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Abstract

A change in executive leadership is a significant event in the life of a firm. This study investigates an important consequence of a CEO turnover: a change in equity volatility. We develop three hypotheses about how changes in CEO might affect stock price volatility, and test these hypotheses using a sample of 872 CEO turnovers over the 1979-95 period. We find that volatility increases following a CEO turnover, even when the CEO leaves voluntarily and is replaced by someone from inside the firm. Forced turnovers increase volatility more than voluntary turnovers - a finding consistent with the view that forced departures imply a higher probability of large strategy changes. For voluntary departures, outside successions increase volatility more than inside successions. We attribute this volatility change to increased uncertainty over the successor CEO's skill in managing the firm's operations. We also document a greater stock price response to earnings announcements following CEO turnover, consistent with more informative signals of value driving the increased volatility. Our findings are robust to controls for firm-specific characteristics such as firm size, changes in firm operations, and changes in volatility and performance prior to the turnover.

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I. Introduction

A change in executive leadership is a significant event in the life of a firm. A chief executive officer's ability, preferences, and ultimate decisions affect the firm through the projects the firm selects, its financial policy, and the corporate culture. To the extent that these characteristics and the resulting decisions differ across individuals, CEO changes can alter the course of the firm and its performance.

This study investigates a potentially significant consequence of a CEO turnover: a change in equity-return volatility. The volatility consequences of a turnover are important because a change in stock-price volatility can have a meaningful impact on the firm, its management, and its stakeholders. Increased volatility could alter the firm's investment policy going forward via an increased cost of capital,[1] or by a reduction in the attractiveness of the firm's equity as a medium for acquisitions or compensation.[2] Increased volatility could also affect the various agency relationships in the firm – exacerbating conflicts between stockholders and bondholders, and hindering resolution of stockholder-management problems. Internal decisions that rely on gleaning information from price changes could also be altered. For example, high volatility costs might lead the board to choose a lower performance threshold as a trigger for replacing management (Hallman and Hartzell, 2003). To the extent that these effects are costly, the expected volatility impact should be a factor for the board in planning a CEO succession strategy.

Many studies have shown that CEO changes can have a significant impact on shareholder wealth and on firm operations.[3] The wealth effect associated with an announced change in CEO

[1] Increased volatility might result in an increase in the required return to the firm's equity. Kalay and Loewenstein (1985) and Bhagat, Brickley, and Loewenstein (1987) argue that "information risk" — undiversifiable risk associated with event-specific information announcements — may be priced by the market. When this type of risk increases, expected returns will increase.

[2] For example, a recent popular press article cites high stock-market volatility as a rationale for Bertelsmann rebuffing a merger attempt by AOL (Ewing, 2000). Another article describes an internet company's (E-Loan's) inability to use its volatile shares to make acquisitions (Hof and Saveri, 1999).

[3] Denis and Denis (1995) find changes in operating performance, the level of corporate control activity, and asset restructuring around turnover. These changes are largest for forced departures. Weisbach (1995) shows evidence that new CEOs often reverse the investment decisions of their predecessors. This finding is independent of the

can be decomposed into an information effect (e.g., the change is a signal that firm prospects are worse than previously believed), and a real effect (e.g., the new CEO is expected to improve performance). Furtado and Karan (1990) cite 10 studies that estimate the announcement effect of CEO changes. They find that abnormal returns around the announcement are typically 25 to 50 basis points for all changes. Bonnier and Bruner (1989) find a stronger positive return of about 2.5% when they attempt to isolate the real effect by focusing on turnovers at distressed firms (where an announced change is unlikely to signal significant information about the state of the firm). As a whole, this evidence suggests that there can be positive real effects, but that the information effect can dominate. Following the event, there is evidence of subsequent restructuring of firm operations (e.g., Denis and Denis, 1995).

The consequences of turnover for equity volatility have been previously unexplored. In fact, previous theoretical work uses various assumptions about the volatility effect of a turnover, without the benefit of empirical evidence. For example, Dewatripont and Tirole (1994) assume that volatility decreases following turnover. In contrast, Berkovitch and Israel (1996) as well as Grinstein (2000) assume that volatility increases following managerial replacement. In each of these studies, the assumption of a volatility change (and the direction of that change) is crucial to the results.

We develop three hypotheses that lead to different predictions of a turnover's impact on volatility: the *strategy hypothesis*, the *ability hypothesis*, and the *scapegoat hypothesis*. The first two of these predict a post-turnover increase in volatility due to increased uncertainty over the firm's strategic direction and management's ability to run the firm, respectively. The third hypothesis predicts no change in volatility; instead, turnover acts only as an incentive device (hence, the CEO is a "scapegoat" for the firm's poor performance).

Using a sample of 872 CEO changes over the 1979-1995 period, we analyze changes in stock-market volatility for turnovers in general, by departure type, and by source of the

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cause of the predecessor's departure. Huson, Malatesta, and Parrino (1999) document an increase in accounting performance subsequent to CEO turnover, especially for turnovers associated with outside succession.

successor. Our results are robust to a variety of controls, including size, historical performance, and the pre-event volatility change (controlled for by the use of matching samples), changes in market-wide volatility, pre-event performance, and changes in company operating characteristics.

The analysis shows that all types of changes in executive leadership result (on average) in equity volatility increases. The most significant increase is associated with forced turnover, and for this type of departure, we find no significant difference between inside and outside successions. For voluntary departures, volatility increases are greater for outside than for inside succession. Furthermore, the effects are long-lived; we find statistically significant increases in volatility up to two years after the event. Taken together, these findings support the strategy and ability hypotheses, reject the scapegoat hypothesis, and are consistent with signals of firm value becoming more informative as market participants learn about the new CEO. As additional confirmation, we find that stock-price sensitivity to the unexpected component of quarterly earnings announcements increases following a turnover.

The largest economic effect is associated with forced departures, which we argue is consistent with important uncertainty over firm strategy following management changes. For this group, in our primary specifications, we find a volatility increase of 17% to 24% in the year following the event. To give one interpretation of economic significance, a 17% volatility change would increase by 15% the value of a one-year at-the-money call option on the equity of an average firm with a forced departure.[4] If even one-fourth of volatility is undiversifiable or otherwise appears in the discount rate, a forced turnover would increase a firm's hurdle rate by one to two percent, which could change the optimal accept/reject decision for a given project.

Section II develops our hypotheses about volatility and CEO turnover. Section III

[4] This estimate relies on the Black-Scholes (1973) model. We use stock and strike prices of $50, a risk-free rate of five percent, and a dividend yield of 0%. At an initial volatility of 33% (sample average for firms with forced departures), we expect a forced turnover to increase volatility to 39% (using the coefficient estimate for forced turnover of Table 4, column 1).

[5] Many papers find a connection between poor performance and CEO turnover. For examples, see Coughlan and Schmidt (1985), Weisbach (1988), and Parrino (1997).

discusses the data, and Section IV presents our empirical results. Section V concludes.

II. CEO turnover and volatility changes

In this section, we discuss three models of CEO succession and their implications for volatility changes. These models are based on three motivating factors for the CEO change and choice of replacement: (1) the board's desire to continue the firm's strategy or find a successor with a different strategy, (2) the board's estimate of the management skill of the current CEO compared to potential successors, and (3) the board's use of the threat of termination to motivate the CEO to exert effort. While these are not mutually exclusive or exhaustive, we develop implications to determine which have empirical support. We conclude this section with a discussion of alternative explanations for volatility change around CEO turnover.

If investor sensitivity to information changes following a turnover, we expect that equity volatility will change. For example, after a turnover event, there may be increased uncertainty about the future prospects of the firm because the skill and strategy of the successor CEO are not known with precision. Initially, the impact of new information may be greater as investors update their prior beliefs. As time passes during the tenure of a CEO, investors may become less likely to revise their beliefs and reaction to news will diminish. Weaker (stronger) priors about the characteristics of the firm after a turnover event would be associated with larger (smaller) volatility changes.

A. Board decisions and the strategy hypothesis

The CEO and board of directors jointly determine the strategic direction of the firm. In extreme circumstances (e.g., in financial distress or when considering a merger), a board may be directly involved in strategic choices. However, the more common and less direct influence of the board derives from the choice of CEO. The decision to retain or fire a CEO, coupled with the choice of replacement if the CEO is fired, gives the board an opportunity to partially adjust the firm's course.

While the board of directors retains the right to terminate an incumbent CEO, a CEO may voluntarily leave the firm at any time. The retirement of the CEO is an example of a voluntary turnover, i.e., one not initiated by the board. Because retirement is not a board's decision, it does not provide a signal of the board's desire to change firm strategy. Assuming that the market anticipates the board's motivations on average, a voluntary departure is expected to result in little or no additional volatility due to a change in strategy.

In contrast, a forced turnover occurs when the board is dissatisfied with the existing CEO. If the board wishes to move the firm in a new direction and believes that the current CEO cannot perform the task, the board dismisses the CEO. This will be most common when the current business strategy is performing poorly, forcing the board to consider a successor CEO who is expected to change the firm's course. On average, then, a forced turnover signals that the existing firm policies are inadequate and that substantial changes are required.

We refer to this line of reasoning as the *strategy hypothesis*. The strategy hypothesis posits that volatility increases after a turnover are the result of increased uncertainty about the nature of the strategy that will be implemented by the new CEO. The magnitude of the increase in volatility should depend on how significantly the new strategy is expected to differ from the old strategy. Empirically, this difference should be more significant following forced departures than voluntary departures. The increase in volatility is expected to diminish as the market learns about details of the plans, and their likelihood of success or failure.

B. The ability hypothesis

We develop this hypothesis using the learning model setting of MacDonald (1982), Murphy (1986), and Gibbons and Murphy (1992). In these models, when the CEO voluntarily retires (or dies), the board of directors chooses the best replacement CEO based on expected ability. The dismissal of an existing CEO occurs when the expected ability of the current manager based on past performance drops below the expected ability of a replacement CEO. If there is a cost to change the CEO, the expected improvement of the new CEO must outweigh the

replacement cost for a dismissal to be optimal.[6]

We use the learning model setting to develop the implications of a change in leadership on volatility. Following a turnover event, investors gather evidence to evaluate the skill of the new CEO. This leads to a period of higher volatility as investors update their ability estimates and revalue the firm. Volatility then falls as the estimate of CEO ability becomes more precise. If there is higher initial uncertainty about CEO skill, then the market will learn more from information revealed after the new CEO is hired, and there will be a greater increase in volatility. We call this the *ability hypothesis*.

Factors that determine the level of uncertainty about the successor CEO's ability should predict volatility following the turnover event. The most important factors likely depend on the background of the incoming CEO. For example, if the CEO is from inside the firm, the board will have a relatively precise estimate of ability based on his or her experience at the firm. The inside successor is likely to have managed a significant part of the firm's operations and to be familiar with its procedures and personnel. Thus, investors might place less weight on news following the turnover to revise their estimates of CEO ability. The board and market will have less certainty about the ability of a successor from outside the firm than one from inside. Therefore, holding firm strategy constant, the ability hypothesis predicts a greater increase in volatility following outside succession than inside succession.

While we expect this relation to hold on average, there may be cases where an outside successor has a well-known track record and the board and market have more precise estimates of ability. For example, consider a firm that hires an outsider from a competitor in an industry characterized by similar firms. In this homogeneous industry, outside successions from within the industry may not have significantly different uncertainty than inside successions. Similarly, if the new CEO has an outstanding track record attributed to him or her (e.g., as CEO of another firm), then the market may have a stronger prior about CEO ability.

[6] The exact firing rule would also depend on the model's assumptions about contract renegotiation.

C. Interaction between strategy and ability hypotheses and empirical implications

The strategy and ability hypotheses are not mutually exclusive. The volatility change after a turnover depends on uncertainty about both the strategic choices to be made by the incoming CEO and his or her ability. We have argued that a forced departure is more likely to signal that the board seeks to pursue an alternative strategy.[7] Accordingly, the strategy hypothesis predicts that forced turnovers are associated with larger volatility increases than voluntary departures. This is our first testable implication.

Holding strategy constant, the ability hypothesis predicts that the board (and market) should on average have less uncertainty about insiders' ability to continue that direction. However, when the firm is changing strategy, it is difficult to differentiate between an outside or insider successor's ability to implement the new strategy. In this case, the previous experience of an inside successor might not provide a strong prior about ability. Thus, following a forced departure, we expect to see similar volatility increases across inside and outside successions.

Because voluntary turnovers are by definition at the discretion of the CEO, these turnovers should not be interpreted as a signal that the board is attempting to change the firm's strategy. The volatility change is more likely to depend on the amount of uncertainty about the skill of the new CEO. So, conditional on a voluntary departure, we expect to observe higher volatility after an outside succession than an inside succession.

Taken together then, the testable implications of the strategy and ability hypotheses can be summarized in a rank ordering of expected volatility changes:

(1) $E(\Delta Volatility(forced\ departure)) > E(\Delta Volatility(voluntary\ departure))$,

(2) $E(\Delta Volatility(outside\ succession \mid forced\ departure)) \cong E(\Delta Volatility(inside\ succession \mid forced\ departure))$, and

(3) $E(\Delta Volatility(outside\ succession \mid voluntary\ departure)) > E(\Delta Volatility(inside\ succession \mid voluntary\ departure))$.

[7] The strategy hypothesis focuses on a change in strategy as the common motivation for the board in firing an existing CEO. Of course, the board could fire a CEO for other reasons and hire a replacement to continue the same strategy as the firm.

D. Agency models and the scapegoat hypothesis

The *scapegoat hypothesis* is based on the agency models of Holmstrom (1979), Shavell (1979), and Mirrlees (1976).[8] These models predict that a credible dismissal threat is necessary to ensure optimal exertion of effort by the incumbent CEO. In these models, all CEOs have equal ability, and differences in firm performance are due to the level of effort exerted and chance. In equilibrium, the board of directors commits to a policy of manager dismissal after poor firm performance. This policy induces all managers to exert the optimal level of effort. Dismissal occurs when there is poor performance due to chance, and a replacement manager with equal ability is selected. Because firing occurs due to random factors that result in poor firm performance, rather than the ability or effort of the CEO, the CEO appears to be a "scapegoat."

Since all managers have the same ability and exert the same effort, the characteristics of the firm (including firm volatility) do not change after a turnover. In addition, succession and departure type convey no information about the future volatility of the firm. We refer to this set of predictions as the *scapegoat hypothesis*.[9]

E. Alternative Explanations for Volatility Changes

Our strategy and ability hypotheses provide a framework to investigate the volatility consequences of a CEO turnover. However, alternative hypotheses can result in similar empirical implications. In addition, there will be instances where the actual volatility impact does not match our prediction, since our predictions characterize an average event.

One relevant alternative hypothesis is that turnover type provides a signal that the firm outlook is worse than expected. This signaling argument could explain an increase in volatility

[8] Huson, Malatesta, and Parrino (1999) develop the implications of this hypothesis (or lack thereof) on accounting performance. We extend the analysis to discuss the implications on stock-price volatility.

[9] An alternative hypothesis, which is difficult to distinguish empirically, is that the uncertainty over the new CEO's ability is very small. For example, screening mechanisms for selecting CEOs may be so developed that there is little difference in uncertainty between the incumbent and new CEOs.

following a forced turnover. The firing of a CEO might indicate poor firm prospects, which increases the uncertainty surrounding the ability of the firm to implement its strategy.

Signaling could also predict a greater increase in volatility for outside successions than inside successions. An outside succession might be interpreted by the market as a signal that the firm's current pool of managers is not talented enough to produce the next CEO. This could increase the uncertainty around the firm's overall prospects independent of the uncertainty surrounding the ability of the incoming CEO.

We attempt to control for signaling by including post-event measures of operating performance in our analysis (see Section IV.E). In equilibrium, these variables should be correlated with signals about future firm prospects. But, because these controls may be incomplete, we interpret our evidence as consistent or inconsistent with our hypotheses. Our evidence should not be taken as a statement that our hypotheses provide the sole underlying reasons for observed volatility changes.

There are also hypotheses that provide the opposite prediction for volatility changes. Suppose the current CEO is fired because of poor ability. If the new CEO comes from an established firm in the same industry, it might decrease the uncertainty surrounding the firm's ability to compete going forward. This could result in a decrease in volatility following a forced turnover. Similarly, a firm may lack managerial talent (and the market may know this) and bringing in an outside CEO might add expertise and stability to the firm operations. Thus, an outside succession might result in lower volatility increase than an inside succession.

III. Data and descriptive statistics

Changes in top executives are identified using the *Forbes* executive compensation surveys over the 1979-1995 period. In order to qualify for the sample, both the departing and incoming CEO must have appeared in the survey. For each change, the announcement date is obtained from the *Wall Street Journal*.

Of particular interest is the nature of the change in management. We classify each turnover as either forced or voluntary, and each succession as inside or outside. Forced departures are those for which (1) the announcement says that the departing CEO was forced out or fired, or (2) the departing CEO is under the age of 60 and does not leave for health reasons or to go to another firm. All other departures are voluntary. Outside successions are those for which the incoming CEO has been with the firm for less than one year, and all other successions are classified as inside.[10]

Each turnover is matched with stock-price data from the Center for Research in Security Prices (CRSP), and where available, accounting data from Compustat. We collect returns for each firm for two years before and three years after the announcement date. We also collect each firm's total assets, net sales, and operating income for two fiscal years before and three fiscal years after the fiscal year of the event. These accounting data are converted into 1983 dollars. Our proxy for the market return is the CRSP value-weighted index. For any calculation that relies on data through n years after the event, we exclude incoming CEOs who did not stay in the position at least n years. For example, if an incoming CEO left office during their second year, that observation would only enter our calculations through year t+1.

Table 1 shows the distribution of turnovers by type and year for our sample of 872 events. Forced departures are not very common, at about 17% of the sample.[11] This frequency is similar to that found previously; Mehran and Yermack (1996) find 15% of turnovers in their sample are forced, and Denis and Denis (1995) find 13.6%. Outside successions are slightly more common, at approximately 21% of the events. In the first half of the sample (through 1987), about 14% of turnovers are forced and 14% are outside successions. The shares of forced and outside successions rise to 21% and 27% in the second half of the sample. The events are well dispersed over time, with no year having more than 10% of the total sample.

[10] Subject to slightly different arbitrary cutoffs, these proxies for turnover types are similar to those used earlier in the literature. For examples of forced/voluntary turnover classification, see Weisbach (1988), Denis and Denis (1995), Mehran and Yermack (1996), Parrino (1997), Denis, Denis, and Sarin (1997), and Hallman and Hartzell (2003). Borokhovich, Parrino, and Trapani (1996) use an identical definition of inside/outside succession.

[11] The turnover-type frequencies are similar for the subsample of firms for which we have Compustat data.

Panel B presents the distribution of turnovers across the four pairs of departure and succession types. Voluntary departure followed by inside succession is the most common event, comprising almost 72% of the sample. The other three pairs – voluntary departure/outside succession, forced departure/inside succession, and forced departure/outside succession – are almost equally common, at 11%, 8%, and 10% of the sample, respectively.

Figure 1 shows changes in volatility for the entire sample, and by turnover type. In constructing the figure, returns are separated into event months (24 before and 36 after the announcement date), where each event month consists of 21 trading days. We calculate volatility as the standard deviation of daily returns for each event month. To control for the overall level of stock-market volatility, we divide the firm-specific volatility by the standard deviation of the market return over the same period. For each event month, we take the median market-adjusted volatility across events. A market-adjusted volatility of 2 indicates that the median volatility was twice as high as the market volatility in that month.

Figure 1 indicates that volatility is higher for the outside succession and forced departure subsamples. On average, forced departures experience the largest volatility increase, and volatility begins to increase approximately one year prior to the turnover event. The volatility increase appears to persist for about two years for forced turnovers and about one year for outside successions.

Table 2 details the summary statistics for these volatility patterns. This table previews the findings of the formal tests in the next section. Pre-event (annualized) daily volatility for two years prior to a turnover (year t-2) averages 28.9%, with a median of 26.3%. Volatility increases to a mean of 30.7% and median of 27.4% for the two-year period following a turnover (years t+1 and t+2).

Compared to the overall sample, forced turnovers exhibit higher volatility prior to the event and larger subsequent increases. For the forced-turnover subsample, pre-event mean (median) volatility is 33.3% (31.7%), followed by 43.2% (33.3%) after the event. To a lesser degree, outside successions are also associated with higher volatility than the overall sample,

with a pre-event mean (median) of 33.9% (30.3%) and post-event mean (median) of 36.8% (30.4%).

Table 3 presents accounting data for the sample, also by turnover and succession type, including the change in operating variables following turnover. Accounting data is available for 703 of the 872 events. An average firm experiencing a turnover in our sample has $9.4 billion in assets, $0.9 billion in operating income, and $5.6 billion in sales. On average, assets and sales increase after a turnover for all classifications except forced. Average operating income increases for all turnover types. However, none of these differences is statistically significant. The next section presents formal tests of the volatility impact of different types of CEO turnover.

IV. Empirical tests

A. Testing the strategy, ability, and scapegoat hypotheses

The scapegoat hypothesis predicts that CEO turnover will not affect volatility regardless of type of departure and type of succession. In contrast, the strategy and ability hypotheses predict that volatility will increase following a turnover, and that the magnitude of the volatility increase will depend on the turnover and succession type. The strategy hypothesis implies that forced departures will be followed by increases in volatility. The ability hypothesis implies that conditional on a voluntary departure, an outside succession will lead to a greater increase in volatility than an inside succession. The strategy and ability hypotheses are not mutually exclusive, and the evidence may support both hypotheses.

We test these hypotheses using several techniques that are described in detail in the following sections. Section B summarizes previous studies that analyze the impact of corporate events on firm volatility. Section C proposes and implements volatility regression tests to measure the relationship between turnover type and volatility. Section D presents an analysis of the return sensitivity to earnings news before and after a turnover, suggesting a possible mechanism by which volatility would increase after a turnover event. In Section E, we further

explore evidence for changes in the operating characteristics of the firm that would be associated with the strategy hypothesis.

B. Volatility event studies

A number of studies analyze the impact of corporate events on firm volatility. These include the effects of cash tender offers (Dodd and Ruback, 1977, and Bhagat, Brickley, and Loewenstein, 1987), mergers and spinoffs (Mandelker, 1974, and Vijh, 1994), stock splits (Ohlson and Penman, 1985, and Dubofsky, 1991), stock repurchases (Dann, Masulis, and Mayers, 1991, Hertzel and Jain, 1991, and Bartov, 1991), dividend announcements (Kalay and Loewenstein, 1985, and Jayaraman and Shastri, 1993), earnings announcements (Cornell, 1978), and major corporate announcements (Brown, Harlow, and Tinic, 1988).

Several papers compare option implied volatilities before and after the event to measure the volatility impact. Mayhew (1995) reviews the literature related to these "implied volatility event studies"; a subsequent related paper is Donders and Vorst (1996). However, the majority of papers perform a volatility event study based on a comparison of the variability of equity price changes before and after the event to determine the volatility impact of the event. For example, Bhagat, Brickley, and Loewenstein (1987) compare pre-event and post-event standard deviations using a t-test, Wilcoxon test, and Fisher sign test. Ohlson and Penman (1985) compare the proportion of post-event squared returns that exceed pre-event squared returns using Cochran's z-statistic. Dubofsky (1991) uses a regression of log-ratios of pre-event and post-event variance on explanatory variables.

C. Volatility regression tests

In this section, we analyze volatility changes around turnover events using regression tests similar to those of Dubofsky (1991). Our dependent variable is the log-ratio of post-event to pre-event standard deviations (the "volatility ratio"). In order to mitigate announcement effects and to test for persistence in volatility changes, we use the volatility two years prior to the

event as the base level or denominator in our ratio.[12] We then calculate a volatility ratio for each of the three years after the turnover.

Non-turnover-related firm-specific characteristics could result in volatility changes following turnover events. For instance, a forced turnover typically follows a period of poor stock price performance.[14] Since a firm that experiences a forced turnover is likely to be smaller and more levered than its peers, it is also likely to be more volatile (e.g., Black, 1976, Christie. 1982, and Hawawini and Keim, 1995). To control for these firm-specific characteristics, we construct two matching samples of firms of similar size.[15] Our first matched sample consists of firms with similar size and return history prior to the turnover event. In the spirit of Barber and Lyon (1996), for each turnover event, we select the firm within the same NYSE size decile with the closest two-year compounded return as of the announcement date. If the matching firm is in our sample, we select the next-best match.

Our second matched sample consists of firms with similar size and pre-event changes in volatility. For each turnover event, we select the firm within the same NYSE size decile and with the closest change in volatility from two years prior to the event to the year prior to the event. Specifically, we match using the natural logarithm of the ratio of the sample standard deviation for year t-1 in event time to the sample standard deviation for year t–2 (where a year consists of 250 trading days).

Figure 2 graphs the median volatility, as well as the 25th and 75th percentiles, in event time for the turnover (solid lines) and matching firms (dashed lines). In this figure, we use event years, which is the same frequency as our subsequent regression tests. We scale each firm's volatility by dividing by the volatility in year t-2. The figure shows results for the match based

[12] Our results are qualitatively similar if we use a base period of one year before the event.
[13] This is also related to the approach of Bollen (1998), in which a matched sample is constructed using non-event firms matched by industry group.
[14] Many papers find a connection between poor performance and CEO turnover. For examples, see Coughlan and Schmidt (1985), Weisbach (1988), and Parrino (1997).
[15] This is also related to the approach of Bollen (1998), in which a matched sample is constructed using non-event firms matched by industry group.

on the pre-event volatility change; the findings for the performance-based matching sample are similar.

Prior to the event, the turnover sample and the matched sample volatilities track quite closely, as one would expect given that our matching criteria is the change in volatility over that period. After the turnover event, there is an increase in volatility for firms experiencing forced turnover (especially for the upper quartile), and volatility for firms with outside successions remains high. In contrast, the matched sample's volatility does not rise significantly, and typically falls.

We next use regressions to directly and more formally test for a significant volatility increase after turnover events, controlling for the changes of both groups of matching-sample firms. For each event, we use three volatility ratios as controls: (1) the market volatility ratio using the CRSP value-weighted index over the same period (to control for market volatility changes), (2) the volatility ratio of the corresponding stock-market-performance matching firm, and (3) the volatility ratio of the corresponding volatility-change matching firm. Finally, we control for prior operating performance using the ratio of net operating income to assets. Because the requirement of accounting data reduces our sample, we present each regression with and without this operating performance variable. To obtain the correct significance levels and robust t-statistics in the presence of heteroscedasticity, we use White (1980) robust standard errors.

Columns one through six of Table 4 report the volatility regression results for the volatility changes in the three years following the turnover relative to the base-period volatility. The key variables of interest are four indicator variables, one for each combination of forced/voluntary departure types and inside/outside succession. First, we see that that stock-price volatility increases after *Voluntary/Inside*, which is the most common type of turnover. Based on the coefficients in columns one and two, this type of turnover is associated with a volatility increase of 2% to 10% in the first year after the turnover. The volatility increase is

significant for the first two years after the event. This evidence is inconsistent with the scapegoat hypothesis, which predicts no volatility change following a turnover.

Second, *Voluntary/Outside* departures result in an even larger volatility increase. The coefficient on the *Voluntary/Outside* implies a 9% rise in volatility in the first year after a turnover, or a 14% rise when we control for operating performance. This finding is consistent with the ability hypothesis, which predicts a larger effect for *Voluntary/Outside* than *Voluntary/Inside.*

Third, we find support for the strategy hypothesis; forced turnovers result in larger volatility increases than voluntary turnovers. In the year following a turnover, volatility is 19% higher for *Forced/Inside* and 17% higher for *Forced/Outside*. These effects are stronger when operating performance is included in the regression, at 23% and 24%, respectively. We cannot statistically distinguish between volatility changes for *Forced/Inside* and *Forced/Outside* turnovers, which is consistent with our discussion of interactions between the strategy and ability hypotheses (Section II.C). The volatility increase following a forced turnover is from two to nine times the increase for a *Voluntary/Inside* turnover.

Interestingly, when we control for operating performance (columns two, four, and six), the estimated coefficients for the turnover/succession indicator variables are noticeably larger. Further, the coefficient on the operating performance measure is significant and negative. Firms with poorer pre-event operating performance tend to experience greater increases in volatility.

The change in the turnover/succession coefficients could be due to either the presence of the additional control variable or the reduction in sample size (e.g., from 767 observations in column one to 572 in column two). To distinguish between these alternatives, we estimate the regression in column one using only the subsample of observations in column two. In this regression (results not reported), the coefficients on the four turnover-type variables are very similar to those in column one (e.g., the coefficient for *Voluntary/Inside* is 0.0197 compared to 0.020 in column one). This, combined with the fact that the operating performance variable is

highly significant, leads us to conclude that operating performance is an important control and that the models in columns two, four, and six are likely to be better specified.

Our regression tests show that departure type (forced versus voluntary) has a stronger effect on volatility than the succession type (*Voluntary/Outside* versus *Voluntary/Inside*). While we cannot rule out all alternative interpretations, this is consistent with the idea that the increase in uncertainty about future strategy following a forced turnover is greater than the increase in uncertainty about ability following a *Voluntary/Outside* turnover. The volatility increase lasts for about two years for all combinations of departure and succession types.

The weakening volatility impact over time, as evidenced by the decline in coefficients across the columns of the table, is consistent with a gradual decrease in uncertainty about firm characteristics following a turnover event. After a turnover, the nature of the strategy is revealed through its implementation, and the success of the strategy is revealed through new results (e.g., reported sales or earnings). Similarly, uncertainty about the ability of a new CEO diminishes as investors observe his or her management of the firm.

When firm returns are positively correlated with market returns, we expect to find a significant positive correlation between firm and market volatility. Our control for market volatility is highly significant in all regressions, which is consistent with our prior. Based on the coefficients for our matching-sample variables, we find that the increase in volatility for our turnover firms is partially explained by the increase in volatility for the matching sample firms. Both pre-event volatility changes and returns are related to subsequent volatility changes, but the pre-event return match does not have as strong of a relation as the volatility-based match.

We control for a possible cross-sectional relation between volatility changes and industry characteristics. It is possible that CEO characteristics affect firm operations more in high-growth industries than low-growth industries. For example, a CEO in a high-growth firm might face more frequent critical decisions about firm strategy. Thus, CEO turnovers in high-growth industries could result in larger volatility increases than those in low-growth industries.

Each regression includes a variable equal to the median Tobin's *Q* for the firm's industry in the year of the turnover, net of that year's median (across all industries).[16] Using the industry-level *Q* should provide a better measure of growth opportunities the firm faces at a point in time rather than firm-level performance. We find no statistically significant effect for Q.

We see differences in turnover patterns over time in Table 1. These differences are examined in detail in Huson, Parrino, and Starks (2001). To test for time variation in volatility impact, we partition our sample into rough thirds (1979 to 1983, 1984 to 1989, and 1990 to 1995). In Table 5, we report the estimates for the year *t*+1 volatility regression (i.e., column two of Table 4) for each subperiod.

As the table shows, our results are stronger in the more recent part of our sample. For example, the volatility impact of a forced/outside event increases from 19% in the earliest period to 24% in the middle period, then to 31% in the most recent period. This pattern is similar for the other turnover and departure types. We do have some evidence that growth opportunities matter for part of the sample; industry *Q* is significant and positive through 1989, but insignificant afterwards.

While the results of Tables 4 and 5 are consistent with the strategy and ability hypotheses, we further analyze the ability hypothesis by comparing volatility changes for outside successions depending on whether the replacement came from within the industry or from outside the industry. We focus on turnovers in "homogeneous" industry groups where the track-record for a top officer at a firm in the same industry is likely to be most informative about ability at the new firm. We classify industries as homogeneous if they fall in the top half of all industries according to Parrino's (1997) measure of industry homogeneity.

We create two subgroups of outside successions for homogeneous industry groups. In the first subgroup, the successor CEO has previously been a top officer from a firm within the

[16] Industries are defined at the two-digit SIC code level. Tobin's *Q* is defined as [Share Price (Compustat Item 24) X Shares Outstanding (Item 25) + Total Assets (Item 6) – Common Equity (Item 6)] / Total Assets (Item 6). We also create another proxy for growth opportunities, industry median research and development expenses (scaled by assets). This alternative is not statistically significant, and its inclusion does not result in substantive changes in other coefficients.

industry (26 observations). Investors are likely to have the most certainty about ability for this group of successions, and the ability hypothesis predicts that volatility changes will be smallest for these turnovers. In the second subgroup, the successor CEO comes from outside the industry and has not been a top officer (20 observations). Investors are likely to have the least certainty about ability for this group of successions, and the ability hypothesis predicts that volatility changes will be largest for these turnovers.

We then examine the change in volatility ratios for the subgroups that is not explained by our control variables (the market ratio, two matching-firm ratios, and industry *Q*). For the first group, we find an average volatility ratio of 0.13 (i.e., roughly a 13% increase) not explained by the control variables. For the second group, the average is 0.25 (or an approximate 25% increase). This is consistent with the ability hypothesis – we find smaller volatility changes for incoming CEOs about whom the market is expected to have stronger priors. However, these differences are not statistically significant, which is not surprising given the relatively small sizes of these subsamples.

D. News and volatility: An earnings response analysis

The previous sections have documented significant increases in stock-price volatility following CEO turnover. In an efficient market, the volatility we observe should be associated with new information being incorporated into prices. Turnover could increase volatility in two ways: the volume of relevant firm-specific news could increase following turnover, or there could be an increase in the importance of each news item.

For example, consider a firm-specific news release of performance data (e.g., an earnings announcement). For a given deviation from expected value, such a release should be more informative for a new CEO compared to his or her predecessor. Whether the release provides information about the new CEO's ability or the viability of his or her strategy, the market is likely to have less precise prior beliefs about the new CEO (i.e., ability or strategy) and therefore should place greater weight on the announcement or signal. Thus, for a given announcement,

one would expect to see a greater stock-price reaction for a new CEO compared to the incumbent prior to departure.

Systematically measuring the stock-price response to all firm-specific information is beyond the scope of this study. Instead, we concentrate on quarterly earnings announcements, which are frequent firm-level announcements with measurable ex ante expectations. This approach allows us to test for differences in the magnitude of response to new information before and after CEO turnover. The strategy and ability hypotheses predict that observe greater stock-price response to information in general and earnings announcements in particular following CEO turnover.

We use the earnings-response-coefficient methodology to analyze the importance of unexpected earnings news on returns. There is an extensive literature on earnings response, but the most applicable study to our hypothesis is Chambers, Freeman, and Koch (1999).[17] They find a positive, cross-sectional relationship between volatility (or total risk) and earnings response coefficients. Our results complement theirs by analyzing the change in the informativeness of earnings around an event associated with higher volatility, CEO turnover.

To implement our test, we calculate quarterly cumulative abnormal returns as the sum of abnormal daily firm returns relative to the CRSP beta-matched portfolios. A quarter begins three days after the previous quarter's earnings announcement and end two days after the current announcement.[18] Unexpected earnings are the difference between actual earnings and the median analyst's forecast, normalized by the closing stock price two days after the previous quarter's earnings announcement. Actual earnings, earnings estimates, and announcement dates are from the Institutional Brokers Estimate System (I/B/E/S). To test for changes in earnings response around turnover, we then run the following regression:

$$CAR_{it} = \gamma_0 + UE_{it} \Sigma^{3}_{y=-2} \delta_y Year_y + \gamma_1 UE_{it}*|UE_{it}|. \quad (1)$$

[17] Please see their paper for a more extensive discussion of the earnings response literature and methodology.
[18] Daily abnormal returns using CRSP standard-deviation-matched portfolios produce very similar results.

In this regression, CAR_{it} is the cumulative abnormal return for firm *i* during quarter *t*, UE_{it} is the unexpected earnings for firm *i* over quarter *t* (actual earnings less the median forecast), and $Year_y$ equals one if quarter *t* is in (event) year *y* relative to the turnover. We include an interaction term, $UE_{it}*|UE_{it}|$, as a control for nonlinearity in earnings response (Freeman and Tse, 1992, Das and Lev, 1994).

Following the structure of our previous volatility tests, we include data from two years (eight quarters) before the turnover until three years (12 quarters) after the turnover, and exclude the quarter that includes the turnover announcement. The δ_y coefficients represent the earnings response coefficients (ERCs) for years *t*–2 through *t*+3. Our hypothesis of an increased stock-price response around turnover predicts an increase in δ_y for the years following CEO turnover.

Our estimated regression is as follows

$$CAR_{it} = -0.011 + UE_{it}\,(0.178\ Year_{t-2} + 0.264\ Year_{t-1} + 0.369\ Year_{t+1} + 0.221\ Year_{t+2} + 0.142\ Year_{t+3} - 0.037\ UE_{it}*|UE_{it}|. \quad (2)$$

All of the coefficients are significant at the 1% level.[19] More importantly, the ERC increases from 0.18 two years prior to the event to 0.37 in the year after the event. The volatility impact is significantly greater in the first two years following turnover than in the base year (*t*-2). Using an F-test, we find that the coefficients for $Year_{t+1}$ and $Year_{t+2}$ are significantly different from the coefficient for $Year_{t-2}$ at the 1% level.

These results support the strategy and ability hypotheses. Announcements are more informative (i.e., have a stronger positive relation with returns) around CEO turnover. This is also consistent with our finding of higher volatility during these periods, and the findings of Chambers, Freeman, and Koch (1999).

E. The strategy hypothesis and the operating characteristics of the firm

To further analyze the strategy hypothesis, we examine evidence of significant changes in firm operating characteristics after a forced turnover and outside succession, which would be

[19] The regression has an adjusted R^2 of 2.3% with 7,228 observations.

expected if the firm implemented a major strategy change. For example, Denis and Denis (1995) find evidence of large changes in operating characteristics and firm size around forced turnover. We also would expect to find little change in operating characteristics for voluntary turnovers and inside succession. Of course, it is possible that new CEOs make similar changes following voluntary departures compared to forced departures. For example, Weisbach (1995) finds that the likelihood that a new CEO reverses the investment decisions of his or her predecessor does not depend on whether the departure was forced or voluntary.

To proxy for changes in firm strategy and operating practices, we calculate five accounting-based variables for the set of events for which Compustat data is available. First, we calculate the percentage change in total assets (net of inflation) from the fiscal year prior to the turnover (t-1) to the second fiscal year after the turnover year (t+2). By using the prior fiscal year as our base year, we start with firm numbers prior to any large write-offs commonly associated with a turnover (e.g., Murphy and Zimmerman, 1993). We also calculate the percent change in net sales over the same interval, and the change in operating income, scaled by total assets at time t-1. To proxy for firm restructuring, we calculate the absolute value of the sum of extraordinary items for the year of and year following turnover, scaled by total assets at time t-1. We expect large assets sales to also be associated with changes in structure and strategy; we proxy for this by dividing the total cash from asset sales in years t and t+1 by total assets at time t-1.

Table 6 presents means of these variables by type of departure and succession. As Panel A shows, our sample seems to mirror the results found by Denis and Denis (1995). Forced turnovers are associated with significant decreases in total assets and net sales relative to all turnovers, but are not associated with changes in operating income. Forced departures are also associated with greater extraordinary items and cash from asset sales relative to voluntary departures. Outside successions are associated with significantly lower changes in assets compared to inside successions, but none of the other operating characteristics are significantly different across succession types. This is a univariate analysis, however. As Table 1 shows,

many inside successions are also voluntary and Panel A does not separate the effects of departure relative to those of succession.

In order to separate these effects, Panel B of Table 6 further subdivides the sample into departure-type/succession-type pairs. These results show that there are significant differences in our proxies for operating changes for forced turnover compared to voluntary, independent of the source of the successor (although the differences are largest for inside succession). Inside and outside successions have little differences in operating measures in either subsample, with the exception of lower asset growth for outside successions following voluntary departures compared to inside successions. These results document a relation between departure type and changes in operating characteristics of the firm. Consistent with the strategy hypothesis, forced departures are associated with larger changes in firm operations than voluntary departures. Outside successions are associated with lower growth in assets, but not with any of the other proxies for changes in operations.

While these results are related to those of Weisbach (1995) and Huson, Malatesta, and Parrino (2003), they are not directly comparable. Weisbach tracks investment and divestiture decisions around CEO turnover, while we only proxy for these decisions using Compustat data. That said, we do find differences in firm size and restructuring activity across types of departure, where he did not. Huson et al. look for changes in operating performance following inside and outside succession, and find that outside succession is associated with a greater improvement in operating return on assets. Our results are over a shorter window, and we track the change in operating income scaled by beginning firm size rather than the change in scaled operating income.

Our results raise the possibility that the volatility change after a turnover might be explained entirely by changes in the operating variables rather than turnover type. To address this issue, we measure volatility changes due to turnover type, while controlling for changes in company fundamentals and other factors. This analysis extends the regression results presented in Table 4. Using a set of variables from Table 6, we add the percentage changes in assets and

sales, and the change in scaled operating income to the regressions of Table 4. Instead of a fixed interval of *t*-1 to *t*+2, we now calculate the changes in operating variables for the various years after the year of the turnover (*t*+*n*), where *n* is chosen to match the corresponding volatility ratio for event year t+*n*.

In Table 7, we present the augmented volatility regression results for three years following the turnover. After controlling for the changes in operating characteristics, we find that while the coefficients are smaller in magnitude, the same general picture emerges. Specifically, volatility increases for all types of turnover, outside succession matters following voluntary departures, and forced departure has a larger effect independent of succession type. Thus, changes in firm size or other operating characteristics do not eliminate the importance of turnover (especially forced departures) on volatility.[20]

V. Conclusion

In this paper, we study the volatility changes surrounding CEO turnover. The uncertain nature and prospects of a new strategy and CEO ability may lead to increased uncertainty about the firm's future cash flows. As the market evaluates the characteristics of the new CEO's strategy and ability, market expectations about firm value may be revised more frequently or dramatically than in the past. These factors suggest that stock-price volatility may increase following a CEO turnover. Such a volatility change might affect many stakeholders of the firm, due to changes in the likelihood of distress, the degree of information asymmetry, or the impact of agency problems.

We explore the different possible volatility effects of departure and succession type through what we term the strategy hypothesis, the ability hypothesis, and the scapegoat hypothesis. The strategy hypothesis predicts that forced turnovers will lead to greater volatility increases than voluntary turnover, while the ability hypothesis asserts that turnovers with outside

[20] Many of the dropped observations due to unavailable Compustat data are associated with high changes in volatility. Thus, the drop in magnitudes and significance of forced turnover and outside succession from Tables 4 to 7 are attributable to both the inclusion of operating variables and the excluded observations.

succession will lead to greater volatility increases than inside successions but predicts no differences in volatility change due to the type of departure. If the firm is not likely changing strategy (i.e., following to a voluntary departure), then the ability of the new CEO will have the major impact on volatility change. In this case, we would expect voluntary departures with outside successions to have larger volatility increases than voluntary departures with inside successions. Alternatively, the scapegoat hypothesis predicts that CEO turnover will not change volatility.

We test these hypotheses using a sample of 872 turnovers in large firms from 1979 through 1995. We find that volatility increases significantly (by 2% to 10% in the first year) for even the most common type of turnover (voluntary departure and inside succession). Volatility increases of 17% to 24% are associated with forced successions turnover in the first year following a turnover. We believe that these results are economically significant and consistent with both the strategy and ability hypotheses, but inconsistent with the scapegoat hypothesis.

An alternative explanation for these results is that pre-turnover firm characteristics are the factors that drive increases in volatility. For example, the increase in volatility and CEO turnover may be jointly caused by poor performance or perhaps an unobserved factor. We directly control for firm and industry characteristics in our tests. Through the use of matching samples, we also control for pre-event stock price performance and volatility change. We directly control for pre-turnover operating performance, as well as changes in operating performance following the turnover. We find that turnover type explains differences in volatility changes, even in the presence of these additional factors.

Our tests provide new evidence on the importance of CEOs. While previous studies have shown small shareholder-wealth changes around the announcement of a turnover, followed by changes in operations, we document a significant change in the volatility of the stock-price process around a change in firm leadership. The volatility changes that follow a CEO turnover may have a significant impact on the firm, and the board should plan a succession strategy taking these effects into account.

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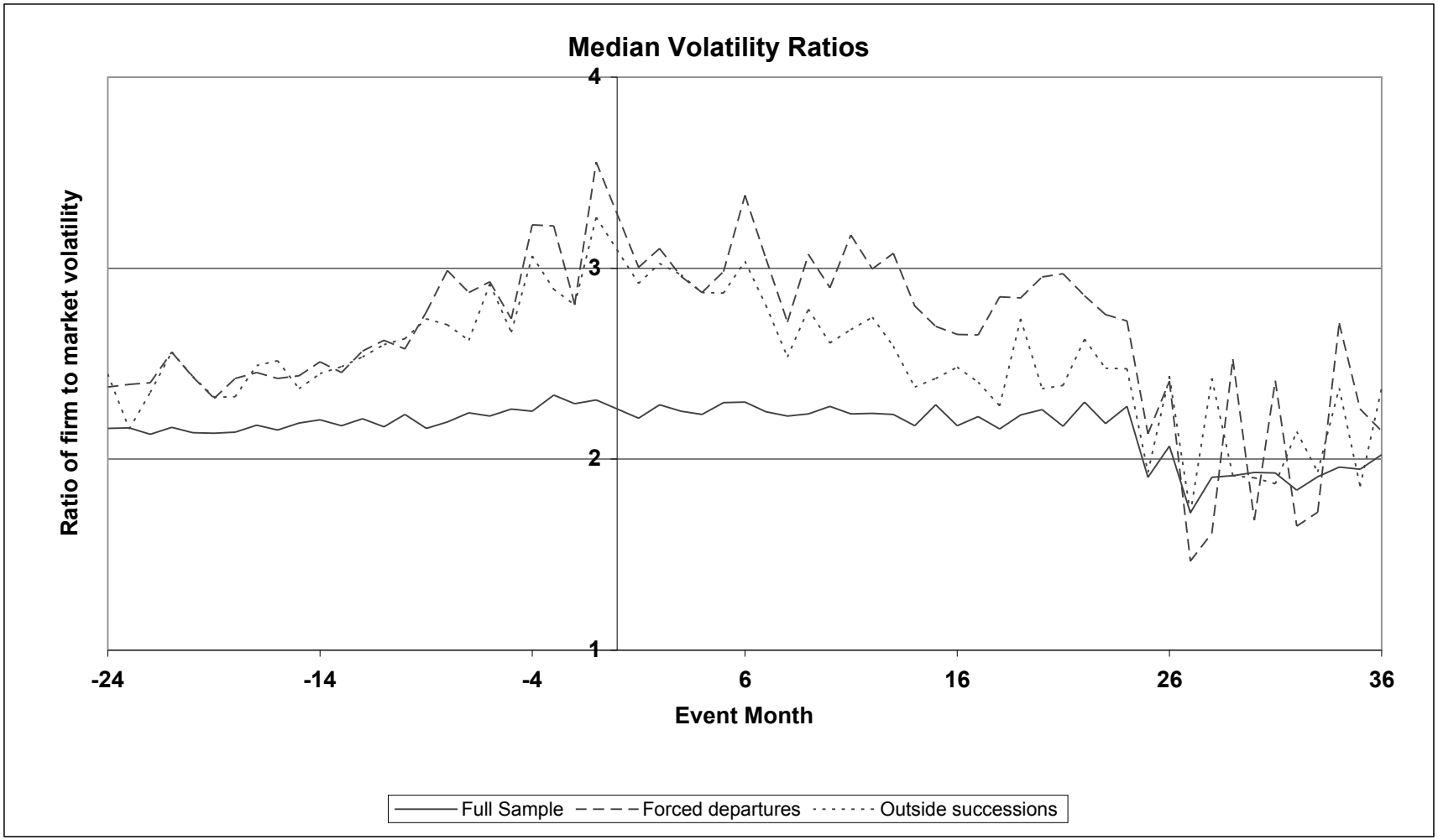

Fig. 1: Median ratios of firm volatility to market volatility around CEO turnover. Volatility is calculated as the daily standard deviation of returns over the event month. The firm to market volatility ratio uses the CRSP value-weighted index as the market proxy. The median ratio is calculated across events for each event month. Forced turnovers are defined as those turnovers where a WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement.

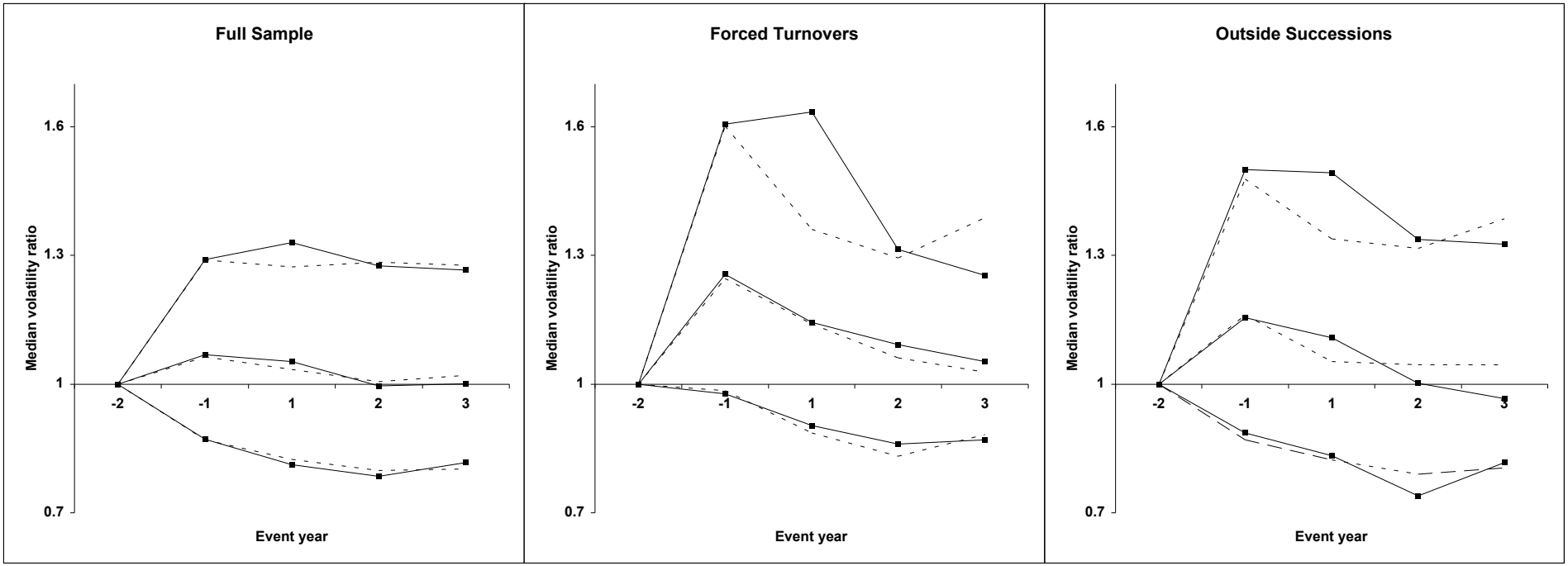

Fig. 2: Ratio of median annual volatility to year t-2 volatility. Solid lines with squares represent 75th percentile (top line), median (middle line), and 25th percentile (bottom line) volatility ratios for turnover sample firms. Dashed lines represent corresponding percentile and median volatility ratios for matching sample firms. Volatility is calculated as the daily standard deviation of returns over the event year. The median ratio is calculated across events for each event year. For each turnover-sample firm, a matching firm is selected from the same size decile, with the closest change in volatility as of the announcement date. The change in volatility for matching purposes is calculated as the natural logarithm of the ratio of volatility for event year *t* -1 to that of *t* -2. Forced turnovers are defined as those turnovers for which the WSJ announcement indicates the CEO was forced out or fired, or for which the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement.

Table 1
Distribution of Turnovers by Type

This table presents summary statistics for the sample of CEO turnovers. Forced turnovers are defined as those turnovers where the WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement.

Panel A: Turnovers by Year

Year	Total Turnovers	Forced	Outside Successions
1979	50	5	9
1980	54	8	8
1981	49	8	4
1982	43	4	2
1983	58	2	4
1984	51	12	9
1985	57	11	15
1986	50	4	5
1987	64	12	13
1988	78	15	20
1989	52	10	15
1990	55	17	18
1991	49	14	15
1992	37	10	10
1993	59	12	19
1994	53	6	10
1995	13	2	4
Total	872	152	180

Panel B: Turnovers by Departure/Succession Pair

	Number of Observations	Percent of Total
Forced Departure / Outside Succession	85	9.7%
Forced Departure / Inside Succession	67	7.7%
Voluntary Departure / Outside Succession	95	10.9%
Voluntary Departure / Inside Succession	625	71.7%

Table 2
Summary Statistics: Standard Deviations of Returns

This table presents summary statistics for the standard deviation of returns for the sample of CEO turnovers. Each statistic is shown for the entire sample, forced turnovers only, and outside successions only. Forced turnovers are defined as those turnovers where the WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement. Standard deviations are annualized by multiplying the daily volatility by the square root of 250. They are presented for the base event year and the two event years following the turnover. An event year is defined as 250 trading days, and the base event year is comprised of the interval from day *t* -500 through *t* -251. Also presented are t-statistics and Wilcoxon Rank-Sum Z statistics for differences in means and medians for the pre- versus post-turnover samples. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Pre-Turnover Standard Deviation of Firm Returns (Annualized) [*t* -500 days, *t* -251 days]					
Full Sample	28.9%	26.3%	11.9%	6.9%	112.7%
Forced Turnover	33.3%	31.7%	14.6%	12.4%	112.7%
Outside Succession	33.9%	30.3%	15.2%	6.9%	112.7%
Post-Turnover Standard Deviation of Firm Returns (Annualized) [*t* +1 day, *t* +500 days]					
Full Sample	30.7%	27.4%	18.4%	9.7%	307.3%
Forced Turnover	43.2%	33.3%	35.4%	17.1%	307.3%
Outside Succession	36.8%	30.4%	22.8%	10.2%	174.0%

Tests for Differences between Pre-Turnover and Post-Turnover Samples

	t Statistic		Wilcoxon Z	
Full Sample	3.38	***	2.82	***
Forced Turnover	2.71	***	2.56	**
Outside Succession	1.82	*	1.45	

Table 3
Summary Statistics: Accounting Variables

This table presents summary statistics for total assets, operating income before depreciation, and net sales for the sample of CEO turnovers. Each statistic is shown for the entire sample, forced turnovers only, and outside successions only. Forced turnovers are defined as those turnovers where the WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement. Statistics are calculated for both the raw data for the fiscal year prior to the turnover (t -1) and the real percentage changes from the year prior to the turnover (t -1) to the fiscal year two years after the turnover (t +2). Accounting variables are available for 703 of the 872 events.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Total Assets $_{t-1}$ ($MM)					
Full Sample	9,210.50	2,995.52	20,568.00	135.17	184,325.50
Voluntary Turnover	9,412.67	2,957.78	20,991.30	172.19	180,545.20
Forced Turnover	9,458.90	3,523.43	20,337.00	135.17	184,325.50
Inside Succession	9,476.76	2,879.72	21,710.69	135.17	184,325.50
Outside Succession	8,312.87	3,800.93	14,969.80	178.94	124,315.00
%□(*Total Assets* $_{t-1,t+2}$)					
Full Sample	11.63%	4.97%	41.65%	-99.26%	376.42%
Voluntary Turnover	14.49%	6.33%	42.15%	-75.69%	376.42%
Forced Turnover	-3.06%	-4.39%	32.20%	-99.26%	90.35%
Inside Succession	13.78%	5.91%	42.42%	-99.26%	376.42%
Outside Succession	1.48%	-2.94%	36.35%	-98.93%	147.75%
Operating Income $_{t-1}$ ($MM)					
Full Sample	852.82	282.62	1,970.00	(840.00)	20,443.90
Voluntary Turnover	905.13	298.34	2,001.61	(840.00)	20,443.90
Forced Turnover	704.03	155.79	1,993.00	(459.42)	12,627.00
Inside Succession	909.77	292.48	2,042.54	(840.00)	20,443.90
Outside Succession	616.79	175.75	1,612.84	(459.42)	12,627.00
%□(*Operating Income* $_{t-1,t+2}$)					
Full Sample	1.54%	0.69%	8.02%	-21.11%	111.50%
Voluntary Turnover	1.61%	0.71%	8.26%	-21.11%	111.50%
Forced Turnover	1.74%	0.43%	5.93%	-12.13%	21.89%
Inside Succession	1.53%	0.71%	8.28%	-21.11%	111.50%
Outside Succession	1.57%	0.67%	6.62%	-16.57%	21.66%
Net Sales $_{t-1}$ ($MM)					
Full Sample	5,658.89	2,252.58	12,277.00	98.39	124,993.90
Voluntary Turnover	5,854.76	2,318.03	12,167.14	98.39	124,993.90
Forced Turnover	5,305.44	2,082.00	14,037.00	114.30	122,081.40
Inside Succession	6,119.72	2,408.86	13,161.82	114.30	124,993.90
Outside Succession	3,634.97	1,784.74	6,841.69	98.39	64,523.00
%□(*Net Sales* $_{t-1,t+2}$)					
Full Sample	9.44%	4.44%	42.02%	-99.99%	377.08%
Voluntary Turnover	10.04%	6.13%	37.55%	-73.20%	377.08%
Forced Turnover	-2.01%	-5.21%	36.17%	-98.06%	161.80%
Inside Succession	10.24%	6.02%	38.95%	-98.06%	377.08%
Outside Succession	5.61%	-2.89%	54.47%	-99.99%	320.76%

Table 4
Changes in Firm Volatility Around Event by Turnover Type

This table presents regressions of changes in firm volatility on turnover/succession type and control variables over the period around a turnover event. The dependent variables are the natural logarithms of the ratio of post-event-date volatility to pre-event-date volatility over various post-event windows. Volatility is defined as the standard deviation of daily returns. Columns one and two use the 250 trading days following the turnover (event year *t* +1), while columns three and four analyze event year *t* +2, and columns five and six analyze event year *t* +3. Volatility ratios for the market and two matching-sample firms over the same days are used as control variables. The CRSP value-weighted index is the market proxy. For each turnover-sample firm, two matching firms are selected from the same size decile: one with the closest return from two years before the announcement until the announcement date, and one with the closest change in volatility from year *t* -2 to *t* -1 (in event time). Forced turnovers are defined as those turnovers where the WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement. *Industry Median Q (Adjusted)* is the median Tobin's Q for the industry, less that year's median Q across all industries. *Pre-Turnover NOI/Assets* is the ratio of Net Operating Income to Total Assets for the fiscal year prior to the turnover year. Robust t-statistics are in parentheses using White (1980) robust standard errors. One, two, and three asterisks indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Dependent Variable	Ln(*Volatility* $_{t+1}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+1}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+2}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+2}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+3}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+3}$/ *Volatility* $_{t-2}$)
	(1)	(2)	(3)	(4)	(5)	(6)
Voluntary Turnover/Inside Succession	0.020 *	0.104 ***	0.033 **	0.116 ***	0.021	0.063 *
	(1.88)	(4.08)	(2.31)	(3.09)	(1.13)	(1.72)
Voluntary Turnover/Outside Succession	0.094 **	0.144 ***	0.044	0.164 ***	-0.058	0.031
	(2.39)	(3.38)	(1.02)	(2.77)	(-1.18)	(0.52)
Forced Turnover/Inside Succession	0.192 ***	0.230 ***	0.189 **	0.283 **	0.045	0.057
	(3.28)	(3.76)	(2.00)	(2.46)	(0.80)	(0.82)
Forced Turnover/Outside Succession	0.174 ***	0.244 ***	0.087	0.145 *	0.110	0.077
	(3.30)	(4.11)	(1.23)	(1.85)	(1.54)	(1.04)
Ln*(Ratio of Post- to Pre-Event Market Volatility)*	0.211 ***	0.198 ***	0.328 ***	0.345 ***	0.218 ***	0.245 ***
	(5.94)	(4.71)	(8.07)	(7.82)	(4.35)	(4.36)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on Pre-event Volatility)*	0.495 ***	0.459 ***	0.254 ***	0.203 ***	0.161 ***	0.189 ***
	(9.72)	(7.42)	(5.28)	(4.28)	(3.93)	(4.02)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on Pre-event Return*	0.166 ***	0.209 ***	0.086 **	0.097 **	0.109 **	0.049
	(3.20)	(4.08)	(1.96)	(2.02)	(2.53)	(1.10)
Industry Median Q (Adjusted)	-0.036	0.035	-0.051	0.036	-0.033	0.018
	(-1.23)	(1.10)	(-1.36)	(0.95)	(-0.82)	(0.36)
Pre-Turnover NOI/Assets		-0.615 ***		-0.706 ***		-0.380 *
		(-4.43)		(-3.10)		(-1.82)
Adjusted R^2	0.506	0.509	0.285	0.295	0.179	0.184
Number of Observations	767	572	640	487	513	385

Table 5
Changes in Firm Volatility Around Event by Turnover Type by Subperiod

This table presents regressions of changes in firm volatility on turnover/succession type and control variables over first, second, and third subperiods (1979-1983, 1984-1989, and 1990-1995) of the original sample. The dependent variable is the natural logarithm of the ratio of year *t* +1 volatility to year *t* -2 volatility. Variables are as defined in Tables 1 through 4. Robust t-statistics are in parentheses using White (1980) robust standard errors. One, two, and three asterisks indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Dependent Variable	Ln(*Volatility* $_{t+1}$/*Volatility* $_{t-2}$)		
Years	*1979-1983*	*1984-1989*	*1990-1995*
	(1)	(2)	(3)
Voluntary Turnover/Inside Succession	0.071	0.109 **	0.170 ***
	(1.46)	(2.47)	(3.87)
Voluntary Turnover/Outside Succession	0.122 *	0.179 **	0.144 **
	(1.94)	(2.11)	(2.14)
Forced Turnover/Inside Succession	0.187 ***	0.241 **	0.312 **
	(2.72)	(2.02)	(2.53)
Forced Turnover/Outside Succession	-0.001	0.236 **	0.393 ***
	(-0.01)	(2.19)	(5.02)
Ln*(Ratio of Post- to Pre-Event Market Volatility)*	0.351 ***	0.206 ***	0.209 **
	(3.71)	(3.22)	(2.30)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on Pre-event Volatility)*	0.391 ***	0.379 ***	0.535 ***
	(4.74)	(3.41)	(6.17)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on Pre-event Return*	0.111	0.230 *	0.187 ***
	(1.57)	(1.79)	(3.43)
Industry Median Q (Adjusted)	0.106 **	0.149 *	-0.040
	(2.24)	(1.92)	(-0.90)
Pre-Turnover NOI/Assets	-0.413	-0.861 ***	-0.718 ***
	(-1.62)	(-3.35)	(-3.21)
Adjusted R^2	0.364	0.536	0.591
Number of Observations	181	227	164

Table 6
Tests of Differences in Operations by Turnover and Succession Type

This table presents an analysis of the changes in firm operations around CEO turnover as it relates to the turnover/succession type. We show average changes of several operating variables around turnover for firms with forced departures (outside successions) versus firms with voluntary departures (inside successions). Forced turnovers are defined as those turnovers where the WSJ announcement indicates the CEO was forced out or fired, or where the CEO was under the age of 60 and did not leave for health reasons or to go to another firm. An outside succession is defined as a change in CEO where the new CEO has been with the firm for less than one year at the date of the announcement. The table reports differences in the following variables across volatility-change subsamples: the percentage changes in total assets, operating income before depreciation, and net sales from the fiscal year prior to the turnover (*t* -1) to the fiscal year two years after the turnover (*t* +2), the absolute value of the sum of extraordinary items and the sum of cash flows from assets sales in years *t* and *t* +1, both scaled by total assets in year *t* -1. White (1980) t-statistics are in parentheses, and one, two, and three asterisks indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. Accounting variables are available for 703 of the 872 events. Panel A details differences across forced and voluntary departures, and outside and inside successions. Panel B details the differences across each possible pair of these two classifications. Columns five and six of Panel B present t-statistics for means tests for departure type, holding succession type constant, and for succession type, holding departure type constant.

Panel A: By Turnover and Succession Type

	Departure Type			**Succession Type**		
	Forced Departures (1)	Voluntary Departures (2)	t-statistic for difference (3)	Outside Succession (4)	Inside Succession (5)	t-statistic for difference (6)
%Δ(*Total Assets* $_{t-1,t+2}$)	-3.06%	13.09%	-4.00 ***	1.48%	13.78%	-3.11 ***
%Δ(*Operating Income* $_{t-1,t+2}$)	1.74%	1.58%	0.20	1.57%	1.53%	0.06
%Δ(*Net Sales* $_{t-1,t+2}$)	-2.01%	10.18%	-2.71 ***	5.61%	10.24%	-0.84
|*Extraordinary Items* $_{t,t+1}$| / *Total Assets* $_{t-1}$	2.73%	0.98%	1.76 *	1.64%	1.15%	1.39
Sales of PP&E $_{t,t+1}$ / *Total Assets* $_{t-1}$	2.25%	1.52%	1.36	1.75%	1.55%	0.49

Panel B: By Turnover/Succession subsample

					t-statistics	
					Inside vs. Outside	Forced vs. Voluntary
Departure type Succession type	Forced Inside (1)	Voluntary Inside (2)	Forced Outside (3)	Voluntary Outside (4)	Forced [Vol.] (1) vs. (3) [(2) vs. (4)] (5)	Outside [Inside] (3) vs. (4) [(1) vs. (2)] (6)
%Δ(*Total Assets* $_{t-1,t+2}$)	-6.84%	14.49%	0.36%	2.82%	-1.00 [2.31**]	-0.36 [-3.77***]
%Δ(*Operating Income* $_{t-1,t+2}$)	1.41%	1.61%	2.05%	1.39%	-0.46 [0.22]	0.48 [-0.20]
%Δ(*Net Sales* $_{t-1,t+2}$)	-2.56%	10.04%	-1.51%	11.19%	0.13 [-0.14]	-1.26 [-2.27**]
|*Extraordinary Items* $_{t,t+1}$| / *Total Assets* $_{t-1}$	3.34%	0.97%	2.26%	1.11%	0.49 [-0.45]	1.90* [1.10]
Sales of PP&E $_{t,t+1}$ / *Total Assets* $_{t-1}$	2.55%	1.47%	1.90%	1.84%	0.65 [-0.77]	0.07 [1.39]

Table 7
Tests for Changes in Volatility Controlling for Operating Variables

This table augments the regressions shown in Table 4 with operating variables. The dependent variable is the natural logarithm of the ratio of post-turnover volatility to pre-turnover volatility. Volatility is defined as the standard deviation of daily returns, and the CRSP value-weighted index is the market proxy. The additional control variables are the percentage changes in total assets, operating income before depreciation, and net sales from the fiscal year prior to the turnover (t -1) to n fiscal years after the turnover (t +n), where n takes the value of one, two, and three in columns one, two, and three, respectively. Other variables are as defined in Tables 1 through 4. Robust t-statistics are in parentheses using White (1980) robust standard errors. One, two, and three asterisks indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. Accounting variables are available for 703 of the 872 events.

Dependent Variable	Ln(*Volatility* $_{t+1}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+2}$/ *Volatility* $_{t-2}$)	Ln(*Volatility* $_{t+3}$/ *Volatility* $_{t-2}$)
	(1)	(2)	(3)
Voluntary Turnover/Inside Succession	0.096 ***	0.099 ***	0.081 **
	(4.02)	(3.20)	(2.37)
Voluntary Turnover/Outside Succession	0.141 ***	0.138 **	0.032
	(3.16)	(2.50)	(0.52)
Forced Turnover/Inside Succession	0.204 ***	0.169 *	0.055
	(3.60)	(1.82)	(0.80)
Forced Turnover/Outside Succession	0.209 ***	0.128 *	0.073
	(3.92)	(1.70)	(0.95)
%□(*Total Assets* $_{t-1,t+n}$)	-0.042	-0.109 **	-0.068
	(-0.98)	(-2.25)	(-1.58)
%□(*Operating Income* $_{t-1,t+n}$)	-0.014 **	-0.001	-0.003
	(-2.55)	(-0.07)	(-0.22)
%□(*Net Sales* $_{t-1,t+n}$)	-0.055	-0.020	0.019
	(-0.94)	(-0.40)	(0.47)
Ln*(Ratio of Post- to Pre-Event Market Volatility)*	0.208 ***	0.353 ***	0.313 ***
	(4.99)	(8.17)	(7.84)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on □(Pre-event Volatility)*	0.490 ***	0.195 ***	0.165 ***
	(8.89)	(3.93)	(3.63)
Ln*(Ratio of Post- to Pre-Event Matching Firm Volatility), Matched on Pre-event Return*	0.156 ***	0.055	0.013
	(4.00)	(1.22)	(0.31)
Industry Median Q (Adjusted)	0.046	0.024	-0.002
	(1.45)	(0.65)	(-0.04)
Pre-Turnover NOI/Assets	-0.520 ***	-0.394 **	-0.256
	(-4.19)	(-2.30)	(-1.26)
Adjusted R^2	0.532	0.320	0.280
Number of Observations	563	472	377