on prior-month characteristics, and thus accommodates this time variation.

5.3 Characteristic based expected returns and realized returns after corporate events

We now turn to the central issue assessed in this paper, whether characteristic-based expected returns can explain the actual returns to event firms in the months following corporate events. Table 7 reports mean differences between realized returns and expected returns to event firms in the thirty six months after each event, for both simple and log returns, for the C5, C14, and C46 models. The differences are estimated from pooled OLS regressions, which give equal weight to each event. We cluster the residuals by time since stock returns tend to move together (Petersen, 2009). In unreported results that are available upon request, we find similar results in Fama-MacBeth specifications which assign equal weight to each calendar month. Panel A provides results for the full 1980 to 2014 sample. Figure 1 displays the average difference between realized and characteristic-based expected log returns for the C5 model.

Notably, we observe on Table 7 that differences between average realized returns and characteristic-based expected returns are never statistically significant for any of the C5, C14, or C46 models, for any of the six corporate events, and when focusing both on simple and log returns. This observation supports the conclusion that returns to event firms in the thirty six months after six important and widely-studied corporate events are not abnormal relative to characteristic-based expected returns generated by any of the C5, C14, and C46 models. Stated alternatively, the apparently abnormal long run returns to event firms, including M&A firms, firms issuing equity through IPOs and SEOs, firms initiating dividends, buying back stock, or engaging in stock splits, as documented in prior studies can be attributed to the (i) the

characteristics of the firms engaging in the events and (ii) relations between firm characteristics and returns that apply to the entire stock market.[8]

Average abnormal returns to event firms reported on Table 7 are economically small, particularly as compared to abnormal returns measured by comparing event firm returns to returns on size-matched control firms, as reported on Panel A of Table 2. Focusing on comparisons of average log returns and the simple C5 model on Panel A of Table 7 to pooled sample average differences in log returns in Column 3 of Table 2, Panel A, the apparently abnormal long run return for firms engaging in M&A announcements is reduced from -0.80% per month to -0.25% per month. For SEOs the reduction in the average abnormal returns is from -0.79% per month to -0.30% per month. For IPOs the estimated abnormal return on Table 2 is -1.18% per month, while the corresponding estimate based on firm characteristics on Table 7 is -0.26% per month. For firms initiating dividends the reduction on abnormal return is from 0.43% per month on Table 2 to 0.12% per month on Table 7. For firms repurchasing shares the reduction is from 0.47% per month when the comparison is to returns on size-matched control firms to 0.33% per month when the comparison is to characteristic-based expected returns. Finally, for firms that split their stock the reduction in measured abnormal returns is from 0.33% per month on Table 2 to 0.03% per month on Table 7.

5.3.1 Subperiod results

On Panels B and C of Table 7 we report subsample results for the 1980-1997 and 1998-2014 periods, respectively. Results for the latter subperiod are important in part because they

[8] Results reported on Table 7 are based on comparisons of actual simple returns to expected simple returns and actual log returns to expected log returns. In the Internet Appendix we report evidence underscoring the importance of the distinction between simple and log returns. If actual simple returns are compared to expected log returns or vice versa the result is economically large and statistically significant abnormal returns in virtually all cases. These apparently significant abnormal returns can be attributed, in turn, to the fact that mean simple returns are larger than mean log returns in all samples.

rely on data subsequent to that studied by Haugen and Baker (1996), who first showed that characteristic-based models have predictive power for stock returns. The robustness of results across the early and later subperiods therefore helps to mitigate potential concerns that the characteristic-based models are adversely affected by collective data snooping biases.

The key conclusion that can be drawn from Panels B and C of Table 7 is that characteristic-based measures of abnormal returns after these six corporate events are statistically insignificant and economically moderate for all events and by the C5, C14, and C46 models, based on both simple and log returns, in both the first and the second half of the 1980 to 2014 sample period. Variation across subperiods appears random. Focusing for example on log returns and the C5 model, the average abnormal return for IPOs increases in absolute magnitude from -0.19% per month in the early sample to -0.46% per month in the later sample, while the average abnormal return for firms initiating dividends decreases from 0.26% per month in the early sample to 0.00% per month in the later sample.

Table 8 reports subperiod results that correspond to those on Panels B and C of Table 7, except that subperiods are defined based on "hot" vs. "cold" markets rather than the first vs. the second half of the sample. Here, a market is regarded as "hot" if the number of IPOs during the year exceeds the median number of IPOs per year during the 1980 to 2014 sample period. Abnormal returns may be more likely following events that occur in hot markets if firms are attempting to take advantage of mispricing (See for example, Loughran and Ritter (2000) ; and Rhodes-Kropf, Robinson, and Viswanathan, 2005.

The results indicate that average returns after the six corporate events do not differ significantly from characteristic- based benchmarks in either hot or cold markets, based on any of the C5, C14, or C46 models. For IPOs in particular, abnormal returns average -0.26 per cent

per month based on the C5 model, during both hot and cold market events. For some events, e.g. M&As and SEOs estimated abnormal returns are larger during hot markets, while for other events, e.g. share repurchases and stock splits, estimated abnormal returns are larger during cold markets. The broad absence of statistical significance and lack of a clear pattern by which estimated abnormal returns are systematically larger during hot vs cold markets on Table 8 indicates that the characteristic-based benchmark method is consistently effective in explaining long run returns after corporate events.

5.3.2 Longer horizon returns

Authors studying long run returns after corporate events most often consider three year or five year horizons. On Table 9 we report results that correspond to those on Table 7, except that returns are measured over sixty rather than thirty six months after the events. These results support the same conclusion. In particular, realized returns over the sixty months after corporate events do not differ significantly from the C5, C14, and C46 model expected returns for any of the six events, for simple or log returns. The economic magnitudes of the abnormal returns are quite comparable across the thirty-six and sixty month horizons. Focusing on abnormal log returns based on the C5 model, sixty month means are -0.18%, -0.25%, -0.28%, 0.06%, 0.31%, and 0.07% per month for M&As, SEOs, IPOs, dividend initiations, share repurchases, and stock splits, respectively, as compared to -0.25%, -0.30%, -0.26%, 0.12%, 0.33%, and 0.03% per month over thirty six months.

5.3.3 The estimation window for expected returns

Results reported to this point are based on expected returns that are measured as the product of month *t*-1 characteristics and average slope coefficients characteristics obtained in cross-sectional regressions estimated over the prior twelve months. Lewellen (2015) reports the

sensitivity of his results focused on whether characteristic-based expected returns forecast actual stock returns for the broad stock market to increases in the horizon over which slope coefficient are averaged. If cross-sectional parameters are stable over time the longer horizon is preferable due to reduced estimation error. In contrast, if cross-sectional parameters evolve through time the shorter horizon estimates may be more informative due to their recency.

On Table 10 we report results of sensitivity tests to this research design decision for our application focused on returns after corporate events. Panel A of Table 10 reproduces full sample results from Panel A of Table 7. In Panel B of Table 10 we report results that correspond to Panel A, except that expected returns are measured based on month *t*-1 characteristics in combination with average cross-sectional slope coefficients from the prior 36 months, while Panel C reports corresponding results based on average cross-sectional slope coefficients over the prior 120 months.

The results on Table 10 indicate a somewhat mixed message. For some events results are nearly invariant to the estimation window for expected returns. For example, focusing on mean log returns based on the C5 model, abnormal returns after SEOs are -0.30% per month at a 1-year estimation horizon, and are -0.27% per month at both the 3-year and 10-year estimation horizons. For other events results are sensitive to this research design decision. For IPOs, for example, mean abnormal log returns based on the C5 model are -0.26% per month at a 1-year estimation horizon, -0.59% at a three-year estimation horizon, and -0.83% per month at a 10-year horizon.

The sensitivity of some of our results to the horizon used to estimate expected returns are suggestive that coefficients relating returns to firm characteristics for the broad stock market vary though time, which comprises an interesting issue for future research. In terms of the

present application to abnormal returns after corporate events, the implication is that expected return estimates based on the more recent data are most relevant.

5.3.4 Matching firms based on expected returns

As noted, a number of authors have assessed whether long-run returns to firms engaging in corporate events are abnormal by comparing event firm returns to returns for control firms that are similar to the event firms in terms of observable characteristics, most often size and market-to-book ratio. In the preceding sections we compare actual returns on event firms to expected returns for the same firms derived from characteristic-based models. An alternative approach combining elements of each is to compare actual returns for event firms to actual returns for control firms selected on the basis of similar characteristic-based expected returns.

We assess this alternative approach by identifying for each event firm on a monthly basis the single closest and ten closest firms based on the estimated expected return for the month, as implied by the C5, C14, and C46 models. Matches are determined separately for expected simple and log returns. We consider matching on ten firms as opposed to only a single firm under the reasoning that expected returns for any single firm are estimated with error, and that such errors are likely to be reduced by diversification within a portfolio.

Table 11 reports average abnormal returns during the thirty six months after the indicated events, computed as the event firm return less the return on the most closely matched firm. Table 12 reports corresponding results when abnormal returns are computed as event firm return less the return to an equal weighted portfolio of the ten closest match firms.

Comparing results across Tables 7, 11, and 12 indicates that estimated abnormal returns are reasonably similar across methods. For example, abnormal log returns to SEO firms based on the C5 model are -0.30% per month on Table 7 (compare actual return to expected

characteristic based return), -0.16% on Table 11 (compare actual returns across event firm and control firm with closest match on expected return), and -0.12% on Table 12 (compare actual returns across event firm and portfolio of ten control firms with closest matches on expected return). In the case of SEOs none of these estimates are statistically significant.

However, in some cases the estimated abnormal returns are statistically significant on Tables 11 and 12, even when they were not significant on Table 7. For example, abnormal log returns based on the C5 model in the case of share repurchases are 0.33% with a t-statistic of 1.11 on Table 7 when actual returns are compared to characteristic-based expected returns, while the corresponding Table 11 estimate, when actual returns are compared across event firms and control firms matched on expected return, is also 0.33%, but with a t-statistic of 6.46. More broadly, the Table 11 results indicate statistically significant abnormal log returns for all events except SEOs, in at least some of the C5, C14, and C46 specifications.

This statistical significance of several estimates of abnormal returns on Tables 11 and 12 arise in the absence of any notable systematic increase in economic magnitudes of abnormal return estimates, and can therefore be attributed to smaller standard errors. State alternatively, the method of comparing event stock returns to returns for control stocks selected on the basis of similar characteristic based event returns provides more powerful tests vs. comparing event stock returns to characteristic-based expected event stock returns. The smaller standard errors on Tables 11 and 12 are likely attributable to commonality in *unexpected* returns across event firms and matched firms.

However, the economic magnitude of the abnormal returns reported on Tables 11 and 12 remain much smaller as compared to estimates obtained when relying on control firms identified based on similar characteristics as event firms, as reported on Table 2. For example, the

abnormal log returns reported on Panel A of Table 2 using the pooled method are -0.80% for mergers and acquisitions, -0.79% for SEOs, and -1.18% for IPOs, while the corresponding C5 estimates of abnormal returns are -0.12%, -0.16%, and -0.23% per month, respectively, on Table 11. Finally, we note that point estimates and t-statistics are generally similar across Tables 10 and 11, implying little benefit to the more complex approach of using ten matching firms as opposed to a single matching firm.

We conclude that the alternative method of comparing event firm returns to returns on control firms identified based on similar characteristic-based expected returns leads to measures of abnormal returns that in some cases statistically significant, but economically small, for all events except SEOs. This alternative method may be preferable on the basis of improved statistical power, although it relies on the implicit assumption that firms with similar expected returns comprise good control firms, and is therefore somewhat less direct that simply comparing realized returns to expected returns for event firms.

5.3.5 Subsets of the C5 characteristics

The empirical results reported here indicate that most or all of the apparently abnormal long run returns to stocks engaging in corporate events can be explained by characteristic-based expected return models. Further, the simple five characteristic C5 model generally works as well as the more complex C14 and C46 models. We next provide some evidence by which to gauge the relative importance of the individual C5 characteristics in explaining returns to event firms.

To do so, we estimate abnormal log returns based on subsets of the C5 characteristics, and report the results on Table 13. Results on the bottom row of Table 13 are based on all five

characteristics, and reproduce the full-sample C5 results from on Panel A of Table 7, while results on higher rows are based on progressively smaller subsets of the C5 characteristics.

Several interesting results can be observed on Table 13. First, focusing on the five rows immediately above the final row of Table 13, in can be observed that removing any one of the C5 characteristics does not overturn, for any of the six corporate events, the finding that abnormal log returns are fully explained by the remaining four characteristics. However, the magnitude of the average abnormal log return for IPO firms is more than doubled when the asset growth characteristic is excluded.

Focusing next on the ten rows of Table 13 where three of the C5 characteristics are used, it can be observed that the average abnormal returns remain statistically insignificant for any combination of three characteristics in the cases of M&As, SEOs, and stock splits. However, some estimates become marginally significant in the cases of IPOs (when market to book and asset growth are excluded), dividend initiations (when momentum and profitability are excluded), and share repurchases (when market to book and asset growth or market to book and asset profitability are excluded.)

In the case of M&As it can be observed on Table 13 that abnormal returns remain statistically insignificant when benchmark returns are estimated based on any combinations of two characteristics, as well as when estimated based on any of the five individual characteristics, and even (first row of Table 13) when no characteristics are used to estimate benchmark returns. In the last case the estimated benchmark return is simply the mean of cross-sectional average log returns (the intercept in the cross-sectional regression) over the prior twelve months. The remarkable implication is that in the case of M&As the apparently abnormal return of -0.80% per

month (Panel A of Table 2) is largely explained (all but -0.24% per month, first row of Table 13) by average log returns during the preceding year.

In contrast to results for M&As, abnormal returns obtained when no characteristics are used (i.e. when the benchmark is simply the mean of cross-sectional average log return during the past year) reported on the first row of Table 1 are larger in absolute value than when event firm returns are compared to control firms selected based on firm size (Panel A of Table 2). The implication is that cross-sectional variation in characteristics is an integral part of the explanation for the apparently abnormal returns after these events.

In the case of IPOs, the abnormal return is reduced by nearly half due to the inclusion of only asset growth as an explanatory variable for expected returns. Further, the inclusion of asset growth in combination with any of the other four characteristics renders the average abnormal return for IPOs statistically insignificant. For the other events, the use of only two characteristics results in statistically significant abnormal returns for some combinations of characteristics, but not for others. No clear or simple pattern emerges.

On balance, these results indicate that conclusions as to whether returns after corporate events are abnormal are quite robust to the exclusion of any one of the C5 characteristics. In the case of IPOs, asset growth is a particularly important characteristic, while in the case of M&As none of the characteristics is important beyond knowledge of the recent average cross-sectional log returns (the intercept in the cross-sectional regressions). For the other events no clear pattern emerges, and the safe prescription would be to include all of the C5 characteristics when estimating benchmark returns.

6. Conclusions and Implications for Future Research

We propose a new method for assessing whether average returns for firms of interest are abnormal. The method relies on the fact that average returns to the stock market as a whole are related to a number of observable characteristics. In particular, we propose that abnormal returns be measured either as the mean difference between actual returns to the firms of interest and characteristic-based expected returns to the same firms, or based on the difference between mean returns to the events of interest and mean returns to control firms selected based on similar characteristic-based expected returns.

We find that a simple set of just five observable characteristics that underlie the market factors incorporated in recent asset pricing models, including firm size, book-to-market ratio, rate of asset growth, recent returns, and firm profitability is as or more effective than more complex characteristic models in forecasting actual stock returns. We also show that the apparently abnormal long run returns following six important corporate events, including initial and secondary public equity offerings, mergers and acquisitions, dividend initiations, share repurchases and stock splits are either greatly reduced or eliminated when implementing the characteristic-based expected return models, for all six corporate events.

While our results with regard to these six corporate events are important, we view these results as illustrative. The methods proposed here can be implemented in any setting where researchers wish to assess whether returns to firms of interest are abnormal. It should be stressed, however, that the method compares observed returns to characteristic-based benchmarks that are based on empirical regularities, and that may or may not be consistent with theory. As such the method is suited to assessing whether returns to a given set of firms are abnormal, and require event-specific explanations, or can be attributed to their observable characteristics and return patterns that exist in the broad stock market. However, the method

does not provide direct evidence of whether returns represent reward for risk or are abnormal with respect to the implications of equilibrium models.

Appendix A: Definition of the C5 and C14 Firm Characteristics

We measure these characteristics following Lewellen (2015). All variables are measured using data from the CRSP stock price files and the Compustat annual data. Accounting data are assumed to be available four months after the fiscal year end.

	Characteristics in the C5 Model
Log Size	Natural log of market capitalization at the end of the prior month.
Log BM	Natural log of the book-to-market ratio at the end of the prior month. Book value is the firm's common equity (Compustat item *ceq*) in the latest annual report. Market value is the firm's market capitalization at the end of the prior month.
Momentum	Cumulative stock returns over months (-12, -2) before the month of interest.
ROA	Income before extraordinary items (*ib*) divided by average total assets (*at*) in the year.
Asset Growth	Natural log of the ratio of total assets (*at*) at the end of the year to total assets at the beginning of the year.
	Additional Nine Characteristics in the C14 Model
Beta	Beta estimated using monthly stock returns over the preceding 60 months. We require a minimum of six data points for the accuracy of the estimation.
Accrual	Change in working capital from the last year minus depreciation and amortization (*dp*), divided by average total assets (*at*) in the year, following Sloan (1996). Working capital equals current assets (*act*) minus cash and short-term investment (*che*) minus current liabilities (*lct*) plus debt in current liabilities (*dlc*) plus income taxes payable (*txp*). Missing *act*, *che*, *lct*, *dlc*, *txp*, and *dp* are replaced with zero.
Dividend	Dividends per share over the prior 12 months divided by the price at the end of the prior month.
Log LR Return	Natural log of cumulative stock returns over months (-13, -36) before the month of interest.
Idiosyncratic risk	In each month, we compute the standard deviation of the residual daily stock returns in the Fama and French three factor regression, following Ang, Hodrick, Xing, and Zhang (2006). Idiosyncratic risk is the average standard deviation over the prior 12 months.
Illiquidity	The average daily ratio of absolute stock return to dollar trading volume during the prior 12 months, as defined by Amihud (2002).
Turnover	Average monthly turnover (shares traded divided by shares outstanding) during the prior 12 months.
Leverage	Debt in current liabilities (*dlc*) plus long-term debt (*dltt*), divided by market capitalization at the end of the last month. Missing *dlc* and *dltt* are replaced with zero.
Sales/Price	Sales (*sale*) divided by market capitalization at the end of the last month.

Appendix B: Definition of the C46 Firm Characteristics

Following Haugen and Baker (1996), we measure the 46 characteristics using the CRSP monthly stock price file and the Compustat quarterly data. The quarterly accounting data are assumed to be known three months after the quarter end if the earnings report date is missing. The earnings report date is available on large scale since 1973. Many of the 46 characteristics require five years of data. Therefore, we focus on the period from 1978 to 2014 for this set of firm characteristics. We require at least four quarters of data when computing the trend of the accounting variables.

	1. Risk factors
Beta, market	Beta estimated using monthly stock returns over the preceding 60 months. We require a minimum of six data points for the accuracy of the estimation.
APT Beta's	Beta's estimated using monthly stock returns over the preceding 60 months. The explanatory variables are three-month treasury bill interest rate, quarterly GDP growth rate, inflation rate, the yield spread between 10-year government bond and three-month treasury bills, and the yield spread between BAA-rate corporate bond and 10-year government bond. We require a minimum of 12 data points for the accuracy of the estimation.
Stock return volatility	Standard deviation of monthly stock returns in the preceding 60 months.
Idiosyncratic volatility	Standard deviation of the residual monthly stock return from the market model regression over the preceding 60 months.
Earnings risk	Standard deviation of the de-trended earnings per share (*Compustat* item *epspxq*) over the preceding 20 quarters, divided by the average earnings per share over the same period.
Leverage	Total liabilities divided by total asset in the latest quarter, (*dlcq* + *dlttq*)/*atq*. Missing *dlcq* and *dlttq* are replaced with zero.
Leverage trend	Trend of leverage over the preceding 20 quarters.
Interest-income ratio	The ratio of interest payment (*intpny*) to total revenue (*revtq*) in the latest quarter. It takes the value of zero if interest payment is negative and one if total revenue is negative.
Interest-income ratio trend	Trend of interest-income ratio over the preceding 20 quarters.
Earnings to price volatility	Standard deviation of earnings to price ratio over the preceding 20 quarters.
Dividend to price volatility	Standard deviation of dividend to price ratio over the preceding 20 quarters.
Cash flow to price volatility	Standard deviation of cash flow to price ratio over the preceding 20 quarters.
	2. Liquidity factors
Market capitalization	Number of shares outstanding times stock price at the end of the prior month.
Stock price	Nominal stock price per share at the end of the prior month.
Trading volume	Average ratio of trading volume to market capitalization over the preceding 12 months.
Trading volume trend	Trend of trading volume over the preceding 60 months.
	3. Factors indicating price level
Earnings to price	Aggregate net income (*niq*) over the latest four quarters divided by market capitalization

	at the end of the latest quarter *(prccq*cshoq)*.
Earnings to price trend	Trend of earnings to price ratio over the preceding 20 quarters.
Book to price	The ratio of common equity to market capitalization in the latest quarter: *ceqq*/(*prccq*cshoq*).
Book to price trend	Trend of book to price ratio over the preceding 20 quarters.
Dividend to price	Aggregate dividend payment (*dvpspq*) over the latest four quarters divided by market price per share at the end of the latest quarter (*prccq*).
Dividend to price trend	Trend of dividend to price ratio over the preceding 20 quarters.
Cash flow to price	Aggregate cash flow (*niq+dpy*) over the latest four quarters divided by market capitalization at the end of the latest quarter (*prccq*cshoq*).
Cash flow to price trend	Trend of cash flow to price ratio over the preceding 20 quarters.
Sales to price	Aggregate sales (saleq) over the latest four quarters divided by market capitalization at the end of the latest quarter (*prccq*cshoq*).
Sales to price trend	Trend of sales to price ratio over the preceding 20 quarters.
	4. Factors indicating growth potential
Profit margin	Average profit margin (*niq/saleq*) in the latest four quarters.
Profit margin trend	Trend of four-quarter moving average profit margin over the preceding 20 quarters.
Capital turnover	Aggregate sales (*saleq*) divided by average total assets (*atq*) over the latest four quarters.
Capital turnover trend	Trend of capital turnover over the latest 20 quarters.
ROA	Aggregate income (*niq*) divided by average total assets (*atq*) over the latest four quarters.
ROA trend	Trend of ROA over the latest 20 quarters.
ROE	Aggregate income (*niq*) divided by average common equity (*ceqq*) over the latest four quarters.
ROE trend	Trend of ROE over the latest 20 quarters.
Earnings growth	Trend of earnings per share (*Compustat* item *epspxq*) over the preceding 20 quarters, divided by the average earnings per share over the same period.
	5. Technical factors
Momentum, *N* months	Buy-and-hold returns over the prior *N* months.
	6. Sector variables
Durables	SIC code from 5000-5099
Nondurables	SIC code from 5100-5199
Utilities	SIC code from 4900-4999
Energy	SIC code from 1200-1399
Construction	SIC code from 1500-1799
Business equipment	SIC code from 3400-3799

Manufacturing	SIC code from 2000-3999
Transportation	SIC code from 4000-4899
Financial	SIC code from 6000-6999
Business service	SIC code from 7300-7399

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Figure 1: Abnormal returns over 36 months after corporate events

This figure plots average monthly abnormal returns over the 36 months after each of six corporate events. The blue bar is the difference in monthly log return between the event firm and its matching firm. For all events except IPOs, we identify for each month a matching firm with the closest market capitalization at the latest December before the event. For IPOs the matching firm is that with the closest but greater market capitalization at the end of December following the IPO. The difference is estimated from pooled OLS regressions, as reported in column (3) of Table 2 Panel A. The red bar shows the difference between the event firm's actual log return and the expected log return based on five firm characteristics (the fourth column of Table 7 Panel A). The green bar is the difference in monthly log return between the event firm and a control firm with the closest expected log return based on five firm characteristics (the fourth column of Table 11).

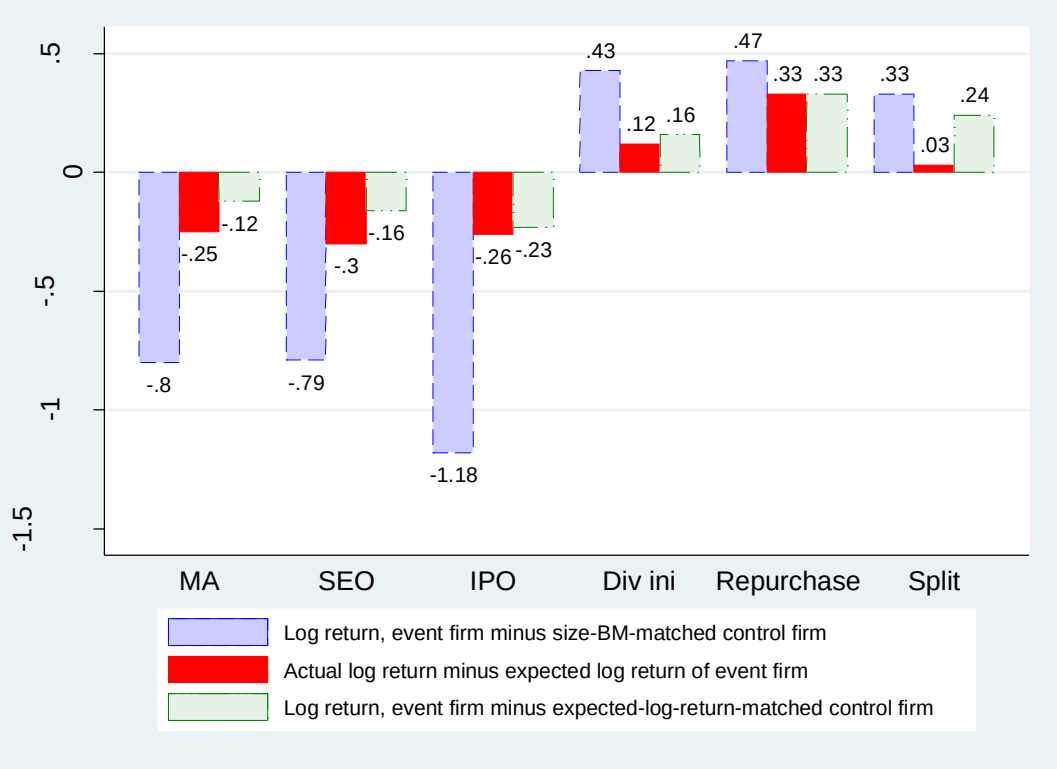
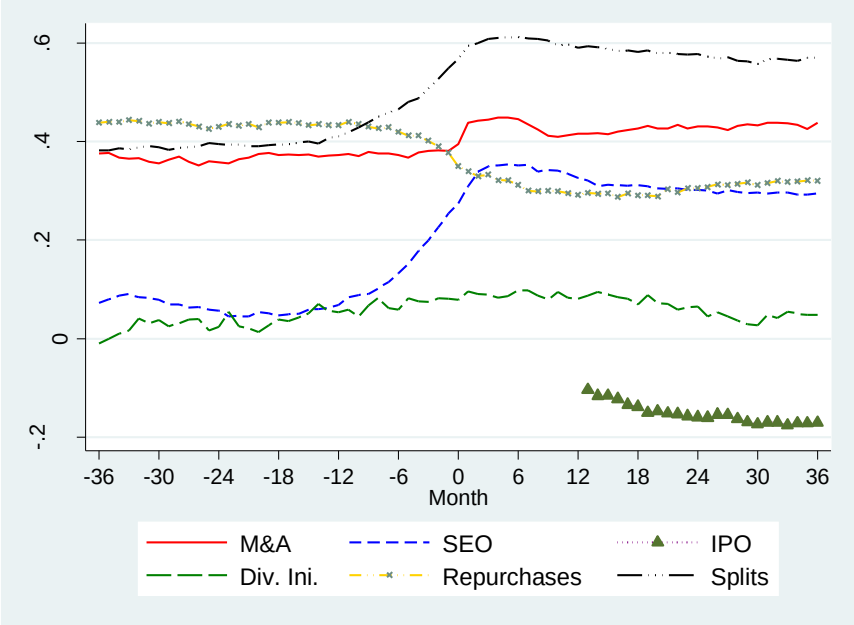


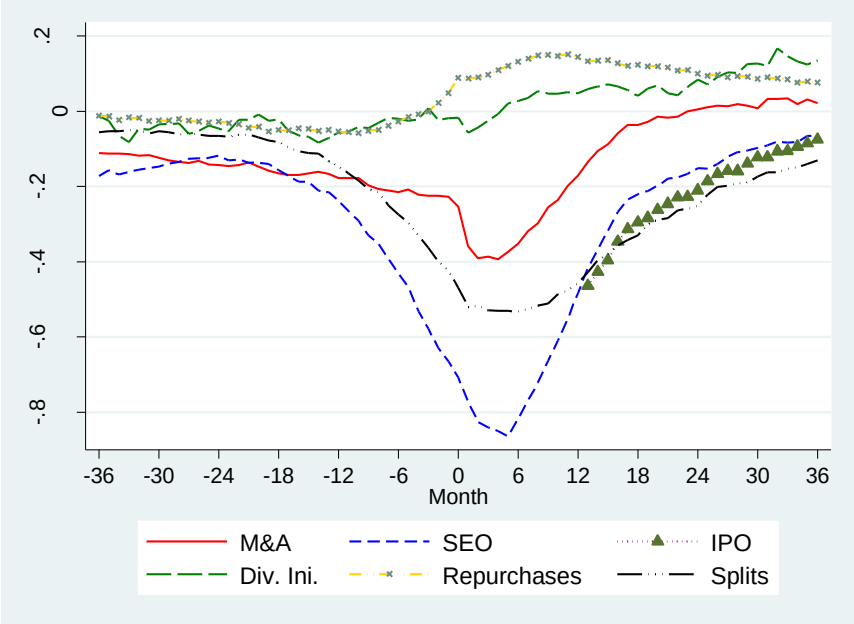
Figure 2: Firm characteristics around corporate events

This figure plots the median firm characteristics over the 73 months (-36, 36) around each of the six corporate events over the period from 1980-2014. We only plot firm characteristics over months (13, 36) after each IPO because almost all characteristics are unavailable during the first 12 months after IPO. See Append A for definition of the firm characteristics. Each firm characteristic is winsorized within each calendar month at the upper and lower 1%, and is normalized by subtracting the cross-sectional mean and dividing by the cross-sectional standard deviation.

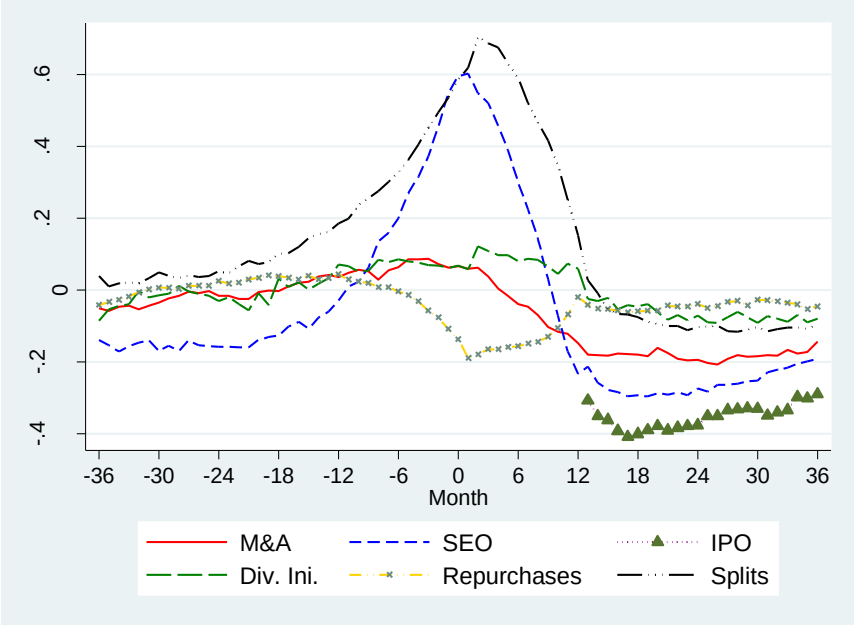
Panel A: Size



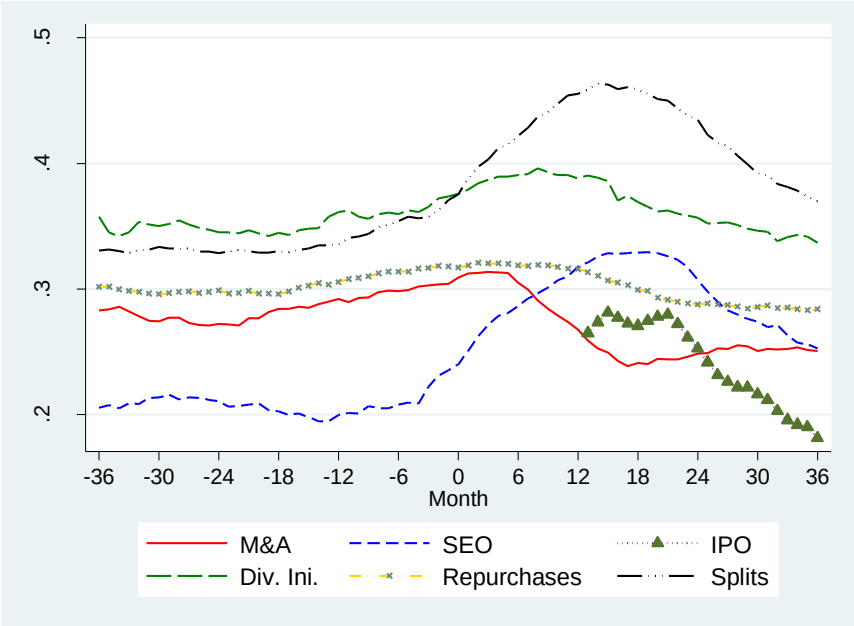
Panel B: Book-to-market ratio



Panel C: Momentum returns over prior 12 months



Panel D: ROA



Panel E: Asset growth

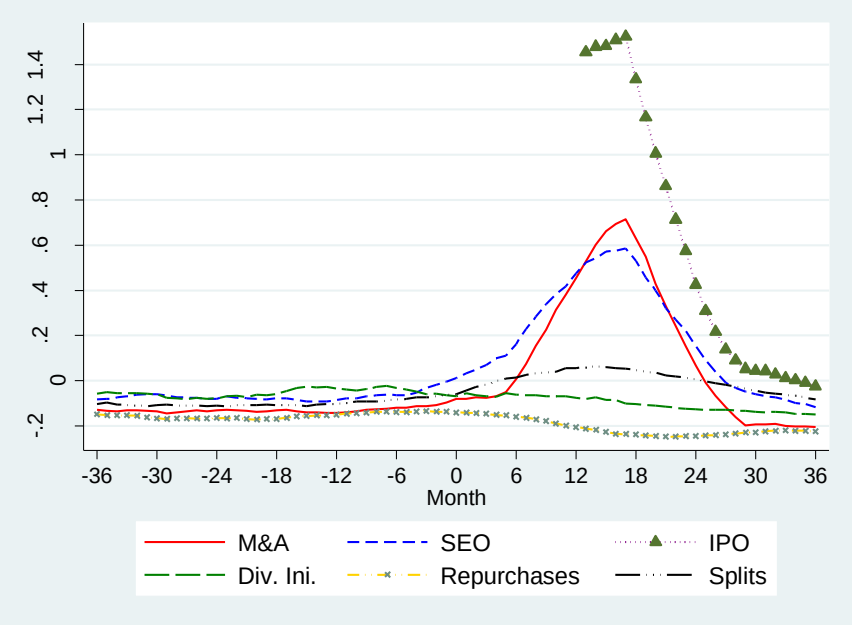


Table 1: Number of corporate events

Panel A reports the number of corporate events contained in our sample. The five columns report the number of events retrieved from the original data sources, the number with a valid match on size and book-to-market ratio (on size only for IPOs), and the number for which we can compute the expected return, based on each of the three models discussed in Table 4. Panel B reports the number of events by year from 1980-2014.

Panel A: Number of corporate events

		Match on	Match on expected return		
Event	Initial	size-BM	C5	C14	C46
Merger and acquisition	4,681	3,873	3,853	3,853	3,851
SEO	7,128	4,748	4,718	4,718	4,726
IPO	10,438	10,357	7,806	7,806	7,865
Dividend initiation	1,475	1,245	1,236	1,236	1,227
Share repurchase	13,310	11,123	11,111	11,111	11,098
Stock split	8,147	6,402	6,403	6,403	6,368
Total	45,179	37,748	35,127	35,127	35,135

Panel B: Number of events by year

Year	Merger and acquisition	SEO	IPO	Dividend initiation	Share repurchase	Stock split
1980	1	206	93	33	3	367
1981	9	198	260	32	81	355
1982	1	184	93	12	76	208
1983	0	409	571	25	155	553
1984	6	86	268	25	435	258
1985	80	154	262	28	132	368
1986	96	210	574	38	159	522
1987	88	146	444	43	683	421
1988	89	58	227	55	209	175
1989	91	110	196	70	380	243
1990	65	92	180	47	561	160
1991	92	261	368	42	234	215
1992	111	240	537	62	347	347
1993	146	315	696	57	367	373
1994	217	209	511	39	629	258
1995	251	323	514	60	584	351
1996	306	404	796	24	691	381
1997	324	341	539	34	614	383
1998	348	210	345	26	1081	321
1999	313	245	501	25	733	297
2000	290	246	367	21	362	237
2001	201	150	91	17	384	132
2002	125	151	80	26	315	157
2003	139	186	74	114	297	175
2004	174	204	199	78	322	194
2005	165	159	189	57	386	205
2006	153	170	203	45	348	153
2007	194	151	232	35	526	94
2008	127	67	34	17	541	24
2009	69	277	63	26	164	10
2010	93	210	166	51	276	41
2011	86	157	138	54	425	52
2012	28	157	152	59	224	36
2013	77	226	210	53	243	42
2014	126	216	265	45	343	39
Total	4681	7128	10438	1475	13310	8147

Table 2: Differences in stock returns and return volatility between event firms and size or size-BM matched firms over 36 months after the event

Panel A presents results based on matching firms selected on firm size, while Panel B is for matching firms based on size and book-to-market ratio. For all events except IPOs, we identify for each month a matching firm based on size or size and book-to-market ratio at the latest December before the event. The size-matched control firm has the closest market capitalization to the event firm. The size-BM matched firm is that with the closest BM ratio among firms with market capitalization between 70% and 130% of the event firm. For IPOs the size-matched firm is that with the closest but greater market capitalization at the end of December following the IPO. The size-BM-matched firm is that with the closest BM ratio among firms with market capitalization larger than the event firm. Column (2) presents the 36-month buy-and-hold abnormal returns of the event firm relative to its matching firm. Columns (3)-(4) report the estimated intercept in pooled or Fama-MacBeth regressions, where the dependent variable is the difference in simple return between the event firm and the matching firm over the 36 individual months following each event. Column (5) reports the estimated intercept in pooled regressions where the dependent variable is the difference between the event firm and the matching firm in standard deviation of stock return over the 36 months following the event. Columns (6)-(7) report the estimated intercept in pooled or Fama-MacBeth regressions, where the dependent variable is the difference in log return between the event firm and the matching firm over the 36 individual months following each event. T-statistics are in parentheses. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Match on size

			Difference in log return		Difference in	Difference in simple return	
	N	BHAR	Pooled	FM	std. dev.	Pooled	FM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
M&A	4,301	-26.26***	-0.80***	-0.50***	3.31***	-0.31**	-0.19
		(-11.82)	(-5.26)	(-3.97)	(16.54)	(-2.06)	(-1.54)
SEO	5,961	-26.76***	-0.79***	-0.73***	4.23***	-0.22	-0.17
		(-14.72)	(-4.44)	(-4.07)	(29.20)	(-1.26)	(-0.94)
IPO	9,744	-39.39***	-1.18***	-1.02***	4.89***	-0.33	-0.24
		(-24.17)	(-5.19)	(-5.22)	(35.26)	(-1.52)	(-1.30)
Div. ini.	1,306	14.70***	0.43***	0.62***	-1.77***	0.08	0.23
		(4.45)	(4.07)	(4.39)	(-6.38)	(0.71)	(1.50)
Share rep.	11,995	15.49***	0.47***	0.50***	-0.60***	0.26***	0.31***
		(13.25)	(5.25)	(6.33)	(-5.20)	(2.91)	(4.00)
Stock split	7,679	11.33***	0.33***	0.33***	-0.15	0.26***	0.25***
		(7.89)	(3.45)	(3.52)	(-1.33)	(2.66)	(2.65)

Panel B: Match on size and BM

			Difference in log return		Difference in	Difference in simple return	
	N	BHAR	Pooled	FM	std. dev.	Pooled	FM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
M&A	3,681	-16.62***	-0.49***	-0.27**	1.31***	-0.30***	-0.16
		(-7.32)	(-4.64)	(-2.49)	(6.14)	(-2.85)	(-1.49)
SEO	4,408	-11.99***	-0.36***	-0.33**	2.03***	-0.09	-0.05
		(-6.00)	(-2.66)	(-2.29)	(13.92)	(-0.72)	(-0.36)
IPO	706	-17.34***	-0.50**	-0.55**	0.98*	-0.31	-0.40*
		(-2.82)	(-2.52)	(-2.47)	(1.86)	(-1.47)	(-1.81)
Div. ini.	1,095	13.04***	0.39***	0.44***	-1.94***	0.05	0.10
		(3.71)	(3.57)	(3.15)	(-6.91)	(0.38)	(0.62)
Share rep.	10,422	16.48***	0.50***	0.48***	-1.30***	0.22**	0.25***
		(13.87)	(5.79)	(6.80)	(-11.88)	(2.51)	(3.35)
Stock split	6,298	15.07***	0.44***	0.42***	-0.79***	0.28***	0.26***
		(10.28)	(4.88)	(4.77)	(-6.93)	(3.00)	(2.87)

Table 3: Summary statistics of firm characteristics

This table reports summary statics regarding the firm characteristics that we employ to predict stock returns. It includes all firm-months from January 1970 to December 2014 in Panel A and from January 1978 to December 2014 in Panel B. In each month, firm characteristics are winsorized at the upper and lower 1% levels. See the Appendix for detailed variable definitions.

Panel A: C5 and C14 characteristics, January 1970 to December 2014

Variable	N	Mean	Std. dev.	5th pctl	25th pctl	Median	75th pctl	95th pctl
Return (%)	2238825	1.3116	17.9088	-21.8310	-6.5757	0.0000	7.3643	26.6304
C5 characteristics								
Log Size	2238825	4.6987	2.1920	1.3107	3.0851	4.5618	6.2009	8.4925
Log BM	2238825	-0.5472	0.9559	-2.2575	-1.0926	-0.4758	0.0717	0.9111
Momentum	2238825	0.1299	0.5911	-0.5972	-0.2094	0.0519	0.3347	1.1098
ROA	2238825	0.0000	0.1735	-0.3365	0.0008	0.0338	0.0754	0.1603
Asset growth	2238825	0.1404	0.3377	-0.2480	-0.0063	0.0828	0.2060	0.7417
Additional 9 characteristics in the C14 model								
Beta	2237097	1.1306	0.7931	0.0450	0.6165	1.0499	1.5349	2.5388
Accrual	2238825	-0.0236	0.1045	-0.1837	-0.0713	-0.0264	0.0193	0.1494
Dividend	2238824	0.0147	0.0230	0.0000	0.0000	0.0000	0.0240	0.0638
Log LR Return	1924377	0.0711	0.6839	-1.1654	-0.2771	0.1335	0.4808	1.0948
Idio. risk	2238778	0.0282	0.0185	0.0091	0.0154	0.0231	0.0354	0.0648
Illiquidity	2076883	5.4110	20.7668	0.0005	0.0130	0.1911	2.0081	25.5440
Turnover	2078665	0.0945	0.1354	0.0049	0.0187	0.0464	0.1121	0.3477
Leverage	2238825	0.8457	1.8670	0.0000	0.0418	0.2666	0.8488	3.5244
Sales/Price	2233129	2.5569	4.2851	0.0815	0.4832	1.1623	2.7544	9.7198

Panel B: Haugen-Baker (1996) C46 characteristics, January 1978 to December 2014

Variable	N	Mean	Std. dev.	5th pctl	25th pctl	Median	75th pctl	95th pctl
Beta, market	1934517	1.1119	0.8318	0.0003	0.5749	1.0201	1.5198	2.6044
Beta, T bill	1909421	-0.0168	0.2124	-0.2417	-0.0470	-0.0080	0.0252	0.1788
Beta, GDP growth	1909421	0.6724	5.4610	-5.8015	-1.1692	0.1907	1.7207	8.9485
Beta, inflation	1909421	-0.0775	8.5308	-10.8495	-2.3887	-0.1269	1.8565	11.3183
Beta, term spread	1909421	-0.0147	0.1080	-0.1771	-0.0444	-0.0090	0.0182	0.1251
Beta, risk spread	1909421	0.0392	0.2980	-0.2691	-0.0476	0.0139	0.0835	0.4115
Stock return volatility	1943514	0.1517	0.0845	0.0571	0.0916	0.1318	0.1884	0.3171
Idiosyncratic risk	1943514	0.1394	0.0816	0.0504	0.0808	0.1189	0.1751	0.2997
Earnings risk	1942087	0.0948	6.1094	-6.1881	-0.7013	0.3355	0.9745	5.7400
Leverage	1945032	0.2259	0.2055	0.0000	0.0446	0.1875	0.3515	0.6227
Leverage trend	1944975	-0.0013	0.0162	-0.0254	-0.0053	-0.0001	0.0045	0.0205
Interest-income ratio	1894154	0.1493	0.3385	0.0000	0.0000	0.0000	0.0321	1.0000
Interest-income ratio trend	1925612	0.0039	0.0192	-0.0197	0.0000	0.0000	0.0038	0.0437
Earnings to price volatility	1945048	0.1825	0.5376	0.0086	0.0206	0.0446	0.1268	0.7245
Dividend to price volatility	1945075	0.0054	0.0137	0.0000	0.0000	0.0000	0.0066	0.0215
Cash flow to price volatility	1945048	0.1781	0.4588	0.0116	0.0274	0.0560	0.1382	0.6696
Market capitalization	1945075	1.4068	5.4676	0.0047	0.0287	0.1219	0.6065	5.8334
Stock price	1945075	18.0169	18.5163	0.8500	4.6200	12.6250	25.4300	54.1700
Trading volume	1928580	0.1028	0.1249	0.0085	0.0273	0.0591	0.1276	0.3477
Trading volume trend	1928977	-0.0001	0.0041	-0.0057	-0.0008	0.0000	0.0008	0.0051
Earnings to price	1945075	-0.0609	0.4813	-0.5839	-0.0318	0.0445	0.0809	0.1732
Earnings to price trend	1944748	-0.0052	0.0448	-0.0508	-0.0058	-0.0006	0.0029	0.0264
Book to price	1945075	0.7114	0.6535	0.0704	0.3178	0.5741	0.9337	1.8687
Book to price trend	1945075	0.0038	0.0579	-0.0732	-0.0162	0.0012	0.0203	0.0891
Dividend to price	1945075	0.0122	0.0212	0.0000	0.0000	0.0000	0.0188	0.0571
Dividend to price trend	1945067	0.0001	0.0013	-0.0014	0.0000	0.0000	0.0000	0.0018
Cash flow to price	1945075	0.0463	0.4107	-0.3998	0.0197	0.0845	0.1546	0.3984
Cash flow to price trend	1944748	-0.0015	0.0376	-0.0420	-0.0050	0.0002	0.0057	0.0348
Sales to price	1943071	2.1204	3.3261	0.0714	0.4556	1.0371	2.3357	7.8549
Sales to price trend	1942781	0.0157	0.2252	-0.2206	-0.0260	0.0035	0.0452	0.2963
Profit margin	1924325	-0.6524	4.8381	-1.5674	-0.0294	0.0333	0.0843	0.1967
Profit margin trend	1929369	0.0299	0.5636	-0.0500	-0.0037	-0.0001	0.0034	0.0889
Capital turnover	1943071	1.0604	0.8665	0.0603	0.3815	0.9336	1.4961	2.6882
Capital turnover trend	1942747	-0.0057	0.0479	-0.0803	-0.0157	-0.0009	0.0100	0.0537
ROA	1945075	-0.0239	0.2111	-0.4499	-0.0218	0.0247	0.0700	0.1588
ROA trend	1944720	0.0012	0.0246	-0.0235	-0.0039	-0.0002	0.0027	0.0269
ROE	1897537	-0.0549	0.5453	-0.9366	-0.0448	0.0880	0.1585	0.3147
ROE trend	1926257	-0.0117	0.1429	-0.1206	-0.0122	-0.0014	0.0052	0.0680
Earnings growth	1942087	0.0119	0.4322	-0.4276	-0.0544	0.0187	0.0738	0.4488
Momentum, 1 month	1944857	0.0104	0.1585	-0.2273	-0.0672	0.0000	0.0744	0.2698
Momentum, 2 months	1942383	0.0215	0.2275	-0.3158	-0.0952	0.0070	0.1151	0.3947
Momentum, 3 months	1939872	0.0326	0.2837	-0.3781	-0.1166	0.0130	0.1473	0.5000
Momentum, 6 months	1931734	0.0675	0.4220	-0.5000	-0.1622	0.0278	0.2251	0.7525
Momentum, 12 months	1909184	0.1459	0.6543	-0.6404	-0.2222	0.0577	0.3599	1.2142
Momentum, 24 months	1758225	0.3135	0.9798	-0.7500	-0.2698	0.1373	0.6122	1.9810
Momentum, 60 months	1370791	1.0100	2.1012	-0.8204	-0.2314	0.4703	1.4750	4.7067

Table 4: Average coefficients on each firm characteristic across the sample period

In each month, we estimate cross-sectional regressions the firm's simple and log stock returns on its own characteristics measured at the end of the preceding month. This table presents average coefficients across time. Firm characteristics are winsorized within each month at the upper and lower 1%, and are normalized by subtracting the mean and dividing by the standard deviation. See the Appendix for detailed variable definitions. The associated *t*-statistics are reported in the parentheses below/besides each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: C5 and C14 characteristics, January 1970 to December 2014

	(1)	(2)	(3)	(4)
	C5	C14	C5	C14
Dep. Var.	Simple return		Log return	
Log Size	-0.2191***	-0.2373***	0.2543***	-0.1313***
	(-2.96)	(-4.65)	(3.70)	(-2.66)
Log BM	0.5177***	0.4071***	0.5765***	0.4348***
	(9.20)	(9.59)	(10.99)	(11.90)
Momentum	0.3894***	0.3866***	0.5875***	0.5688***
	(5.89)	(7.90)	(9.46)	(12.34)
ROA	0.0905	0.0774**	0.5674***	0.3339***
	(1.53)	(2.02)	(10.74)	(9.88)
Asset growth	-0.3078***	-0.2217***	-0.4014***	-0.2788***
	(-9.51)	(-9.64)	(-11.53)	(-12.35)
Beta		0.0859*		0.0328
		(1.72)		(0.67)
Accrual		-0.1137***		-0.1171***
		(-5.99)		(-6.51)
Dividend		0.0083		0.0339
		(0.26)		(1.06)
Log LR Return		-0.0368		0.0120
		(-1.09)		(0.40)
Idio. risk		-0.2298***		-0.9077***
		(-2.83)		(-11.87)
Illiquidity		0.2970***		0.2992***
		(6.89)		(7.90)
Turnover		-0.0016		-0.1713***
		(-0.04)		(-4.04)
Leverage		-0.1037***		-0.2107***
		(-3.26)		(-7.20)
Sales/Price		0.1696***		0.0855***
		(5.04)		(3.05)
Constant	1.2668***	1.2668***	-0.0032	-0.0032
	(4.94)	(4.94)	(-0.01)	(-0.01)
Adj. R2	0.0349	0.0586	0.0409	0.0673

Panel B: Haugen-Baker (1996) C46 characteristics, January 1978 to December 2014; Simple return

Variable	Coefficient	T-stat	Variable	Coefficient	T-stat
Beta, market	0.0229	(0.41)	Sales to price trend	0.0195	(0.67)
Beta, T bill	0.1041	(1.54)	Profit margin	0.0294	(1.03)
Beta, GDP growth	-0.0123	(-0.33)	Profit margin trend	-0.0017	(-0.07)
Beta, inflation	-0.0209	(-0.57)	Capital turnover	0.0542	(1.52)
Beta, term spread	-0.0324	(-0.57)	Capital turnover trend	0.1123***	(5.79)
Beta, risk spread	-0.0558	(-0.97)	ROA	-0.0555	(-1.03)
Stock return volatility	0.3810	(1.58)	ROA trend	-0.0004	(-0.02)
Idiosyncratic risk	-0.3016	(-1.32)	ROE	0.2383***	(6.17)
Earnings risk	0.0162	(1.13)	ROE trend	0.0102	(0.47)
Leverage	-0.2115***	(-6.72)	Earnings growth	0.0007	(0.05)
Leverage trend	0.0470**	(2.37)	Momentum, 1 month	-0.7908***	(-15.71)
Interest-income ratio	-0.1595***	(-7.32)	Momentum, 2 months	-0.4254***	(-8.69)
Interest-income ratio trend	-0.0219	(-1.13)	Momentum, 3 months	0.0295	(0.61)
Earnings to price volatility	-0.6572***	(-3.07)	Momentum, 6 months	0.0423	(0.97)
Dividend to price volatility	-0.0468***	(-2.90)	Momentum, 12 months	0.3992***	(9.24)
Cash flow to price volatility	0.7211***	(3.44)	Momentum, 24 months	-0.0332	(-1.00)
Market capitalization	-0.0438**	(-2.07)	Momentum, 60 months	-0.0404*	(-1.72)
Stock price	0.0691**	(2.00)	Durables	-0.1699	(-1.64)
Trading volume	-0.3098***	(-5.81)	Nondurables	-0.1139	(-1.04)
Trading volume trend	-0.0811***	(-3.89)	Utilities	-0.0313	(-0.23)
Earnings to price	-0.2493**	(-2.13)	Energy	-0.0886	(-0.33)
Earnings to price trend	0.0267	(0.19)	Construction	-0.1088	(-0.67)
Book to price	0.2352***	(6.76)	Business equipment	0.0132	(0.17)
Book to price trend	0.0494**	(2.00)	Manufacturing	0.1260**	(1.97)
Dividend to price	-0.0368	(-1.13)	Transportation	0.1919*	(1.72)
Dividend to price trend	0.0087	(0.56)	Financial	-0.0938	(-0.94)
Cash flow to price	0.1439	(1.40)	Business services	0.3727***	(3.57)
Cash flow to price trend	-0.1508	(-1.12)	Constant	1.2842***	(4.76)
Sales to price	0.0835*	(1.95)	Adj. R2	0.0767	

Panel C: Haugen-Baker (1996) C46 characteristics, January 1978 to December 2014; Log return

Variable	Coefficient	T-stat	Variable	Coefficient	T-stat
Beta, market	0.1254**	(2.53)	Sales to price trend	-0.0208	(-0.82)
Beta, T bill	0.0727	(1.28)	Profit margin	0.0691***	(2.89)
Beta, GDP growth	-0.0124	(-0.37)	Profit margin trend	-0.0108	(-0.56)
Beta, inflation	-0.0355	(-1.16)	Capital turnover	0.0622*	(1.92)
Beta, term spread	-0.0369	(-0.77)	Capital turnover trend	0.1125***	(6.43)
Beta, risk spread	-0.0093	(-0.20)	ROA	0.1398***	(3.04)
Stock return volatility	-0.1970	(-0.91)	ROA trend	-0.0422*	(-1.75)
Idiosyncratic risk	-0.3497*	(-1.72)	ROE	0.2576***	(7.49)
Earnings risk	0.0217*	(1.70)	ROE trend	0.0268	(1.37)
Leverage	-0.2288***	(-7.76)	Earnings growth	0.0035	(0.27)
Leverage trend	0.0262	(1.49)	Momentum, 1 month	-0.7568***	(-17.34)
Interest-income ratio	-0.1626***	(-8.27)	Momentum, 2 months	-0.3553***	(-8.48)
Interest-income ratio trend	-0.0335*	(-1.90)	Momentum, 3 months	0.1053**	(2.42)
Earnings to price volatility	-0.5651***	(-3.28)	Momentum, 6 months	0.1619***	(3.92)
Dividend to price volatility	-0.0118	(-0.76)	Momentum, 12 months	0.4174***	(10.63)
Cash flow to price volatility	0.5992***	(3.55)	Momentum, 24 months	-0.0146	(-0.48)
Market capitalization	-0.0434**	(-2.06)	Momentum, 60 months	-0.0733***	(-3.29)
Stock price	0.1246***	(3.70)	Durables	-0.2019**	(-2.23)
Trading volume	-0.3645***	(-6.72)	Nondurables	-0.0762	(-0.73)
Trading volume trend	-0.1223***	(-6.45)	Utilities	0.0308	(0.23)
Earnings to price	0.1624	(1.62)	Energy	-0.0316	(-0.12)
Earnings to price trend	0.2938***	(2.65)	Construction	-0.1209	(-0.81)
Book to price	0.2529***	(8.17)	Business equipment	-0.0529	(-0.74)
Book to price trend	-0.0085	(-0.40)	Manufacturing	0.1649***	(2.80)
Dividend to price	-0.0169	(-0.53)	Transportation	0.2178**	(2.12)
Dividend to price trend	0.0050	(0.32)	Financial	-0.0727	(-0.78)
Cash flow to price	0.1097	(1.23)	Business services	0.2683***	(2.82)
Cash flow to price trend	-0.3263***	(-3.05)	Constant	-0.0909	(-0.33)
Sales to price	0.0403	(1.08)	Adj. R2	0.0868	

Table 5: Expected stock return and actual stock return

Panel A presents the results of Fama-MacBeth regressions where the dependent variable is the actual monthly simple or log return and the explanatory variable is the expected simple or log return, based on the models reported in Table 4. T-statistics for tests of whether the estimated coefficient equals zero (one) are reported in parentheses (brackets). In each month from January 1980 to December 2014, stocks are sorted into deciles based on their expected simple or log return. Panel B presents equal- and value-weighted returns to portfolios sorted on expected simple return, while panel C presents the same information for the portfolios sorted on expected log return. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Fama-MacBeth regression of actual return on expected return, January 1980 to December 2014

	C5	C14	C46	C5	C14	C46
Dependent var.	Simple return			Log return		
Expected return	0.8000***	0.5418***	0.4717***	0.8044***	0.7540***	0.6422***
	(3.46)	(8.27)	(10.87)	(11.78)	(13.04)	(15.64)
	[-0.87]	[-6.99]	[-12.17]	[-2.86]	[-4.25]	[-8.71]
Constant	1.0231	0.4718*	0.6467**	-0.0947	-0.0799	0.0060
	(1.11)	(1.71)	(2.56)	(-0.35)	(-0.31)	(0.02)
N	1,886,673	1,886,673	1,791,891	1,886,673	1,886,673	1,791,891
R2	0.012	0.016	0.013	0.018	0.025	0.023

Panel B: Returns to portfolios sorted on expected simple return

	C5		C14		C46		C5		C14		C46	
Decile	Ret	Std	Ret	Std	Ret	Std	Ret	Std	Ret	Std	Ret	Std
	Equal-weighted						Value-weighted					
Low	-0.18	7.29	-0.35	7.85	-0.54	7.41	0.36	6.64	0.12	7.61	0.15	7.17
2	0.47	6.23	0.46	6.55	0.43	6.28	0.73**	5.95	0.73**	6.16	0.73**	5.87
3	0.79***	5.71	0.73**	5.81	0.72**	5.73	1.00***	5.45	0.91***	5.60	0.90***	5.21
4	0.92***	5.41	0.94***	5.36	0.96***	5.37	0.97***	5.39	1.04***	5.07	1.00***	4.90
5	1.08***	5.18	1.11***	5.23	1.14***	5.13	1.05***	5.60	1.19***	5.09	1.12***	4.65
6	1.22***	5.08	1.31***	5.10	1.28***	5.17	1.26***	5.52	1.18***	5.12	1.03***	4.76
7	1.37***	5.08	1.38***	5.22	1.52***	5.25	1.37***	5.48	1.23***	5.45	1.22***	4.87
8	1.60***	5.41	1.67***	5.56	1.78***	5.67	1.59***	6.24	1.43***	5.97	1.35***	4.90
9	1.93***	6.36	1.84***	6.17	1.99***	6.31	1.53***	6.92	1.52***	6.47	1.26***	5.72
High	2.33***	7.93	2.37***	7.80	2.77***	7.94	1.89***	8.35	1.75***	8.03	1.73***	7.21
H - L	2.51***	7.21	2.72***	8.09	3.31***	7.13	1.53***	8.14	1.63***	8.70	1.58***	7.61

Panel C: Returns to portfolios sorted on expected log return

	C5		C14		C46		C5		C14		C46	
Decile	Ret	Std	Ret	Std	Ret	Std	Ret	Std	Ret	Std	Ret	Std
	Equal-weighted						Value-weighted					
Low	-0.08	8.83	-0.33	9.41	-0.59	8.84	-0.22	8.57	-0.34	9.48	-0.36	8.80
2	0.48	7.03	0.53	7.40	0.48	7.09	0.58	7.36	0.37	8.07	0.39	7.30
3	0.86***	6.12	0.82***	6.43	0.79**	6.27	0.65**	6.72	0.67**	6.62	0.69**	6.41
4	1.04***	5.52	1.05***	5.74	1.07***	5.68	0.71**	5.91	0.89***	6.06	0.99***	5.45
5	1.16***	5.12	1.17***	5.31	1.22***	5.26	0.97***	5.80	0.87***	5.35	1.05***	5.05
6	1.26***	4.88	1.32***	4.94	1.34***	5.01	0.91***	5.60	1.05***	5.02	1.01***	4.70
7	1.44***	4.94	1.42***	4.89	1.51***	5.01	0.98***	5.41	1.18***	4.80	1.09***	4.67
8	1.62***	4.92	1.64***	5.02	1.69***	5.10	1.17***	5.16	1.29***	4.95	1.12***	4.57
9	1.78***	5.58	1.81***	5.25	1.94***	5.42	1.28***	5.28	1.34***	5.19	1.37***	4.66
High	1.94***	6.81	2.07***	6.15	2.37***	6.44	1.39***	6.03	1.61***	5.94	1.55***	5.66
H - L	2.02***	7.30	2.40***	8.45	2.96***	7.62	1.62***	7.60	1.95***	9.09	1.91***	7.87

Table 6: Difference in firm characteristics between event and non-event firms

This table reports the coefficient estimated on an event firm dummy that equals one if the firm has engaged in the indicated corporate event during any of the prior thirty six months and zero if the firm did not do so. Within each month, firm characteristics are winsorized at the upper and lower 1%, and then normalized by subtracting the mean and dividing by the standard deviation. See the Appendix for detailed variable definitions. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	Size	BM	Momentum	ROA	Asset growth
M&A	0.40***	-0.14***	-0.02***	0.00	0.36***
	(53.32)	(-27.35)	(-4.15)	(0.70)	(60.42)
SEO	0.29***	-0.42***	0.05***	-0.18***	0.42***
	(24.28)	(-51.45)	(4.64)	(-8.67)	(54.84)
IPO	-0.27***	-0.22***	-0.22***	-0.31***	0.91***
	(-47.31)	(-21.54)	(-18.32)	(-22.69)	(53.16)
Div. ini.	0.00	0.09***	0.12***	0.40***	-0.03***
	(0.41)	(15.65)	(14.63)	(103.48)	(-4.48)
Share rep.	0.38***	0.12***	0.03***	0.32***	-0.19***
	(39.60)	(20.29)	(4.32)	(109.80)	(-37.55)
Stock split	0.61***	-0.42***	0.28***	0.46***	0.17***
	(96.03)	(-65.88)	(35.53)	(162.78)	(26.13)

Table 7: Abnormal returns based on characteristic models over 36 months after the event

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference between the actual return and the expected return obtained from the characteristic-based model. The analysis includes returns for each firm that engaged in the indicated event over the 36 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: 1980-2014

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
M&A	-0.11	-0.12	-0.31	-0.25	-0.16	-0.23
	(-0.28)	(-0.31)	(-0.75)	(-0.60)	(-0.39)	(-0.55)
SEO	-0.18	-0.19	-0.29	-0.30	-0.14	-0.17
	(-0.51)	(-0.52)	(-0.77)	(-0.82)	(-0.38)	(-0.44)
IPO	0.15	0.24	0.13	-0.26	0.05	-0.06
	(0.28)	(0.45)	(0.25)	(-0.50)	(0.10)	(-0.11)
Div. ini.	-0.06	-0.01	-0.05	0.12	0.04	0.03
	(-0.24)	(-0.03)	(-0.20)	(0.48)	(0.16)	(0.14)
Share rep.	0.22	0.22	0.21	0.33	0.25	0.31
	(0.75)	(0.75)	(0.71)	(1.11)	(0.83)	(1.04)
Stock split	0.14	0.12	-0.10	0.03	0.01	-0.12
	(0.44)	(0.40)	(-0.33)	(0.08)	(0.04)	(-0.38)

Panel B: 1980-1997

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
M&A	-0.09	-0.11	-0.26	-0.28	-0.19	-0.21
	(-0.19)	(-0.23)	(-0.54)	(-0.57)	(-0.38)	(-0.42)
SEO	-0.16	-0.16	-0.22	-0.25	-0.16	-0.14
	(-0.37)	(-0.36)	(-0.50)	(-0.57)	(-0.36)	(-0.31)
IPO	0.16	0.22	0.06	-0.19	0.03	-0.10
	(0.30)	(0.42)	(0.12)	(-0.35)	(0.05)	(-0.18)
Div. ini.	0.08	0.10	0.04	0.26	0.14	0.11
	(0.23)	(0.28)	(0.12)	(0.75)	(0.41)	(0.31)
Share rep.	0.23	0.23	0.21	0.27	0.21	0.26
	(0.67)	(0.68)	(0.61)	(0.77)	(0.61)	(0.73)
Stock split	0.17	0.13	-0.09	0.07	-0.00	-0.14
	(0.46)	(0.34)	(-0.25)	(0.17)	(-0.01)	(-0.36)

Panel C: 1998-2014

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
M&A	-0.13	-0.14	-0.34	-0.22	-0.14	-0.25
	(-0.23)	(-0.24)	(-0.60)	(-0.39)	(-0.25)	(-0.43)
SEO	-0.22	-0.23	-0.38	-0.38	-0.11	-0.20
	(-0.37)	(-0.39)	(-0.64)	(-0.64)	(-0.19)	(-0.33)
IPO	0.12	0.27	0.31	-0.46	0.11	0.05
	(0.10)	(0.22)	(0.24)	(-0.38)	(0.09)	(0.04)
Div. ini.	-0.18	-0.10	-0.12	0.00	-0.05	-0.03
	(-0.51)	(-0.28)	(-0.35)	(0.00)	(-0.14)	(-0.08)
Share rep.	0.22	0.22	0.21	0.39	0.28	0.36
	(0.50)	(0.50)	(0.49)	(0.88)	(0.63)	(0.82)
Stock split	0.06	0.11	-0.12	-0.07	0.05	-0.07
	(0.11)	(0.23)	(-0.25)	(-0.13)	(0.10)	(-0.15)

Table 8: Abnormal returns based on characteristic models over 36 months after the event in hot versus cold market

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference between the actual return and the expected return obtained from the characteristic-based model. The analysis includes returns for each firm that engaged in the indicated event over the 36 months following each event. A year is regarded as a hot market if the number of IPOs is above the median over the period 1980-2014. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
	Hot market					
M&A	-0.20	-0.22	-0.38	-0.41	-0.30	-0.34
	(-0.36)	(-0.40)	(-0.67)	(-0.72)	(-0.53)	(-0.60)
SEO	-0.24	-0.23	-0.26	-0.38	-0.22	-0.19
	(-0.49)	(-0.49)	(-0.54)	(-0.77)	(-0.44)	(-0.37)
IPO	0.18	0.29	0.16	-0.26	0.09	-0.04
	(0.29)	(0.46)	(0.25)	(-0.41)	(0.14)	(-0.06)
Div. ini.	-0.05	-0.01	-0.06	0.22	0.06	0.03
	(-0.15)	(-0.03)	(-0.20)	(0.70)	(0.21)	(0.08)
Share rep.	0.22	0.21	0.21	0.30	0.19	0.28
	(0.60)	(0.57)	(0.57)	(0.82)	(0.52)	(0.77)
Stock split	0.14	0.11	-0.11	-0.01	-0.00	-0.14
	(0.34)	(0.28)	(-0.27)	(-0.01)	(-0.01)	(-0.34)
	Cold market					
M&A	0.02	0.03	-0.20	-0.00	0.05	-0.06
	(0.05)	(0.06)	(-0.48)	(-0.01)	(0.12)	(-0.14)
SEO	-0.11	-0.12	-0.32	-0.20	-0.04	-0.14
	(-0.25)	(-0.28)	(-0.69)	(-0.45)	(-0.08)	(-0.30)
IPO	0.01	0.03	0.03	-0.26	-0.11	-0.13
	(0.03)	(0.07)	(0.06)	(-0.58)	(-0.24)	(-0.29)
Div. ini.	-0.07	-0.01	-0.04	0.05	0.02	0.04
	(-0.21)	(-0.02)	(-0.13)	(0.16)	(0.07)	(0.12)
Share rep.	0.22	0.24	0.21	0.37	0.33	0.35
	(0.61)	(0.65)	(0.57)	(1.00)	(0.87)	(0.94)
Stock split	0.14	0.15	-0.09	0.10	0.05	-0.08
	(0.43)	(0.45)	(-0.27)	(0.29)	(0.14)	(-0.25)

Table 9: Abnormal returns based on characteristic models over 60 months after the event

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference between the actual return and the expected return obtained from the characteristic-based model. The analysis includes returns for each firm that engaged in the indicated event over the 60 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
M&A	-0.06	-0.08	-0.20	-0.18	-0.09	-0.11
	(-0.15)	(-0.20)	(-0.51)	(-0.44)	(-0.23)	(-0.28)
SEO	-0.11	-0.12	-0.16	-0.25	-0.09	-0.07
	(-0.31)	(-0.33)	(-0.45)	(-0.68)	(-0.26)	(-0.18)
IPO	0.11	0.17	0.16	-0.28	0.03	0.01
	(0.22)	(0.32)	(0.30)	(-0.55)	(0.06)	(0.01)
Div. ini.	-0.10	-0.04	-0.07	0.06	-0.02	-0.00
	(-0.36)	(-0.17)	(-0.25)	(0.23)	(-0.06)	(-0.01)
Share rep.	0.20	0.20	0.17	0.31	0.23	0.28
	(0.65)	(0.67)	(0.56)	(1.02)	(0.77)	(0.92)
Stock split	0.13	0.11	-0.08	0.07	0.04	-0.05
	(0.43)	(0.36)	(-0.27)	(0.22)	(0.12)	(-0.17)

Table 10: Abnormal returns based on characteristic models over 36 months after the event: Different estimation windows

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference between the actual return and the expected return obtained from the characteristic-based model. The analysis includes returns for each firm that engaged in the indicated event over the 36 months following each event. The expected return is computed using models in Table 4 with different estimation windows: one year, three years, or ten years. The expected return is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Simple return - Expected simple return			Log return - Expected log return		
	Panel A: 1 year					
M&A	-0.11	-0.12	-0.31	-0.25	-0.16	-0.23
	(-0.28)	(-0.31)	(-0.75)	(-0.60)	(-0.39)	(-0.55)
SEO	-0.18	-0.19	-0.29	-0.30	-0.14	-0.17
	(-0.51)	(-0.52)	(-0.77)	(-0.82)	(-0.38)	(-0.44)
IPO	0.15	0.24	0.13	-0.26	0.05	-0.06
	(0.28)	(0.45)	(0.25)	(-0.50)	(0.10)	(-0.11)
Div. ini.	-0.06	-0.01	-0.05	0.12	0.04	0.03
	(-0.24)	(-0.03)	(-0.20)	(0.48)	(0.16)	(0.14)
Share rep.	0.22	0.22	0.21	0.33	0.25	0.31
	(0.75)	(0.75)	(0.71)	(1.11)	(0.83)	(1.04)
Stock split	0.14	0.12	-0.10	0.03	0.01	-0.12
	(0.44)	(0.40)	(-0.33)	(0.08)	(0.04)	(-0.38)
	Panel B: 3 years					
M&A	-0.16	-0.19	-0.38	-0.32	-0.26	-0.34
	(-0.39)	(-0.47)	(-0.97)	(-0.80)	(-0.63)	(-0.84)
SEO	-0.17	-0.19	-0.32	-0.27	-0.11	-0.17
	(-0.49)	(-0.55)	(-0.91)	(-0.77)	(-0.31)	(-0.46)
IPO	-0.05	-0.03	-0.26	-0.59	-0.34	-0.58
	(-0.10)	(-0.06)	(-0.51)	(-1.16)	(-0.67)	(-1.14)
Div. ini.	-0.04	-0.01	-0.05	0.21	0.09	0.08
	(-0.19)	(-0.06)	(-0.19)	(0.84)	(0.36)	(0.34)
Share rep.	0.22	0.23	0.22	0.29	0.21	0.28
	(0.76)	(0.79)	(0.78)	(1.02)	(0.73)	(0.97)
Stock split	0.06	0.00	-0.22	-0.06	-0.13	-0.29
	(0.21)	(0.01)	(-0.74)	(-0.21)	(-0.43)	(-0.92)
	Panel C: 10 years					
M&A	-0.19	-0.22	-0.41	-0.41	-0.35	-0.42
	(-0.48)	(-0.56)	(-1.05)	(-1.01)	(-0.87)	(-1.05)
SEO	-0.15	-0.15	-0.31	-0.27	-0.10	-0.18
	(-0.42)	(-0.44)	(-0.88)	(-0.75)	(-0.27)	(-0.50)
IPO	-0.17	-0.16	-0.45	-0.83	-0.62	-0.92*
	(-0.34)	(-0.31)	(-0.88)	(-1.65)	(-1.24)	(-1.80)
Div. ini.	-0.03	-0.01	-0.05	0.29	0.18	0.17
	(-0.12)	(-0.06)	(-0.20)	(1.22)	(0.75)	(0.67)
Share rep.	0.12	0.12	0.12	0.16	0.07	0.13
	(0.41)	(0.43)	(0.41)	(0.54)	(0.26)	(0.47)
Stock split	0.03	-0.00	-0.26	-0.11	-0.17	-0.38
	(0.12)	(-0.01)	(-0.89)	(-0.37)	(-0.54)	(-1.25)

Table 11: Differences in stock return between event firms and matched firms over 36 months after the event

For each event firm/month, we identify a matching firm with the closest expected simple/log stock return. This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference in simple/log return between the event firm and the matching firm over the 36 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Match on expected simple return			Match on expected log return		
M&A	-0.23**	-0.25***	-0.47***	-0.12	-0.16*	-0.21**
	(-2.51)	(-2.94)	(-4.49)	(-1.43)	(-1.68)	(-1.98)
SEO	-0.09	-0.16	-0.18	-0.16	-0.06	-0.13
	(-0.80)	(-1.45)	(-1.62)	(-1.41)	(-0.57)	(-1.11)
IPO	-0.07	-0.20	-0.19	-0.23**	-0.06	-0.32**
	(-0.45)	(-1.36)	(-1.30)	(-2.02)	(-0.52)	(-2.37)
Div. ini.	0.21**	0.17	0.19*	0.16*	0.18*	0.32***
	(1.98)	(1.59)	(1.70)	(1.77)	(1.96)	(3.25)
Share rep.	0.25***	0.16***	0.17**	0.33***	0.27***	0.39***
	(4.37)	(2.74)	(2.39)	(6.46)	(4.76)	(5.59)
Stock split	0.22***	0.16*	0.02	0.24***	0.22***	0.20**
	(2.63)	(1.77)	(0.16)	(2.95)	(2.60)	(2.08)

Table 12: Difference in stock return between event firms and matching firms over 36 months after the event: 10 matching firms

For each event firm/month, we identify 10 matching firms with the closest expected simple/log stock return in the month. This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference in simple/log return between the event firm and the average matching firm over the 36 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Match on expected simple return			Match on expected log return		
M&A	-0.20***	-0.21***	-0.32***	-0.15**	-0.16**	-0.19**
	(-2.77)	(-2.72)	(-3.70)	(-2.02)	(-2.10)	(-2.13)
SEO	-0.10	-0.14	-0.16	-0.12	-0.10	-0.07
	(-1.02)	(-1.34)	(-1.44)	(-1.21)	(-0.98)	(-0.67)
IPO	-0.09	-0.12	-0.17	-0.21*	-0.12	-0.31**
	(-0.62)	(-0.89)	(-1.13)	(-1.82)	(-1.06)	(-2.48)
Div. ini.	0.09	0.17**	0.12	0.26***	0.22***	0.29***
	(1.10)	(2.11)	(1.49)	(3.53)	(3.20)	(3.87)
Share rep.	0.23***	0.20***	0.18***	0.29***	0.28***	0.39***
	(4.20)	(3.67)	(2.85)	(6.47)	(5.41)	(6.01)
Stock split	0.23***	0.18**	0.09	0.24***	0.23***	0.22**
	(2.97)	(2.16)	(0.92)	(3.25)	(2.86)	(2.43)

Table 13: Abnormal log returns based on characteristic models over 36 months after the event: Different combinations of characteristics

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the difference between the actual log return and the expected log return obtained from the characteristic-based model. The analysis includes returns for each firm that engaged in the indicated event over the 36 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We use different combinations of firm characteristics as return predictors. Characteristic "1" refers to firm size, "2" book-to-market ratio, "3" momentum returns, "4" ROA, and "5" asset growth. "None" means we do not include any firm characteristics in the regression to predict future returns; only the intercept is estimated. We cluster standard errors by time. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	M&A	SEO	IPO	Div. ini.	Share rep.	Stock split
None	-0.24	-0.48	-1.31**	0.49*	0.82***	0.42
	(-0.57)	(-1.30)	(-2.55)	(1.96)	(2.71)	(1.29)
1	-0.48	-0.63*	-1.21**	0.44*	0.59*	0.09
	(-1.16)	(-1.72)	(-2.34)	(1.77)	(1.96)	(0.29)
2	-0.17	-0.33	-1.20**	0.50**	0.80***	0.60*
	(-0.40)	(-0.88)	(-2.33)	(1.98)	(2.64)	(1.85)
3	-0.25	-0.53	-1.21**	0.40	0.79***	0.22
	(-0.59)	(-1.42)	(-2.33)	(1.59)	(2.62)	(0.67)
4	-0.33	-0.50	-1.02**	0.17	0.55*	0.04
	(-0.81)	(-1.34)	(-1.98)	(0.70)	(1.84)	(0.13)
5	-0.07	-0.33	-0.71	0.49*	0.73**	0.49
	(-0.18)	(-0.89)	(-1.37)	(1.95)	(2.41)	(1.51)
12	-0.48	-0.49	-1.03**	0.43*	0.50*	0.23
	(-1.17)	(-1.34)	(-1.98)	(1.70)	(1.66)	(0.71)
13	-0.40	-0.61*	-1.14**	0.37	0.63**	0.03
	(-0.96)	(-1.66)	(-2.19)	(1.47)	(2.10)	(0.09)
14	-0.44	-0.56	-0.97*	0.18	0.45	-0.09
	(-1.05)	(-1.52)	(-1.87)	(0.72)	(1.51)	(-0.28)
15	-0.34	-0.50	-0.56	0.44*	0.48	0.13
	(-0.82)	(-1.35)	(-1.08)	(1.74)	(1.58)	(0.40)
23	-0.12	-0.29	-0.95*	0.36	0.74**	0.47
	(-0.30)	(-0.78)	(-1.83)	(1.44)	(2.44)	(1.44)
24	-0.28	-0.37	-0.94*	0.19	0.55*	0.20
	(-0.68)	(-1.00)	(-1.83)	(0.78)	(1.82)	(0.63)
25	-0.03	-0.23	-0.68	0.49**	0.72**	0.63*
	(-0.07)	(-0.61)	(-1.32)	(1.97)	(2.38)	(1.93)
34	-0.33	-0.53	-0.97*	0.13	0.56*	-0.08
	(-0.80)	(-1.44)	(-1.88)	(0.53)	(1.87)	(-0.26)
35	-0.09	-0.38	-0.63	0.40	0.70**	0.29
	(-0.21)	(-1.03)	(-1.23)	(1.60)	(2.33)	(0.89)
45	-0.16	-0.33	-0.42	0.15	0.45	0.10
	(-0.38)	(-0.88)	(-0.81)	(0.62)	(1.51)	(0.30)
123	-0.38	-0.41	-0.82	0.31	0.49	0.18
	(-0.92)	(-1.12)	(-1.57)	(1.22)	(1.64)	(0.56)
124	-0.44	-0.46	-0.84	0.20	0.40	0.04
	(-1.07)	(-1.25)	(-1.63)	(0.81)	(1.35)	(0.12)
125	-0.36	-0.40	-0.49	0.42*	0.41	0.24
	(-0.87)	(-1.07)	(-0.94)	(1.67)	(1.35)	(0.75)
134	-0.37	-0.55	-0.93*	0.13	0.50*	-0.14
	(-0.89)	(-1.48)	(-1.80)	(0.53)	(1.67)	(-0.43)
135	-0.27	-0.49	-0.54	0.37	0.52*	0.06
	(-0.66)	(-1.32)	(-1.03)	(1.47)	(1.73)	(0.19)
145	-0.29	-0.40	-0.35	0.16	0.34	-0.06
	(-0.70)	(-1.10)	(-0.67)	(0.64)	(1.13)	(-0.19)
234	-0.23	-0.33	-0.78	0.13	0.54*	0.16
	(-0.54)	(-0.89)	(-1.51)	(0.52)	(1.80)	(0.50)
235	-0.01	-0.22	-0.53	0.37	0.67**	0.49
	(-0.02)	(-0.58)	(-1.03)	(1.46)	(2.23)	(1.50)
245	-0.13	-0.25	-0.41	0.17	0.45	0.21
	(-0.31)	(-0.68)	(-0.79)	(0.69)	(1.51)	(0.64)
345	-0.16	-0.37	-0.40	0.11	0.47	-0.03
	(-0.39)	(-0.99)	(-0.76)	(0.46)	(1.55)	(-0.09)
1234	-0.36	-0.40	-0.70	0.13	0.42	0.03
	(-0.88)	(-1.07)	(-1.35)	(0.54)	(1.39)	(0.08)
1235	-0.28	-0.34	-0.38	0.31	0.41	0.19
	(-0.68)	(-0.93)	(-0.73)	(1.24)	(1.38)	(0.59)
1245	-0.30	-0.34	-0.32	0.18	0.31	0.04
	(-0.73)	(-0.93)	(-0.62)	(0.72)	(1.03)	(0.13)
1345	-0.23	-0.40	-0.35	0.12	0.39	-0.11
	(-0.57)	(-1.09)	(-0.68)	(0.47)	(1.30)	(-0.35)
2345	-0.10	-0.23	-0.34	0.12	0.46	0.16
	(-0.23)	(-0.63)	(-0.65)	(0.47)	(1.53)	(0.51)
12345	-0.25	-0.30	-0.26	0.12	0.33	0.03
	(-0.60)	(-0.82)	(-0.50)	(0.48)	(1.11)	(0.08)

Internet Appendix

Table A1: Abnormal returns based on characteristic models over 36 months after the event

This table reports the estimated intercept in pooled OLS regressions where the dependent variable is the abnormal return of the event firm relative to the expected stock return over the 36 months following each event. The expected return is computed using models in Table 4, and is known before the beginning of the month. We cluster standard errors by time in pooled regressions. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	C5	C14	C46	C5	C14	C46
	Simple return - [exp(expected log return) - 1]			Log return - log(1 + expected simple return)		
M&A	1.30**	1.37**	1.25**	-1.49***	-1.50***	-1.67***
	(2.25)	(2.35)	(2.14)	(-3.63)	(-3.63)	(-4.00)
SEO	1.31**	1.56***	1.47**	-1.50***	-1.50***	-1.60***
	(2.25)	(2.65)	(2.46)	(-4.07)	(-4.05)	(-4.23)
IPO	2.66**	3.18**	3.11**	-2.21***	-2.11***	-2.20***
	(2.12)	(2.49)	(2.41)	(-4.24)	(-4.04)	(-4.15)
Div. ini.	0.68*	0.63*	0.65*	-0.79***	-0.74***	-0.77***
	(1.93)	(1.79)	(1.84)	(-3.23)	(-3.03)	(-3.08)
Share rep.	1.47***	1.35***	1.43***	-0.74**	-0.73**	-0.74**
	(3.25)	(3.00)	(3.17)	(-2.49)	(-2.47)	(-2.48)
Stock split	1.03**	1.14**	1.00**	-0.72**	-0.73**	-0.94***
	(2.08)	(2.27)	(2.01)	(-2.25)	(-2.29)	(-2.92)