EARNINGS, IDIOSYNCRATIC VOLATILITY AND COSTS OF CAPITAL

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ABSTRACT

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This thesis consists of three essays. The first essay (chapter two) examines short- and long-term persistence and predictability of earnings and cash-flow growth rates. Aggregate results show that the mean firm exhibits persistence in short-term earnings growth rates, but little persistence in growth at the long-run. More consistent with economic intuition, aggregate cash-earnings growth rates show some short-term mean-reversion and little persistence in the long-run. Consistent with the earnings smoothing theory, cross-sectional results show short-term persistence in earnings growth rates. Cash-earnings, which suffer less manipulation than accrual earnings, show short-term cross-sectional mean-reversion. Long-term growth rates show evidence of mean-reversion in both cases. Our most interesting findings are related to various examined attributes such as age, industry characteristics, listing exchange, and the number of analysts following the stock which are shown to have an impact on the growth persistence of individual firms.

The second essay (chapter three) examines the increasing trend in idiosyncratic volatility of stock returns, which has been documented by Campbell et *al.* (2001). Using the Campbell (1991) return decomposition framework, we relate idiosyncratic volatility of returns to the volatility of changes in expected ROEs for one-, two- and three-year horizon forecasts (i.e., to the volatility of cash-flow news). The upward trend in idiosyncratic volatility documented by Campbell *et al.* (2001) is associated with a similar

increasing trend in the volatilities of cash-flow news for the three forecast horizons. This relationship is persistent after correcting for analysts' forecast biases and is consistent for newly-listed and mature firms and for earnings (non-) announcement periods. Our findings support an informational explanation to the increasing trend in idiosyncratic volatility, and are consistent with the market efficiency hypothesis which implies that stock return volatility is caused by an increase in the uncertainty of fundamental variables.

In the third essay (chapter four) we estimate the internal rates of return (IRR) for domestic and cross-listed Canadian firms, nine GICS sectors, and cap-based portfolios. Using the Fama and French (1999) methodology, we distinguish between the IRR on value or the cost of capital as expected by stakeholders and the IRR on cost that represents the implied real cost of investments. The real cost of capital [equity] over the period 1960-2003 is 5.90 [6.58] percent for the entire nonfinancial sector. The real return on such cost is 6.64 [7.78] percent indicating that, similar to the U.S., the Canadian corporate sector creates value. As expected, cross-listed firms enjoy, on average, lower costs of capital and equity than domestic firms. Although the cost of capital varies considerably across GICS sectors, value is created almost equally by all GICS sectors. IRR values on cap-based portfolios are consistent with the negative relationship between costs of capital and firm size. While both types of IRRs decrease on average after we correct for replacement costs and include extraordinary items, the IRR on cost remains higher than the IRR on value confirming the positive value creation hypothesis. Allowing for inflation illusion, our findings suggest that equity was undervalued during most of the sample period and that the misvaluation was lower for cross-listed firms.

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CHAPTER 1

INTRODUCTION

In this thesis, we focus on the use of firm fundamentals and specifically earnings and earnings related variables to investigate several issues in finance. The first issue (chapter two) is centered around the academic debate on growth rate persistence and predictability. Estimates or forecasts of earnings growth rates are commonly used to estimate the cost of equity and/or equity risk premium in ex-ante and/or forward looking approaches. To better assess the validity of these forecasts and their usefulness, a legitimate inquiry is to examine whether growth rates are inherently persistent and predictable or completely random. To address this issue we use a research framework that uses both lagged growth variables and a set of firm and industry attributes to better capture any persistence in growth rates. The second issue (chapter three) deals with the phenomenon of increasing stock return idiosyncratic volatility. By studying the relationship between stock return idiosyncratic volatility and volatility of news in cash-flow expectations, we suggest an explanation for this phenomenon, which is consistent with the market efficiency hypothesis and which links the increase in idiosyncratic volatility to an increase in firm fundamentals' volatility. The third issue (chapter four) deals with the costs of capital and relies on a forward looking approach to provide costs of capital estimates for different sub-samples of the Canadian corporate sector. We actually apply a rather innovative IRR approach which does not rely on growth rates estimates or an asset equilibrium model and uses mainly earnings and market fundamentals to estimate the costs of capital and equity.

The second chapter (first essay) addresses the debate around the persistence and predictability in earnings growth rates. Despite the importance of the growth in expected earnings in financial management and investment decisions, research on the time-series behavior of earnings growth is unable to provide unambiguous evidence for or against the null hypothesis that changes in earnings are distributed randomly so that past and future changes are essentially uncorrelated. The major argument for a random behaviour for growth rates is based on the economic presumption that little time-series persistence should exist in the profitability of a firm due to competitive pressures. The main counter-argument stipulates that pervasive earnings smoothing, industry and firm frictions induced by barriers to entry, capital intensity and size among others would limit competitive pressures and/or would induce certain persistence and predictability of growth rates.

In this essay we link many previous research designs by including both time series and past characteristics, and macro-variables when investigating growth rate persistence and predictability at different levels of aggregation. This expansion of the predictive set allows for a better understanding of the growth rate behavior. It also provides a setting for exploring interactions among different variables and for studying their impact on growth persistence. We also introduce new variables that are shown to be linked to growth rate persistence. When examining growth rates, we distinguish between growth rates in accounting or accrual earnings and cash-flow earnings or cash-flow, since the former is subject to higher management manipulation. Our results show evidence of short-term persistence in earnings growth and little persistence or mean-reversion in cash-flow growth, at the aggregate level. Long-term results show little persistence in growth for both aggregate earnings and cash-flow, which is more consistent with economic intuition. While economic indicators such as GDP and industrial production growth show certain predictive power for short-term growth rates, they are not quite helpful in predicting long-term growth rates. The same pattern of short-term persistence in earnings growth and short-term mean-reversion in cash-flow growth is observed in aggregate industry growth rates. We find some predictive power for industry characteristics such as capital intensity and product type, but such predictive power is not always consistent among growth rates, especially for long-term growth rates which show little persistence and predictability.

Although cross-sectional results seem to show similar pattern of short-term persistence in earnings growth and mean-reversion in cash-flow growth, we find that persistence in individual firms growth rates could be predicted using various attributes such as age, the number of analysts' following the stock, long-term analysts' forecasts, earnings' volatility and past returns. Individual firms' long-term growth rates are mean-reverting and could be predicted to some extent using certain firm characteristics such as past book-to-market, earnings yield, and size. Overall, our findings show that short-term earnings growth rates are persistent, which is consistent with the management manipulation theory, whereas short-term cash-flow growth rates are mean-reverting, which is consistent with the economic intuition of little persistence in actual profitability. Long-term growth rates, which show little persistence and predictability at the aggregate level, seem to be predictable using certain firm attributes at the firm level.

In the third chapter (second essay) we address the issue of the increasing trend in stock return idiosyncratic volatility. Following the seminal work of Campbell et *al.*

(2001), many studies proposed various explanations for such phenomenon. We build on this literature by relating the idiosyncratic return variability of individual stocks to volatility in earnings to explore whether the upward trend in idiosyncratic volatility can be explained by changes in the uncertainty of the fundamentals. Unlike previous work, we use the monthly forecasts of analysts instead of reported annual or quarterly earnings to measure volatility. We also focus on volatility of changes in expected cash-flows or cash-flow news as opposed to the volatility of earnings or changes in earnings, which provides a more accurate correspondence with the fundamental return decomposition. Using the forecasts of analysts allows a better evaluation of the periodic changes in earnings expectations and their impact on expected returns, since analysts provide more timely forecasts and incorporate information beyond past earnings and financial statements. To control for the impact of the forecast bias of analysts, historical measures of forecast error are used to extract the documented forecast bias from the total forecasts of analysts. This allows us to investigate whether the market corrects for the bias when valuing stocks after forecasts are made or updated.

Our results indicate that the upward trend in idiosyncratic volatility is associated with a similar increasing trend in the volatility of cash-flow news, as measured by the volatility of monthly changes in expected ROE of one-, two- and three-year horizon forecasts. This relationship is persistent through time and is robust to the inclusion of other fundamental variables such as size, leverage and book-to-market. It is also consistent for both newly-listed and mature firms as well as during and outside earnings announcement dates. Our findings are consistent with the market efficiency hypothesis that suggests that stock return volatility is caused by changes in fundamental variables and are in favor of an informational explanation to the increasing trend in idiosyncratic volatility.

The fourth chapter (third essay) uses an internal rate of return approach developed by Fama and French (1999) to estimate the cost of equity and cost of capital for domestic and cross-listed nonfinancial Canadian firms, 9 GICS industries, and cap-based portfolios. Due to the somewhat unsatisfactory results suggested by equilibrium asset pricing models, the recent literature focuses on forward-looking, ex-ante and/or fundamental information such as earnings or dividends and variations of the Discounted Cash Flows (DCF) or Dividend Growth Model (DGM) to estimate the equity risk premium and the cost of capital. An advantage of the IRR methodology is that it provides an independent estimate of the cost of capital/equity that can be compared to historical or realized values. At a minimum, this helps in understanding the likely ranges for historical risk premia and how to relate it to the expected risk premia. By computing the IRR on cost (return delivered by the corporate sector) and the IRR on value (the return required by investors), we were able to determine whether corporate investment adds value on average. We also examined the sensitivity of the results to the replacement cost adjustments and to the inclusion of extraordinary items to assess the effective costs of capital. Our results would allow investors to better match their return requirements with the profitability of the aggregate market, individual firms or industries. Using the Ritter and Warr (2002) "inflation illusion" adjustments we assess how the market undervalues equity.

We find that the real cost of capital [equity] over the period 1960-2003 is 5.90 [6.58] for the entire nonfinancial sector, and that the IRR on cost is persistently higher than the

IRR on value, which indicates that the corporate sector creates positive value. As expected, cross-listed firms enjoy, on average, lower costs of capital and equity than domestic firms. Although the cost of capital varies considerably across GICS sectors, value is created almost equally by all GICS sectors. IRR values on cap-based portfolios confirm the negative relationship between costs of capital and firm size. After correcting for replacement costs and including extraordinary items, both the IRR on value and on cost decrease on average but there is still evidence of average positive value creation. Allowing for inflation illusion, our findings suggest that equity was undervalued during most of the sample period and that the misvaluation was lower for cross-listed firms.

The fifth chapter summarizes the main findings of the three essays and provides avenues for further research.

CHAPTER 2

PERSISTENCE AND PREDICTABILITY OF EARNINGS GROWTH RATES

2.1. INTRODUCTION

Discounted cash flow (DCF) models for valuing a common share are grounded in the notion that price is given by the present value of the cash flows expected to be received from the share's ownership. Although Miller and Modigliani (1962) demonstrate that the various DCF models are equivalent if properly defined, what should be discounted varies by author, and includes dividends, accrual earnings, accrual earnings plus non-cash charges such as depreciation (i.e., traditional CF) and more comprehensive CF measures that include, for example, investments. Similarly, some analysts prefer to use price-to-earnings as a valuation multiple, while others prefer to use price-to-CF, where CF is measured as operating CF or "free cash flow" or "operating CF less net investment". Estimates of earnings and earnings growth are generally more informative than dividends about the financial and operating condition of the firm because not all firms pay dividends and cash dividend processes are usually managed and artificially smoothed.[1] Thus, the time-series behavior of earnings and earnings growth rates (and their CF counterparts) is an important area for empirical research because of its implications for valuation.

[1] In his pioneering study, Lintner (1956) establishes that earnings changes are the main determinants of dividend changes.

A large number of studies rely on estimates of expected earnings growth for stock valuation (i.e., for the elusive "g" in most traditional valuation models), or for estimating a firm's cost of capital. For instance, in the context of aggregate market valuation, and because of the controversy that surrounds the appropriate level of the equity risk premium, recent models use projections about future growth or financial analysts' estimates of earnings and earnings growth to predict the equity risk premium (e.g., Claus and Thomas, 2001). Other studies use forward-looking methods and earnings growth to explain cross-sectional prices (Gebhardt et al., 2001; Fama and French, 2002), to estimate the cost of capital (Fama and French, 1999), to investigate the time-series relation between value and price (Lee, Myers and Swaminathan, 1999) or to assess profitability (Fama and French, 2000).

Despite the importance of the growth in expected earnings for financial management and investment decisions, research on the time-series behavior of earnings growth is unable to provide unambiguous evidence for or against the null hypothesis that changes in earnings are distributed randomly so that past and future changes are essentially uncorrelated. The major argument for a random behaviour for growth rates or changes in earnings is based on the economic presumption that little time-series persistence should exist in the profitability of a firm due to competitive pressures. Tests that are unable to reject this null hypothesis include studies that examine time-series properties such as persistence and predictability of annual and quarterly earnings and/or their growth rates at the cross-sectional and individual firm level (e.g., Little, 1962; Lintner and Glauber, 1967; Beaver, 1970; Ball and Watts, 1972; Griffin, 1977; Albrecht, Lookabill and McKeown, 1977; Chan, Karceski and Lakonishok, 2003).

The studies that provide evidence for the alternative hypothesis that annual earnings or their rates of growth are better described by models other than the random walk model can be classified into six groups. The first group of studies provides evidence in support of the conjecture that accounting rates of return are mean reverting and that certain predictability exists in deflated earnings and/or individual firm's earnings (Beaver, 1970; Salamon and Smith, 1977; Mueller, 1977; Ou and Penman, 1989; Sloan, 1996; Fama and French, 2000). The second group of studies provides evidence in support of the conjecture of pervasive income smoothing, which implies certain persistence and predictability of reported earnings (e.g., Subramanyam, 1996; Sloan, 1996; Burgstahler and Dichev, 1997; Degeorge et al., 1999; Myers, Myers, and Skinner, 2006).

The third group of studies provides support for the conjecture that, although low predictability of earnings should prevail in perfect markets, competitive pressures between and within industries are limited by industry or firm frictions. Thus, the time-series properties of earnings across firms are related to fundamental economic characteristics, such as product type, capital intensity, firm size and barriers to entry (e.g., Lev, 1983).[2] The fourth group of studies is based on the empirical regularity of ongoing forecasts of future earnings and earnings growth by financial analysts, which is based on the underlying premise that earnings growth is predictable to a certain extent.[3] The fifth group of studies reports evidence against the hypothesis that all assets traded in a market should have the same price/earnings ratio if earnings changes are random (e.g., Freeman, Ohlson and Penman, 1982; Fuller, Huberts and Levinson, 1992, 1993). To illustrate,

[2] Also, see Lev (1969), Freeman, Ohlson and Penman (1982), Collins and Kothari (1989), Easton and Zmijjewski (1989), Penman (1991), Elgers and Lo (1994), Basu (1997) and Baginski et al. (1999).

[3] Although the more recent literature suggests that the earnings forecasts of analysts are biased (Abarbanell, 1991; Claus and Thomas, 2001; Dechow, Hutton and Sloan, 1999; Chung and Kryzanowski, 2000), analysts still earn material salaries from making such forecasts.

firms with high [low] earnings-to-price or EP ratios signal low [high] persistence in future earnings (Fama and French, 1995).

The sixth and final group of studies argues that lagged values of various variables have predictive power for earnings. These variables include the firm's stock price (Beaver et al., 1987; Collins et al., 1987; Freeman, 1987), size (Lev, 1983; Bathke et *al.*, 1989), book rate of return to the time series of earnings (Freeman et al., 1982), dividend yield or dividend-to-price ratio (Campbell and Shiller, 1988b), standard deviation of past earnings (Minton et al., 2002; Dichev and Tang, 2005), earnings quality (Chan et *al.*, 2006; Myers, Myers, and Skinner, 2006), macro-variables and industry attributes (King, 1966; Brown and Ball, 1967; Kinney, 1971; Lev, 1983; Baginsky et *al.* , 1999), and IBES forecasts (Harris, 1999).[4]

Most of the work that uses time-series models to examine the behaviour of the growth of earnings focuses on one-year horizon predictability and is severely limited by the unavailability of a long enough history of earnings data to allow precise model estimation (Little, 1962; Little and Rayner, 1966; Lintner and Glauber, 1967; Beaver, 1970; Ball and Watts, 1972). Although Chan et al. (2003) examine predictability of short- and long-term growth rates; they use a nonparametric approach whose results are contingent on consistency of growth rates among different horizons.

Our work reported herein aims to link the previous research designs by including time series and past characteristics as well as macro-variables when investigating growth rate persistence and predictability at different levels of aggregation and for a wide cross-section of firms using more than 50 years of data. Unlike Chan et al. (2003) who focus on nonparametric tests of persistence based on "run tests", we use a more rigorous

[4] However, many studies find evidence of bias in the forecasts of analysts that diminishes their predictive power.

parametric approach to examine short- and long-term growth persistence and predictability of earnings and CF. Furthermore, our research design is less restrictive, not contingent on consistency in growth, less exposed to survivorship bias, and does not eliminate growth rates when the base year value is negative. In addition, we use this research design to explore the impact of a richer set of predictive variables. The expansion of the predictive set allows for a better understanding of the possible determinants of growth rate behaviour, which have not been previously investigated. Our research framework provides an appropriate setting to explore interactions among different variables and to study their impact on growth persistence, which is harder to capture when either time series or other predictive variables are studied independently.

Examining growth rate predictability at different levels of aggregation is of interest because it addresses different issues and provides a reconciling framework for global (Foster, 1977; Griffin, 1977; Brown and Rozeff, 1979) and firm-specific (Albrecht et al., 1977; Lev and Thiagarajan, 1993) approaches, which are competitors for predicting earnings changes. Also growth rates at different levels of aggregation could be used for different purposes. For instance, long-term aggregate market growth is useful in predicting the equity risk premium and aggregate economic growth, and in strategic and tactical asset allocation. Predicting growth rates of industry-wide earnings is of use for sector pricing, determining industry costs of capital and in sector rotation strategies.[5] Conspicuously, forecasting growth rates at the firm level is useful in estimating the equity cost of capital or stock value for individual firms. Moreover, since the processes generating the earnings of individual firms are likely to differ from the representative or

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[5] We thank Eugene Kandel for suggesting that we examine the predictability of long-term industry-wide growth rates.

aggregate firm (Mueller, 1977; Lorek, 1979), earnings growth persistence and predictability are also examined at the industry and individual firm levels.

Since accounting earnings contain non-cash components that are believed to involve a certain degree of subjectivity and management manipulation (e.g., see Healy, 1985; Moses, 1987), we also examine the behaviour of the growth rates of cash earnings, which are expected to exhibit less manipulation than their accrual counterparts.[6] Cash-flows (CF) are of a more general interest to the finance community than accounting earnings since investors supposedly use cash-flows rather than accounting earnings to value equities.[7]

The contribution of this chapter to the earnings growth literature is two-fold. First, unlike most previous work which uses more restricted samples and focuses on univariate approaches and short-term growth investigations, we use a comprehensive research design where lagged growth rates, firm and industry characteristics, and interaction variables are used to better investigate any predictability in growth rates for U.S. firms for a period of more than 50 years. We also introduce a new set of variables that we show has a predictive impact on both short- and long-term growth. Second, we provide an explanation for persistence and mean reversion of growth rates using firm characteristics and industry attributes which are consistent with the industrial organization literature and the economic intuition of mean reversion in growth rates.

Our major results indicate that earnings growth rates at the aggregate and individual firm levels exhibit short-term persistence. Although long-term aggregate earnings growth rates are not consistently predictable using different aggregation methods, the long-term

[6] See Healy and Wahlen (1998) for a review of the earnings manipulation literature.
[7] We use two CF definitions herein to examine the relation of persistence with current versus non-current and financial CF.

growth rates of individual firms show evidence of mean-reversion and some predictability. Consistent with economic intuition, the corresponding cash-flow growth rates exhibit mean-reversion in short-term growth rates and little predictability in long-term growth rates. The inclusion of interactive effects confirms that various attributes such as age, industry characteristics, listing exchange, volatility, past return and the number of analysts following the stock have an impact on earnings growth persistence and predictability of individual firms.

The remainder of this chapter is organized as follows. Section 2.2 describes the data, the sample and the metrics used to measure both earnings and cash-flow growth rates. Section 2.3 presents and discusses the major results for growth rate persistence and predictability for aggregate market and industry portfolios. In section 2.4, cross-sectional regressions are used to examine the persistence and predictability of earnings and CF growth for individual firms. Section 2.5 concludes the chapter.

2.2. SAMPLE, DATA AND GROWTH METRICS

2.2.1. Sample and Data

Our initial sample consists of all public U.S. firms with data available in the Annual Industrial Compustat (Active and Research files). Firms are selected at the end of each calendar year from 1950 through 2006. Despite the existence of a backfill bias before 1973, the earlier years are included for the sake of completeness (see Kim, 1997; Fama and French, 1999).[8] Firms without data on income before extraordinary items and

[8] Due to data backfilling, firms that failed to report financial statements in the past because of problems like thin trading and financial distress but recovered from the problem later could retroactively report financial statements, which is not the case for firms which still suffer from such problems. This time-dated flexibility might produce a selection bias for the earlier years.

common shares outstanding for the base and current year and those with different fiscal and calendar year-ends (about 35% of the firms) are eliminated from further study.

As is widely acknowledged in the literature, economic and not accounting earnings are the primary determinants of dividends and consequently firm value (Marsh and Merton, 1987; Lee, 1996). Because of the flexibility under the Generally Accepted Accounting Principles (GAAP), accounting (or accrual) earnings are subject to managerial discretion. For instance, managers may manipulate accruals and/or select alternative accounting methods to: maximize their bonus awards (Healy, 1985), reduce the probability of being fired (Fudenberg and Tirole, 1995), increase the value of firm's stock (Moses, 1987), reduce the perceived bankruptcy probability and borrowing costs (Trueman and Titman, 1988), or reduce shareholders' losses when trading for liquidity (Goel and Thakor, 2003).[9] Although managerial discretion could enhance earnings informativeness by allowing communication of private information (Watts and Zimmerman, 1986; Healy and Palepu, 1993), in many instances it uses the flexibility in GAAP to manage earnings opportunistically. In turn, such manipulation can lead to distortions in reported earnings. Many studies (Sloan, 1996; Fairfield et al., 2001; Xie, 2001; Dechow et al., 2004) find differential persistence in cash flows and accrual earnings. Therefore, to the extent that accruals can be manipulated, the CF component of earnings is expected to be a more reliable indicator of the firm's potential future performance.

To explore the differences between accounting or accrual earnings (hereafter AE) and cash-flow earnings (hereafter CF), we also examine persistence and predictability in CF

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[9] Examples of earnings manipulation through accruals and discretion in accounting methods include premature revenue recognition, subjective write-downs, and opportunistic use of inventory accounting and amortization methods.

growth. We define the non-cash items of earnings or accruals as the change in working capital net of depreciation. As a result, the following relationship is used for reported earnings, $E_{j,t}$:

$$E_{j,t} = C_{j,t} + A_{j,t}, \tag{2.1}$$

where $C_{j,t}$ and $A_{j,t}$ are cash-flows and accruals for firm *j* during year *t*, respectively. In (2.1), $C_{j,t}$ is obtained as the difference between estimates of $E_{j,t}$ and $A_{j,t}$, where $E_{j,t}$ is measured as Income before extraordinary items (i.e., Compustat item #18). The value of $A_{j,t}$, or $A1_{j,t}$, is given by the Change in working capital (or ΔWC) minus Depreciation and Amortization (Compustat item #14).[10, 11]

The cash component of earnings is computed for all firms in our sample with the exception of financial companies (SIC codes in the range of 6000-6999) since the distinction between operating and financing activities is not clear for these firms. We also follow the prior literature and impugn data before 1962 due to the lack of certain data items necessary to compute the cash component of earnings (Sloan, 1996; Subramanyam, 1996). Following Subramanyam (1996), observations where cash-flows are more than three standard deviations from their means are deleted.

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[10] ΔWC is equal to the change in current operating assets (Compustat item #4), net of cash and short-term investments (Compustat item #1), less the change in current operating liabilities (Compustat item #5), net of short-term debt (Compustat item #34).

[11] We also examine a more comprehensive definition of accruals based on the statement of cash flows (as in Richardson et al., 2005), which incorporates various non-cash items and deferrals.

$$A2_{j,t} = A1_{j,t} + \Delta NCO + \Delta FIN \tag{2.2}$$

where ΔNCO is the change in non-current assets minus the change in non-current liabilities; ΔFIN is the change in financial operations; ΔNCO is given by the change in non-current assets (Compustat item #6 minus #4), net of long-term non-equity investments and advances (Compustat item #32), less the change in non-current liabilities (Compustat item #181 minus #5), net of long-term debt (Compustat item #9); and ΔFIN is given by the change in short-term investments (Compustat item #193) plus long-term investments (Compustat item #32) less the change in short-term debt (Compustat item #34), long-term debt (Compustat item #9) and preferred stock (Compustat item #130). Results using CF based on this definition of accruals are not tabulated and are only discussed whenever they differ materially from the traditional CF results.

2.2.2. Growth Metrics

Since our focus is on predictability, growth is measured on a per share basis after correcting for stock splits, in order to remove any predictability due to changes in the scale of the firm's operations. Our perspective is that of an investor who buys and holds one share over some horizon (e.g., one-year), and tracks the growth of the AE and CF that the firm reports. Consistent with this perspective, the growth rate of income per share before extraordinary items (i.e., $EPSG$) and its CF counterpart are examined.

We use a rather innovative approach when computing growth rates which includes negative base-year values as long as the values for the successive year are also negative.[12] This approach is motivated by the observation that about 17 percent of the firms in our sample, on average, have negative values of earnings before extraordinary items for each specific year.[13] Ignoring the existence of negative earnings in base years induces a biased characterization of the distribution of $EPSG$ rates, which alters the distribution through left-side truncation and creates survivorship bias. Some important empirical features in financial markets are considered when negative earnings values are used to compute growth rates. These features include the existence of distressed firms which continue to operate despite a series of negative earnings and enjoy some probability of recovery, and the existence of start-up firms in industries such as biotechnology, which usually generate a series of negative earnings at the beginning of their life cycles.

Growth rates computed using negative values in base years are generally very informative. For instance, a series of successively greater negative EPS values (i.e.,

[12] We do not include negative base-year values which are followed by positive values since we are not sure how to interpret them. Their occurrence is however much lower than the occurrence of series of successive negative earnings.

[13] Chan et *al.* (2003) assert that 29 percent of the firms have negative values of earnings before extraordinary items in their sample, which makes the elimination of firms with negative earnings even more of a concern.

increasing in absolute magnitude) should indicate that a firm has persistent troubles and including such growth rates provides a more realistic characterization of the distribution of the growth rates for that firm. Negative *EPS* values followed by subsequent lower negative *EPS* (i.e., lower absolute) values is a common scenario for firms that are at the beginning of their life cycles, and usually means that such firms are only beginning to realize the cash inflows from their initial investments. We propose that this should be interpreted as an indicator of positive growth as the negative EPS value becomes smaller (i.e., decreases in absolute value).[14] The problem of whether negative EPS values are the result of poor performance or accounting rules (income smoothing or conservatism as usually reflected by high accruals and low earnings) is mitigated somewhat by examining the growth of the cash component of earnings, since cash flows are less susceptible to accounting manipulation than accrual earnings. The generic method used herein for computing $EPSG_{j,t}$ is:

$$EPSG_{j,t} = D(EPS_{j,t} - EPS_{j,t-1})/EPS_{j,t-1}, \tag{2.3}$$

where D is a dummy variable that is equal to +1 if $EPS_{j,t} > 0$ and $EPS_{j,t-1} > 0$, or $EPS_{j,t} < 0$ and $EPS_{j,t-1} > 0$, and is equal to −1 if $EPS_{j,t-1} < 0$ and $EPS_{j,t} < 0$; and $EPS_{j,t}$ is income before extraordinary items divided by number of shares outstanding for firm j during period t.

As in previous studies, firm-year observations where the absolute value of the one-year *EPS* growth rate exceeds 100% are deleted from further analysis in order to reduce the impact of outliers on our results. Such observations generally occur when the base

[14] Ettredge and Fuller (1991) argue that the potential for recovery of firms initially reporting losses tends to be underestimated by the market. La Porta (1996) finds that a large fraction of firms with high expected growth rates based on analysts' forecasts have negative earnings.

year *EPS* is near zero, as is the case for turnaround and start-up firms as they move to profitability. Growth rates in CF are computed in a similar fashion. However, unlike the treatment of AE growth rates, the CF growth rates are not truncated at an absolute value of 100%, since CF growth rates outside of this range are common. Instead, the extreme 1% of the growth rate distribution for the whole sample is removed from further study to reduce the impact of outliers. The series of individual cash-flow growth rates is denoted by $CF1G_{j,t}$ where j denotes firm and t time.[15] Long-term growth rates are computed as the annualized 5-year growth rate for each variable and are denoted as follows: $EPSG_{j,ltg}$ for 5-year growth rates in AE; and $CF1G_{j,ltg}$ for 5-year growth in CF.[16]

2.3. GROWTH RATE PERSISTENCE AND PREDICTABILITY USING MARKET AND INDUSTRY PORTFOLIOS

2.3.1. Portfolio Construction

All of the portfolio growth series, which are discussed in this section, are dynamic in that they account for changes in the compositions of market or industry-based portfolios as companies enter and exit the market on an annual basis. Not only does aggregation result in the cancellation of most of the random fluctuations to leave only the trend (if any) to be observed but aggregation also reduces the problem of survivorship bias that is highly present when dealing with individual firms with short lives.

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[15] The series of CF growth rates using the more comprehensive definition of CF is denoted by $CF2G_{j,t}$ and their results are only reported whenever they exhibit some material differences from those reported herein for the traditional CF measure.

[16] When computing 5-year growth, annual CF growth rates, $CF1G_{j,t}$, are truncated to |100%| to avoid problems of raising negative numbers to fractional powers.

2.3.1.1. Market- and Typical-firm-based Portfolios

The series of annual growth rates for the average or mean firm, $EPSG_{mean,t}$, are computed using the annual mean growth rates of all firms existing in the market at the end of each year *t*. Since such computations implicitly place an equal weight on each firm's growth regardless of its size, an alternative *EPSG* measure is formed by weighting each firm's growth by the relative proportion of its total assets in the market for each year *t* to obtain $EPSG_{vw,t}$. Total assets (*TA*) are used as the weighting variable because weights based on total assets should exhibit less volatility than those obtained from using market values. The growth rates of a market index which contains all firms available in the market for a particular year is also examined. The index EPS is computed as the sum of the EPS of individual firms multiplied by the number of shares outstanding. At the end of each year, the index EPS growth rate, $EPSG_{index,t}$, is computed as previously described. In a similar fashion, the series of annual cash-flow growth rates, $CF1G_{mean,t}$, $CF1G_{vw,t}$, and $CF1G_{index,t}$ are computed.

2.3.1.2. Industry-based Portfolios

To investigate whether certain industries are expected to generate more predictable growth than others, the time-series behaviours of the annual equally-weighted AE and CF growth rates by industry $EPSG_{i,t}$ and $CF1G_{i,t}$ are examined, where *i* stands for one of the 43 (out of the 48) industry groups used by Fama and French (1997). The following industries are eliminated: Agriculture; Banking; Insurance; Real Estate; and Trading.

To investigate the impact of industry attributes on growth persistence and predictability, three types of industry characteristics are studied where the first two measures for each industry are averaged over the last three years to reduce the impact of potential data errors (Hou and Robinson, 2006). The first is the concentration level as proxied by the Herfindahl index (HHI), which is calculated herein using market shares, as measured by sales revenue, for the top five firms in each 43 industry classification. Based on the argument of Stigler (1963) that persistence in a firm's profitability is positively related to the degree of concentration in its industry, and the findings of Lev (1983) and Baginski et al. (1999) of persistence in the earnings for firms with low competition, we expect growth rates to be more persistent for highly concentrated firms and industries.

The second industry characteristic is capital intensity, which is computed as the average ratio of net property, plant and equipment divided by total assets for the top five firms in terms of market shares (Francis et al., 2004).[17] Findings by Lev (1983), Ismail and Choi (1996) and Baginski et al. (1999) exhibit lower persistence in earnings for firms with high capital intensity, since demand fluctuations, for instance, have a higher impact on firms with higher fixed costs.

The third industry characteristic is product type where a dummy variable TYPE is used for industries classified into nondurables & services (TYPE=0) and durables (TYPE=1) using the Survey of Current Business classification that is available from the Bureau of Economic Analysis. Based on Friedman's permanent income theory, which assumes that the consumption of nondurables & services [durables] is a function of permanent [transitory] income, demand and growth rates for nondurable goods & services should be more stable and more persistent than that for durable goods (Lev, 1983).

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[17] The classification is similar when the ratio of gross value of property, plant and equipment divided by total sales is used, as in Zmijewski and Hagerman (1981).

2.3.2. The Regression Model and Descriptive Statistics

Most work on earnings persistence and changes focuses on modeling the time series of changes in earnings on cross-sections of firms and uses Box-Jenkins based methodologies.[18] In contrast, a model that includes both lagged growth rates and other predictive variables is used herein because it imposes fewer restrictions on the lagged response of the dependent variable, and it allows for the inclusion of other variables that are susceptible to predicting future growth as well as the persistence of growth rates. This methodology is appropriate for studying both firm- and aggregate-based growth rates by modifying the predictive set depending on the variables of interest and availability for each level of aggregation.

At the market level, we use a dynamic model which is a variant of an autoregressive distributed lag model (ARDL). Our approach is similar in spirit to Welch (1984) who examines quarterly earnings predictability using a distributed lag (DL) model. However, we augment the DL model by adding three lags of the dependent variable, use a different set of macro-variables that includes both realized and forward-looking data, and investigate annual and long-term (5-year) growth rates in both AE and CF. Our model is structured as follows:

$$G_{p,t+n} = \gamma_{p,0} + \sum_{q=1}^{Q} \gamma_{p,q} G_{p,t-q} + \sum_{mv=1}^{N} \sum_{k=1}^{K} \beta_{p,mv,k} MV_{t-k} + \varepsilon_{p,t+n} \tag{2.4}$$

$$\varepsilon_{pt+n} \sim N\left(0, \sigma^2\right)$$

where $G_{p,t+n}$ indicates earnings growth rate $EPSG_{p,t+n}$ or CF growth rate $CF1G_{p,t+n}$ for portfolio p at time t when $n=0$ or at time $t+4$ when $n=4$; q indicates the lag where Q is

[18] See, for instance, Foster (1977), Griffin (1977), and Brown and Rozeff (1979). Exceptions include King (1966), Lev (1983), Welch (1984), Freeman, Ohlson and Penman (1982), Ismail and Choi (1996), and Fama and French (1999).

the length or the number of lagged earnings or CF growth factors; *MV* indicates the forecast (or actual) macro-variable; *mv* indicates the number of macro-variables included; *k* is the length or the number of lagged macro-economic variables used; γ_p is the intercept; $\varepsilon_{p,t}$ is the error term; and σ^2 is the volatility of the error term.

A lag length or *Q* of three should also alleviate any autocorrelation in the residuals. Since stock price changes and returns are related to market-wide factors (Fama and French, 1993), AE or CF and their changes are also expected to reflect a similar association (King, 1966; Brown and Ball, 1967). We test whether actual and/or lagged forecasts of a set of macro-variables have predictive power for future growth rates. Our first macro-variable is the annual forecast of industrial productivity growth which is a proxy for expected future growth rates in the economy. It is computed using 12-month median forecasts of inflation-deflated industrial production for year-end t-1, and actual industrial production for year-end t-1. Both forecasts and actual values are available from the Livingston Survey through the Federal Reserve Bank of Philadelphia. A second measure of economic growth is based on actual values of annual real GDP growth, extracted from the U.S. Bureau of Economic Analysis. As aggregate growth rates are expected to be related to business cycle fluctuations, we also include the term and default premium in our predictive model. The historical values of the term structure of interest rates (long-term government bond yield minus the three-month Treasury-bill rate) and the default premium (long-term corporate bond yield minus long-term government bond yield)[19] are extracted from Ibbotson Associates for the 1950-2006 period. As we are investigating predictability of the dependent variable, we do not use any

[19] Actual and not forecasted levels of the term premium are used since the Livingston Survey provides such forecasts starting from 1992 only.

contemporaneous macro-variables in our model. We only use macro-variable values with a lag length k of one for all macro-variables, since we believe that any impact from prior macro-variables should be reflected in the lagged dependent variables that appear on the right-hand side of our model regression.[20]

Descriptive statistics and unit root tests for the set of macro-variables and dependent variables are reported in table 2.1. All values are presented in annual real terms. The mean and median values of EPS growth rates are comparable to the corresponding expected industrial production growth ($EIPG$) values. The mean and median $EPSG_{vw}$ are lower than their corresponding GDP growth value which supports the findings of Bernstein and Arnott (2003) who argue that earnings grow slower than GDP since the growth in existing firms represents only a part of GDP growth. Mean and median values of CF growth rates are higher than their corresponding EPS growth rates, except for the median firm values, which indicate that, on average, firms have higher growth in CF than AE.[21] Specifically, statistics for value-weighted growth rates indicate that firms with high total assets, or usually mature firms, tend to have lower AE growths but higher CF growths than small firms. Index growth rates $EPSG_{index}$ and $CF1G_{index}$ mean and median statistics are slightly different from the corresponding value-weighted growth values, but indicate that mean earnings and cash-flow growth rates are comparable at the index level. However, index growth rates show the highest standard deviation among the various measures of growth rates. The Augmented Dickey Fuller test with an intercept (ADF1)

[20] We also tried variables such as forecasts of GDP growth and actual equity risk premium in an earlier version, but none of these are significant. Hence, these variables are removed from the model. We also tested the interactive effect of recession and expansion periods on persistence, but the results are not significant for most series.

[21] This could be due to a variety of reasons such as positioning in the latter stages of the firm's life cycle, low ratios of the value of growth prospects to assets in place, more conservative accounting practices, and higher accrual components of earnings.

rejects the unit root hypothesis for all variables at the 5% and the 1% levels. The test rejects the unit root hypothesis for all variables at the 1% level when both a trend and an intercept are added (ADF2).

[Please place table 2.1 about here.]

Table 2.2 reports Pearson and Spearman correlations for the explanatory variables that are used in the aggregate regressions. Not surprisingly, $EPSG_{mean}$ is highly correlated with $EPSG_{vw}$. The same applies to the CF growth mean and value-weighted growth values.[22] Also, as expected, a positive and significant contemporaneous correlation exists between GDP growth and all measures of EPS growth. Unexpectedly, no significant correlation exists between GDP and industrial production growth. Although the risk of a multicollinearity problem is believed to be low in general, we interpret the results related to the GDP variable with caution when both lagged GDP and lagged growth rates are used in the same regression.

[Please place table 2.2 about here.]

2.3.3. Empirical Findings

All regressions are estimated using GMM and the Newey and West correction for heteroscedasticity and autocorrelation in order to mitigate the dual problem of autoregression and autocorrelation which arises when lagged dependent variables are used as regressors in the estimated relationship. Pooled cross-section and time-series regressions are run at the industry and firm levels to account for contemporaneous cross-correlations in the error terms.

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[22] Non-tabulated results indicate a negative correlation between the mean and value-weighted EPS growth rates ($EPSG_{mean}$ and $EPSG_{vw}$) and the mean CF growth rates using the comprehensive definition of cash $CF2G_{mean}$. This may indicate that firms resort to generating CF from financial and non-operating activities when their earnings growth rates are decreasing.

2.3.3.1. Empirical Findings for 1-year Growth for Market-based Portfolios

Based on the theoretical model (2.4), the following regression is run on the market-based portfolios of growth rates to investigate short- and long-term persistence:

$$G_{p,t+n} = \gamma_{p,0} + \gamma_{p,1}G_{p,t-1} + \gamma_{p,2}G_{p,t-2} + \gamma_{p,3}G_{p,t-3} + \beta_{p,EIPG}EIPG_{t-1} + \beta_{p,GDPG}GDPG_{t-1} + \beta_{p,TERM}TERM_{t-1} + \beta_{p,DEF}DEF_{t-1} + \varepsilon_{p,t+n} \qquad (2.5)$$

where $EIPG$ is expected industrial production growth; $GDPG$ is the GDP growth rate; $TERM$ is the actual term premium; and DEF is the actual default premium. All other variables are as previously defined.

Summary results are reported in table 2.3. When regressed solely on the lagged dependent variables, $EPSG_{mean}$ shows evidence in panel A of persistence with a positive and statistically significant first-order lag. However, lags two and three are negative but not significant, which indicates that any persistence is shortly lived. The persistence remains significant when macro-variables are added. All macro-variables coefficients are significant (and positive except for the negative sign for GDP growth).[23] Inclusion of macro-variables dramatically improves model significance which indicates that macro-variables are useful in predicting aggregate earnings growth rates.[24]

Regression results for mean CF growth rates, $CF1G_{mean}$, show little evidence of persistence with consistently negative but non-significant coefficients on the lagged dependent variable. Inclusion of macro-variables improves the model's fit. However, not all macro-variables are significant, which might indicate that mean CF growth rates are

[23] To control for the contemporaneous correlation between GDP growth and EPS growth, we rerun the tests using the residual variable from a regression of GDP on EPS growth rates. The results remain qualitatively the same.

[24] Untabulated results using median growth rates show similar results.

less sensitive to the business cycle than mean AE growth rates. Results using value-weighted growth rates are reported in panel B and confirm previous findings of short-term persistence and predictability of AE with evidence of mean-reversion in CF growth rates. Term and Default coefficients are positive for EPS growth but negative for CF growth which indicates that earnings increase and CF decreases following declines in business cycles. When index growth rates are examined, short-term persistence of EPS growth is again confirmed but with lower predictive power from the macro-variables side. We also find clear evidence of mean-reversion in CF growth.[25]

[Please place table 2.3 about here.]

In summary, we find statistical evidence of short-term persistence in earnings growth rates at the market level. Macro-variables show differential levels of predictive power depending on the method used to aggregate to the market level. Our results show little evidence of persistence in CF growths; however index CF growth rates exhibit clear evidence of mean reversion. Since CF growth rates are better predictors of economic growth and are less subject to manipulation than earnings, these findings are consistent with the economic intuition that growth rates are mean-reverting. However, since these results are based on an investigation of short-term growth rates, we also need to examine long-term growth rates for more robust conclusions on growth persistence at the market level.

2.3.3.2. Empirical Findings for 5-year Growth for Market-based Portfolios

Table 2.4 reports summary results for regression (2.5) using 5-year annualized growth rates. Panel A reports results related to mean AE and mean CF growth rates. Little

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[25] These results are also consistent with Ismail and Choi (1996) who find negative autocorrelations in the first-order differences of CF.

persistence and predictability of long-term aggregate growth rates is identified, when lagged 1-year growth rates and macro-variables are used. Results are similar when value-weighted growth rates are used (see panel B). Some evidence is found for mean reversion in long-term, index-based AE growth rates (panel C). Overall, the results indicate that long-term growth rates at the market level show little evidence of predictability.

[Please place table 2.4 about here.]

In summary, aggregate short-term results show statistical evidence of persistence in earnings growth rates and little evidence of persistence in CF growths. Consistent with economic intuition, long-term growth rates are not persistent and show little predictability based on macro-variables. Macro-variables show, however, differential levels of predictive power for short-term growth depending on the method used to aggregate to the market level.

2.3.3.3. Empirical Findings for 1-year Growth for Industry-based Portfolios

Two types of regressions are run next. The first applies the previously described ARDL model to the 43 industries considered herein for both 1- and 5-year growth rates. Specifically:

$$\begin{aligned} G_{i,t+n} = \gamma_0 + \gamma_1 G_{i,t-1} + \gamma_2 G_{i,t-2} + \gamma_3 G_{i,t-3} + \beta_{EIPG} EIPG_{t-1} + \beta_{GDPG} GDPG_{t-1} \\ + \beta_{TERM} TERM_{t-1} + \beta_{DEF} DEF_{t-1} + \varepsilon_{i,t+n} \end{aligned} \quad (2.6)$$

where $G_{i,t}$ indicates earnings growth rate $EPSG_{i,t}$ or cash-flow growth rate $CF1G_{i,t}$ for industry i at time *t*; and all other variables are as previously defined.

Table 2.5 reports regression (2.6) results using 1-year growth rates. The industry results reported in panel A confirm the aggregate market results of short-term persistence in AE growth, with a more noticeable evidence of mean-reversion in CF growth. The significance of the macro-variables is lower than for the aggregate market and none of the macro-variables are significant in predicting CF growth rates at the industry level.

To investigate the impact of industry characteristics on growth rate persistence, we introduce a second regression which examines the predictive power of industry characteristics, as well as their impact on growth rate persistence by regressing growth rates on lagged 1-year growth rates, industry concentration, capital intensity, product type and a set of interactive variables. This leads to the following formulation where all variables are as previously defined:[26]

$$\begin{aligned} G_{i,t+n} &= \gamma_0 + \gamma_1 G_{i,t-1} + \gamma_2 G_{i,t-2} + \gamma_3 G_{i,t-3} + \beta_{HHI} HHI_{i,t-1} + \beta_{CI} CI_{i,t-1} + \beta_{TYPE} TYPE_{i,t-1} \\ &+ \delta_{HHI*lag1,} HHI_{i,t-1} * G_{i,t-1} + \delta_{CI*lag1,} CI_{i,t-1} * G_{i,t-1} + \delta_{TYPE*lag1,} TYPE_{i,t-1} * G_{i,t-1} + \varepsilon_{i,t+n} \end{aligned} \quad (2.7)$$

Panel B of table 2.5 reports regression (7) results based on mean 1-year growth rates. When industry characteristics are added, the overall results of persistence and mean-reversion for AE and CF growth rates are unchanged. The concentration level (HHI) does not predict the mean industry growth or influence its persistence. Product type (TYPE) and capital intensity (CI) have predictive power for growth in AE with higher growth rates for nondurables versus durables, and for less versus more capital intensive industries. Capital intensity (CI) has also predictive power for CF growth, with less capital intensive industries generating higher cash growth. Contrary to expectations, the inclusion of interactive variables shows no evidence of higher persistence or mean-reversion of growth rates attributable to such industry characteristics.

[Please place table 2.5 about here.]

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[26] We also conduct a regression which contains both macro-variables and industry characteristics as independent variables to guard against the omitted variables problem. All major conclusions remain the same for this new regression.

In summary, the industry results confirm the previous findings of short-term persistence for AE growth rates and little persistence in CF growth rates. We find mixed evidence for the predictive power of industry characteristics that are presented in the literature as indicators of future persistence in profitability. Capital intensity and product type help predict AE growth rates, and capital intensity alone shows some predictive power for CF growth rates. Industry concentration (HHI) shows little effect on the predictability of the mean industry growth rate.

2.3.3.4. Empirical Findings for 5-year Growth for Industry-based Portfolios

Based on panel A of table 2.6 for regression (2.6), little evidence of long-term growth persistence exists for AE or CF based on lagged 1-year growth rates or when lagged macro-variables are included in the predictive set. Based on panel B of table 2.6 for regression (2.7), little persistence exists in mean long-term growth rates using lagged mean 1-year growth rates. Unlike the concentration level (*HHI*), product type (*TYPE*) seems to forecast long-term AE growth rates, with durables having lower long-term growth rates than services and non-durables. Capital intensity (*CI*) also has predictive power for long-term CF growth rates. The positive and significant coefficients on capital intensity indicate that firms with higher capital intensity are predicted to have higher long-term growth rates. None of the industry characteristics seems to have an impact on long-term growth persistence.

[Please place table 2.6 about here.]

In summary, the evidence is consistent with persistence (mean-reversion) in AE (CF) growth rates for short- and not long-term growth rates. Short-term CF growth rates are less sensitive than their AE counterparts to industry characteristics. Product type (capital intensity) provides some prediction for long-term AE (CF) growth. We address whether our conclusions might be unduly affected by the averaging process in the next section.

2.4. CROSS-SECTIONAL PERSISTENCE AND PREDICTABILITY OF EARNINGS AND CASH-FLOW GROWTHS

Since the processes generating the AE or CF of individual firms are likely to differ from the representative or aggregate firm (Mueller, 1977; Lorek, 1979), findings based on aggregate portfolios and/or the median firm may not be generalizable to the firm level.

2.4.1. Model

The model used in this section distinguishes between variables that are believed to predict the direction of growth rates in earnings and CF and those that have an impact on the persistence of growth. Traditionally used variables (Fama and French, 1995) include: $BM_{j,t}$, which is the ratio of book equity to market equity of firm *j*, and is measured as the book value of stockholders' equity over the market value of equity at the end of the last fiscal year *(t-1)*; $EP_{j,t-1}$, which is the total earnings of the fiscal year end (*t-2*) divided by the price at the end of March of year *t-1*; $DP_{j,t}$, which is the total dividend paid at the end of the last fiscal year end *(t-1)* divided by the price at December *t-1*; and $Size_{j,t}$, which is the log of total assets for firm *j* at the end of year *t-1*, where the log is taken to reduce the impact of heteroscedasticity.

Kothari and Sloan (1992), Fama (1990) and others argue that stock prices and returns anticipate growth rates. The basic intuition stems from the fact that annual stock returns are simply the sum of future expected earnings growth rates. Similar to Chan et al. (2003), we examine whether the previous year's compound six month stock return, $RET_{j,t}$, has any predictive power for future AE and CF growth rates. Intuitively, we would expect higher returns to predict higher future growth rates.

To study the usefulness of analysts' forecasts on growth rate predictability, two forecast variables are examined: $IBESG_{j,t}$ is the implied growth rate of earnings for firm j for year t, which is computed using the last actual earnings observed in December of year t and the IBES consensus forecast made at the end of December of year $t-1$ for earnings at the end of fiscal year t beginning with 1976. $IBESLTG_{j,t}$ is the IBES consensus forecast of long-term growth beginning with 1981.[27]

Persistence in earnings has been widely linked to earnings quality (Subramanyam, 1996; Sloan, 1996; Burgstahler and Dichev, 1997; Degeorge et al., 1999; Myers, Myers, and Skinner, 2006). Firms with high earnings quality are expected to have lower persistence in their earnings, than firms with poor earnings quality and higher management incentives to manipulate earnings.[28] The impact of earnings quality on growth persistence is tested herein using various variables (number of analysts following the stock ($Ana_{j,t}$), age, and listing exchange) and their interaction with growth rates. The first interactive variable is $Ana_{j,t-1}$ with the lagged growth rate of earnings ($y_{j,t-1}$), where we assume that firms with low coverage by analysts have higher incentives to smooth earnings and have higher persistence of growth rates.[29]

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[27] To verify that IBES forecasts provide predictive information beyond that provided by historical growth rates, both 1-year and long-term IBES forecasts are orthogonalized with respect to contemporaneous and past growth rates before being included in any of the predictive sets.

[28] Ghosh, Gu and Jain (2005) find that firms that report sustained increases in earnings but no growth in revenues do not have high earnings quality.

[29] We also used the amount of accruals, where high accruals signal low earnings quality (Chan et al, 2006) and the dispersion in earnings forecasts, where high dispersion signals low earnings quality (Rajgopal et al., 2006). Based on untabulated results, while the overall model significance is improved, the estimated coefficients have low statistical significance.

The second interactive variable used herein is lagged y with age, $Age_{j,t}$ where age is proxied by the number of years at time t that firm j has been included in Compustat. A negative relationship is expected between growth rate persistence and firm age. First, firms in the growth phase of their life cycle have higher ratios of future growth opportunities to assets in place. Second, older firms supposedly have less discretion to manage earnings as large deviations from their historical norms are easier to detect (Gu, Lee and Rosett, 2005).

The third interactive variable used herein is lagged y with listing exchange, $Exch_{j,t}$ where the latter is a binary variable that takes the value 1 if firm j is listed on NASDAQ during year t and is 0 otherwise. Due to the stringent auditing and monitoring requirements on the NYSE (starting from 1978), firms listed on NYSE/AMEX are expected to have more institutional investors and more analysts following them than firms trading on NASDAQ. Thus, we expect more room for earnings manipulation for NASDAQ compared to NYSE/AMEX firms. Also, NASDAQ contains a relatively larger proportion of smaller stocks and high-growth stocks (such as technology stocks), which are believed to exhibit more persistent growth.

The fourth interactive variable is growth rates with their volatility measure, $SD_{j,t}$, which is measured using the rolling standard deviation of AE or CF growth over the last five years for firm j and year t, provided that the firm has five continuous observations for such growth.[30] Assuming that firms that smooth their earnings have lower volatility in their growth rates, we expect a negative relationship between earnings growth persistence and volatility. Our last interactive variable is growth rates with past stock returns, as

[30] Since SD should be highly correlated with earnings quality (Francis et al., 2004), SD might subsume the impact of quality in a multivariate setting.

captured by the compound six-month return, $RET_{j,t}$. We expect higher rates of return to be associated with higher persistence in growth rates.

Various papers examine the impact of industry attributes on AE and CF persistence (Lev, 1983; Baginski et al., 1999; Ismail and Choi, 1996). Industry concentration ($HHI_{j,t}$), capital intensity ($CI_{j,t}$) and product type ($TYPE_{j,t}$) are examined for their impact on the persistence of AE and CF growth rates. Firms with high capital intensities or in less concentrated industries are expected to have lower persistence in growth. Similarly, non-durables firms are expected to have more persistent growth rates due to their lower exposure to changes in the business cycle. This leads to the following testable model where $y_{j,t+n}$ is the growth rate of earnings or cash-flows for firm *j* at time *t+n,* and n is 0 for short-term growth and 4 for long-term growth. All variables are as previously defined:

$$\begin{aligned} y_{j,t+n} &= \beta_0 + \gamma_1 y_{j,t-1} + \gamma_2 y_{j,t-2} + \gamma_3 y_{j,t-3} + \beta_1 BM_{j,t-1} + \beta_2 DP_{j,t-1} + \beta_3 EP_{j,t-2} \\ &+ \beta_4 Size_{j,t-1} + \beta_5 IBESG_{j,t-1} + \beta_6 IBESLTG_{j,t-1} + \beta_7 Age_{j,t-1} * y_{j,t-1} \\ &+ \beta_8 Exch_{j,t-1} * y_{j,t-1} + \beta_9 HHI_{j,t-1} * y_{j,t-1} + \beta_{10} CI_{j,t-1} * y_{j,t-1} + \beta_{11} TYPE_{j,t-1} * y_{j,t-1} \\ &+ \beta_{12} ANA_{j,t-1} * y_{j,t-1} + \beta_{13} SD_{j,t-1} * y_{j,t-1} + \beta_{14} RET_{j,t-1} + \beta_{15} RET_{j,t-1} * y_{j,t-1} + e_{j,t+n} \end{aligned} \quad (2.8)$$

2.4.2. Empirical Findings for 1-year Growth Rates

Table 2.7 reports the correlation coefficients among the different growth rates, firm characteristics, IBES forecasts and industry attributes. Positive correlations exist between various pairings of size (SIZE), earnings yield (EP), and dividend to price ratio (DP). As expected, size is positively correlated with age (AGE), whereas EPS growth (EPSG) and long-term growth (LTG) are negatively correlated with age. Both size and age are positively correlated with the standard deviation of CF growth, which might indicate that new and small firms try to stabilize their CF rates more than mature and large firms.

Growth rates implied from IBES forecasts (IBESG) and long-term growth forecasts (LTG) are positively correlated with EPS growth rates, and negatively correlated with EP ratios, which is consistent with a positive predictive power of IBES forecasts. Return is positively correlated with IBES growth and BM.

[Please place table 2.7 about here.]

Based on table 2.8, the first lag of EPSG is positive and significant whereas the second lag is negative and significant, which confirms the previous findings of short-term persistence in AE growth rates followed by a mean-reverting trend with(out) the addition of predictive variables based on firm characteristics. Evidence of predictive power exists for both IBES one- and long-term EPS forecasts. The coefficient on lagged growth becomes negative and significant when IBES forecasts are included which may be due to the contemporaneous positive correlation between EPS growth and IBES earnings forecasts. Evidence of predictability when past returns are included with lagged variables confirms previous findings which infer that returns anticipate earnings growth.

When interactive variables are included individually, untabulated results show that they are all significant with their expected sign. The industry attributes which had little significance when examined on an industry basis, exhibit the expected effect on individual firm's EPS growth rates. When we run regression [(5)] which includes interactive variables that have a positive impact on growth persistence (Exch*y, HHI*y, TYPE*y and RET*y), all three variables retain their positive sign and significance. When all interactive variables which indicate a negative impact on growth persistence (CI*y, AGE*y, SD*y and ANA*y) are included in the same regression [(6)], both the number of analysts (ANA) and the growth rate standard-deviation (SD) lose their statistical significance. In contrast, age (AGE) and capital intensity (CI) remain negative and significant.

The last regression [(7)] reported in table 2.8 includes all variables (including interactive variables). None of the firm characteristics are significant except for BM, which now has a negative sign. The two IBES variables and past returns are still significant, and only AGE, SD, and RET retain their significant interactions with growth rates. However, the loss of significance of the interactive variables is expected due to possible collinearity and to the averaging out of the divergent directional effects of these variables on growth when they are all included in the same regression. Our most important finding is the significant impact of age, number of analysts, listing exchange and past returns on growth rate persistence.

[Please place table 2.8 about here.]

Table 2.9 reports cross-sectional results for the CF growth rate, *CF1G*. When only lagged growth rates are included, the first and second lag coefficients are negative and highly significant, which indicates a mean-reverting trend in CF growth rates. Coefficients on firm characteristics are all negative (and significant except for DP). This indicates that low dividend yield firms do not have significantly higher CF growths, and that firms with high BM values (distressed firms) or high EP (low future growth prospects) or large firms have lower future CF growth. Coefficients on IBES forecasts are positive and significant, which indicates that firms with high future AE growth prospects are also likely to have high growth in their CF. The past return variable coefficient that was positive and significant in the AE growth rate regression is not informative about CF growth persistence, although the latter is argued to be a better proxy of profitability.

When interactive variables are included individually, untabulated results show that Age, CI and HHI are significant with a similar predictive sign as for the AE growth formulation. The only exception is SD, whose coefficient is significant and positive, which indicates that firms with high CF volatility exhibit low persistence in their CF growth rates. Industry attributes, CI, HHI but not Type are significant. The exchange variable, which was positive and significant for AE growth, is no longer significant. This could be interpreted as evidence of higher incentives for earnings manipulation for firms listed in the NASDAQ which creates an artificial persistence in AE growth rates. The interactive effects of Age and CI (HHI and SD) remain negative (positive) and significant when both variables are included in the same regression. When all variables are in the same regression [(7)], all lagged variables maintain their significance, as do BM, DP and IBES forecasts.[31]

[Please place table 2.9 about here.]

Overall, the cross-sectional results indicate that AE growth rates exhibit short-term persistence followed by reversion. CF growth rates exhibit mean-reversion. Certain firm characteristics and industry attributes (such as age, listing, and volatility) are significant predictors of persistence in future growth rates. These results confirm previous conjectures that returns anticipate growth rates and are informative about the persistence tendency of growth rates. Our findings indicate that any tendency for earnings manipulation appears to be shortly lived since AE persistence is not evident beyond one lag. This result could also indicate that the main cause for AE growth persistence is

[31] Some differences occur when comprehensive CF growth rates are used. Based on untabulated results, the sign for size becomes negative for this CF measure. This could indicate that growth in cash from non-operating and financial activities is positively related to firm size. Past return becomes positive and significant which suggests that growth in comprehensive CF is linked to the firm's past return performance.

market imperfections which lead to a lagged competition effect. In general our results show that short-term growth rates persistence and mean-reversion could be predicted using past performances and a set of characteristics. The overall adjusted R^2 values remain low for the models tested herein and suggest that other variables should be explored in future tests of growth rate predictability.

2.4.3. Empirical Findings for 5-year Growth Rates

Based on the table 2.10 results for regression (2.8), long-term growth rates $EPSG_{ltg}$ exhibit mean-reversion when only lagged 1-year growth rates are in the regression. This suggests that 1-year growth persistence is short lived and is followed by a mean-reverting trend. Predictive variables based on firm characteristics are all negative and significant, except for size. Therefore, firms with high BM, high DP or high EP are expected to have low long-term growth rates. Although the 1-year IBES coefficient is not significant, the IBES long-term forecast coefficient is positive and significant, indicating that LT IBES forecasts help predict long-term future AE growth rates. When interactive variables are included individually, firms listed on Nasdaq, with high analysts' following, or with high past returns are predicted to have significantly higher long-term AE growth rates.

[Please place table 2.10 about here.]

Based on table 2.11, mean-reversion exists in long-term CF growth rates when only lagged 1-year growth rates are used as predictor variables. All firm characteristics exhibit a negative sign and are significant (except for past DP). Thus, firms with high BM, high EP or large size are expected to have low long-term CF growth rates. Both short- and long-term IBES forecasts help predict future CF growth rates. The return coefficient indicates that high past returns predict high future CF growth rates. Based on untabulated results, age and two industry characteristics (capital intensity and industry concentration) predict long-term CF growth rates when individual interactive variables are added. When all variables are included [(6)] most variables maintain their significance and the model's significance improves dramatically.

[Please place table 2.11 about here.]

Overall, the investigation of long-term predictability identifies mean-reversion in both AE and CF growth rates. IBES forecasts, past returns, certain firm characteristics and interactive effects based on age, firm listing and analysts' following show some predictive power for both short- and long-term growth rates. Interestingly, our model performance explains 28% of the variation in long-term growth in CF.

2.5. CONCLUSION

In this chapter, we examined the persistence and predictability of short- and long-term growth rates for both accrual earnings (AE) and cash-flow earnings (CF). At various aggregation levels, short-term persistence is found in AE and little persistence or mean-reversion in CF growth rates. Consistent with economic intuition and previous findings, we find little persistence in growth rates at the aggregate and industry level. Economic indicators (such as forecasted industrial production, GDP growth, term premium and default premium) show some short-term growth predictability but cannot predict aggregate growth rates at the long run. Industry attributes (such as capital intensity and product type) exhibit certain predictive power for growth rates at both industry and firm level and for both short-term and long-term growth rates.

Our strongest findings are at the firm level where AE (CF) growth rates exhibit short-term persistence (mean-reversion), and both AE and CF growth rates exhibit long-term mean-reversion. Consistent with Fama and French (1995), certain firm characteristics that help predict returns have similar predictive power for earnings growth rates. The inclusion of interactive effects confirms that various attributes (such as age, industry characteristics, volatility, the exchange where the firm is listed, and the number of analysts following the stock) have an impact on the growth persistence of individual firms. Past returns anticipate future AE growth rates as well as their persistence. Although long-term growth rates of individual firms show evidence of mean reversion, our results show that the prediction of long-term growth rates is aided by IBES forecasts and certain other attributes such as age, number of analysts following the stock, volatility of EPS, and past returns.

CHAPTER 3

EARNINGS FORECASTS AND IDIOSYNCRATIC VOLATILITIES

3.1. INTRODUCTION

A fundamental issue in economics, finance and accounting involves the relationship between a firm's earnings and its stock returns. A huge financial accounting literature, which starts with Ball and Brown (1968) and Beaver (1968), investigates the information content of earnings and its impact on realized stock returns and prices. Ball and Brown, among others, demonstrate that accounting earnings capture a portion of the information set that is reflected in security returns.[32] In early tests of market efficiency, Basu (1983) shows that earnings-yield ratios (E/P) help explain the cross-section of average returns on U.S. stocks after controlling for size and market beta.[33] Together with other market anomalies, this evidence led to the three-factor pricing model of Fama and French (1992). Other earnings-related variables that are linked to return predictability include: cash-flow yields and sales growth (Lakonishok et al., 1994), analysts' optimism and forecasts (LaPorta, 1996), dividends to earnings ratios (Lamont, 1998), discretionary accruals (Sloan, 1996; Subramanyam, 1996; Collins and Hribar, 2000a,b), extreme accrual portfolios (Xie, 2001), the probability of changes in earnings (Ou and Penman, 1989a,b), and dispersion in earnings expectations (Diether, Malloy and Scherbina, 2002; Chen, Hong, and Stein, 2002; Park, 2005).

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[32] Also, see Kormendi and Lipe (1987), Easton and Zmijewski (1989) and Collins and Kothari (1989) for further evidence on earnings response coefficients and the relationship between earnings and stock returns.
[33] Other studies that link return predictability to earnings yields are Shiller (1984) and Fama and French (1988).

Following the seminal work of Campbell et *al.* (2001), which documents an increase in individual stock's volatility, some researchers examined the empirical relationship between the return variability of individual stocks and changes in fundamentals to investigate whether the upward trend in return volatility can be explained by changes in the uncertainty of the fundamentals. For instance, Vuolteenaho (2000, 2002) uses Campbell's (1991) return decomposition framework to decompose stock returns at the individual-firm level into changes in cash-flow expectations (cash-flow news) and changes in discount rates (expected-return news). He finds that contrary to aggregate volatility which is mainly driven by expected return news, firm-level stock return variability is highly driven by changes in cash-flow expectations. Wei and Zhang (2006) apply the Vuolteenaho (2000, 2002) methodology and find that the increase in the total volatility of returns on equity helps explain the upward trend in the return volatility of individual stocks. Irvine and Pontiff (2005), Rajgopal and Venkatachalam (2006) and Jiang and Lee (2006) find that measures of cash-flow and/or cash-flow volatility are determinants of idiosyncratic volatility.

In this chapter, we also examine the relationship between idiosyncratic stock return volatility and earnings/cash-flow volatility.[34] However, unlike previous work, we use the monthly forecasts of analysts instead of reported annual or quarterly earnings to measure volatility, since analysts' forecasts provide a better and a more timely evaluation of the periodical changes in earnings expectations, leading to a better assessment of the impact of changes in earnings on expected returns.[35] We also focus on volatility of changes in

[34] The use of earnings instead of dividends mitigates the impact of dividend smoothing. Although earnings can be manipulated, the extent of earnings manipulation is much lower than for dividends.
[35] Analysts provide more timely forecasts and incorporate information beyond past earnings and financial statements, including market-wide behavior, voluntary disclosures and non-financial information.

expected cash-flows or cash-flow news as opposed to the volatility of earnings or changes in earnings, since it is the news about future cash-flows and not their level that induces return volatility (Campbell, 1991).

The use of analysts' forecasts to update expectations about future cash-flows is well documented in the literature. Several studies find that analysts' forecast revisions predict future returns (Givoly and Lakonishok, 1980; Stickel, 1991; Liu and Thomas, 2000; Beneish et al., 2001; Gleason and Lee, 2003) and cause a subsequent market response (Griffin, 1976; Givoly and Lokonishok, 1979, 1980; Imhoff and Lobo, 1984; Gleason and Lee, 2003). Research that uses analysts' forecasts to estimate ex ante equity risk premiums documents a strong association between returns and analysts' forecasts (Abarbanell and Bernard, 1992; Frankel and Lee, 1998; Penman and Sougiannis, 1997; Dechow, Hutton and Sloan, 1999; Gebhardt et al., 2001).[36] Roy (1983) finds that the forecasts of both earnings and dividends by analysts are better proxies for market expectations than dividend information alone.

To control for the impact of the forecast bias of analysts,[37] historical measures of forecast error are used to extract the documented forecast bias from the total forecasts of analysts. This allows us to investigate whether the market corrects for the bias when valuing stocks after forecasts are made or updated.[38] Our tests are conducted with(out) a bias correction to assess whether any relationship between idiosyncratic risk and the volatility of updates of earnings forecasts changes after correcting for the bias. Our tests

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[36] While there are many advantages when using analysts forecasts, there is also the problem of the documented bias in the forecasts of analysts (e.g., Gu and Wu, 2000).

[37] Despite their predictive power, many studies report evidence of bias in analysts' forecasts of both short-term (Fried and Givoly, 1982; DeBondt and Thaler, 1990; Abarabanell, 1991; Richardson et al., 1999; Gu and Wu, 2000; Claus and Thomas, 2001) and long-term (LaPorta, 1996; Dechow and Sloan, 1997) earnings forecasts. The evidence on whether this optimism has declined in recent years is conflicting (e.g., Brown, 1997, 1998; Richardson et al, 1999).

[38] See, for example, Michaely and Womack (1999), Dechow, Hutton, and Sloan (1999), Scharfstein and Stein (1990), and LaPorta (1996).

are also conducted with(out) earnings announcement periods to assess whether any increase in idiosyncratic risk is related to the documented evidence of an increasing volatility during such periods (see Landsman and Maydew, 2002).[39]

Our work is consistent with the fundamental view of return variability, which relates return volatility to changes in expectations of either future returns and/or cash-flows. We propose possible explanations related to earnings smoothing, conservatism and/or manipulation.[40] Our results are related to the empirical findings that suggest that the informativeness of financial statements has declined and that the dispersion of analysts' forecasts has increased (Lev and Zarowin, 1999; Rajgopal and Venkatachalam, 2006).[41] A decrease of earnings and financial statements informativeness leads to an increase in cash-flow shocks and thus to an increase in both the volatility of earnings forecasts and the returns of individual firms. However since volatility in analysts' forecasts can also increase with increasing firm risk, our work allows for a test of the informational quality hypothesis against the individual risk hypothesis by comparing how our results vary between small versus large firms and new versus mature firms.[42]

This chapter makes at least three contributions to the literature. First, we provide a framework that allows us to explore an explanation for the increasing pattern of idiosyncratic stock return volatility, which is consistent with a fundamental view of return variability and the deterioration of financial reporting. Second, we propose that

[39] A vast literature that begins with Beaver (1968) reports increased return variability around earnings announcements. Other studies include May (1971), Patell and Wolfson (1984), Lee (1992), Teoh and Wong (1993), Salamon and Stober (1994), and Freeman and Tse (1992).
[40] An increase in cash-flow volatility is related to a deteriorating quality of financial reporting by Rajgopal and Venkatachalam (2006). However, Irvine and Pontiff (2005) relate the increase in cash-flow volatilities to an increasingly competitive environment where firms have less market power and higher fundamental cash-flow shocks.
[41] However, Francis and Schipper (1999) and Landsman and Maydew (2002) find that the information impact of financial statements has increased or stayed constant over time.
[42] Volatility in analysts' forecasts also increases total risk. However, recent work by Campbell et al. (2001) finds no evidence of an increase in total risk.

using earnings forecasts for up to three years as a proxy for earnings expectations provides a more realistic description of how the market adjusts to changes in future cash-flow expectations (Gleason and Lee, 2003) than using annual or quarterly observations of past reported earnings. Third, developing a methodology that uses both bias adjusted and unadjusted earnings forecasts, allows us to examine whether the relationship between idiosyncratic volatility and earnings forecasts is conditional on the bias or whether it is more inherently related to earnings forecasts free from bias.

The remainder of the chapter is organized as follows. In the next section, we present the theoretical framework. Section 3.3 presents the sample and the data. Section 3.4 presents descriptive statistics and the preliminary analysis. The cross-sectional relationship between earnings volatility and idiosyncratic risk is examined in section 3.5. Section 3.6 examines time-series trends in volatility. Section 3.7 presents robustness checks. Section 3.8 presents a summary and a discussion of the major findings. Section 3.9 concludes the chapter.

3.2. THEORETICAL FRAMEWORK

As the efficient market hypothesis implies, a firm's stock return is driven by shocks to expected cash-flows and/or discount rates. Vuolteenaho (2000, 2002) uses the Campbell (1991) return-decomposition framework and an accounting-based approach known as the clean surplus relationship to develop an alternative return-decomposition for stocks of individual firms. This leads to the following decomposition, where return-on-equity is used instead of dividends to represent the relationship between returns and cash-flow changes:[43]

$$r_t - E_{t-1} r_t = \Delta E_t \sum_{j=0}^{\infty} \rho^j \left(e_{t+j} - f_{t+j} \right) - \Delta E_t \sum_{j=1}^{\infty} \rho^j r_{t+j} + \kappa_t \tag{3.1}$$

where ΔE_t denotes the change in expectations from *t-1* to *t*; $e_t = \log\left(1 + EAR_t / B_{t-1}\right)$ is the return-on-equity from *t-1* to *t*; $r_t = \log\left(1 + R_t + F_t\right) - \log(1 + F_t)$; R_t is the simple excess stock return; F_t is the risk-free interest rate; EAR_t is earnings from *t-1* to *t*; ρ is a constant slightly less than one; B_{t-1} is the book-value of equity at *t-1*; and κ_t is an approximation error. Using (3.1), the unexpected return variance is decomposed into the variance of cash-flow news and the variance of expected return news to obtain:

$$\mathrm{var}\left(r_t - E_{t-1} r_t\right) = \mathrm{var}\left(N_{r,t}\right) + \mathrm{var}\left(N_{cf,t}\right) - 2\,\mathrm{cov}\left(N_{r,t}, N_{cf,t}\right), \text{ and} \tag{3.2}$$

$$N_{cf,t} \equiv \Delta E_t \sum_{j=0}^{\infty} \rho^j \left(e_{t+j} - f_{t+j} \right) + \kappa_t, \text{ and } N_{r,t} \equiv \Delta E_t \sum_{j=1}^{\infty} \rho^j r_{t+j}. \tag{3.3}$$

Using a VAR approach, Vuolteenaho finds that firm level returns are mainly driven by cash-flow news rather than expected return news. Wei and Zhang (2006) use the Vuolteenaho decomposition and focus on the relationship between conditional return volatility and the conditional variance of cash-flow news. They find that stock return volatility is positively related to the volatility of the return on equity.

Our work also aims at studying the relationship between idiosyncratic volatility and changes in expected cash-flows. Similar to Wei and Zhang, we focus on the (conditional) variance of cash-flows when studying return volatility. Specifically, we use:

[43] Liu, Thomas and Nissim (2002, 2006) find that cash-flow valuations are dominated by earnings, and that earnings-based valuations are closer to traded prices than cash-flow-based valuations.

$$\text{var}(r_t - E_{t-1}r_t) = \text{var}\left[\Delta E_t \sum_{j=1}^{\infty} \rho^j \left(e_{t+j}\right)\right] + \zeta_t \qquad (3.4)$$

where ζ_t contains the variances in the expected return news, the error term κ_t, the risk-free rate and all the covariance terms.[44] However, unlike Wei and Zhang (2006) who use the time-series of quarterly earnings forecasts to measure the conditional volatility of return on equity, our approach focuses on revisions of analyst's forecasts of earnings and their impact on idiosyncratic volatility. This is based on the belief that the revision and hence the news about future cash-flows and not their level causes returns to change (Campbell, 1991). This allows us to include revisions in forecasts of multi-year-ahead earnings, which should explain more variation in stock returns (Liu and Thomas, 2000). The empirical model used in our tests includes forecasts for the next three years. This leads to the following approximate relationship:

$$\begin{aligned} \text{var}(r_t - E_{t-1}r_t) &= \text{var}\left[\Delta E_t \rho e_{t+1}\right] + \text{var}\left[\Delta E_t \rho^2 e_{t+2}\right] + \text{var}\left[\Delta E_t \rho^3 e_{t+3}\right] \\ &+2\,\text{cov}\left[\Delta E_t \rho e_{t+1}, \Delta E_t \rho^2 e_{t+2}\right] + 2\,\text{cov}\left[\Delta E_t \rho e_{t+1}, \Delta E_t \rho^3 e_{t+3}\right] \\ &+2\,\text{cov}\left[\Delta E_t \rho^2 e_{t+2}, \Delta E_t \rho^3 e_{t+3}\right] + \psi_t + \zeta_t \end{aligned} \qquad (3.5)$$

where ψ_t encompasses variance terms of higher-period forecasts. We assume that ψ_t and ζ_t are uncorrelated.

Equation (3.5) is then used to assess how idiosyncratic return volatility is related to revisions in expected cash-flows because revisions of analysts' forecasts provide a more comprehensive, frequent and timely source of information for investors to use when

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[44] Vuolteenaho finds that the error term κ_t is small and that the covariance between cash-flow news and discount rate news is also small. Campbell, Lo and Mackinlay (1997) assume that news about future dividends are uncorrelated with news about future returns. They assert that this assumption could be true if, for example, expected returns are determined by the volatility of the dividend growth process and dividend volatility is driven by a GARCH model so that shocks to volatility and the level of dividends are uncorrelated.

updating their expectations about stock returns. The revision of analysts' forecasts also plays an important role in the diffusion of information about future corporate earnings and unlike earnings announcements, which occur at a quarterly basis, the revisions of analysts' forecasts are made on a monthly or higher frequency basis.

Many studies ignore the biases in the forecasts of analysts by, in effect, implicitly assuming that investors naively rely on the forecasts of analysts (e.g., LaPorta, 1996; Dechow and Sloan, 1997; Jiambalvo, Myers and Peecher, 1998). In turn, this implies that investors are not fully rational towards the bias or that its magnitude is completely unpredictable. Other studies report evidence that investors make adjustments for predictable bias (e.g., Freeman and Tse, 1992; Dugar and Nathan, 1995, Han, Manry and Shaw, 2001).

Herein, we assume that investors use a simple approach to adjust analysts' forecasts for predictable bias. Specifically, we assume that investors extrapolate average past biases and use them as an indicator of future biases. To reduce the impact of forecast error in bias estimation, the last forecast made before an earnings announcement is used as our proxy of the least biased analysts' forecast.[45] This procedure has two advantages. First, it helps in differentiating the forecast bias from the forecast error term, since the latter is induced by innovations to expected earnings and should be independent from the forecast bias. Second, using the last period forecast instead of reported earnings, as a proxy of the least biased forecast, mitigates the impact of management manipulation which affects reported earnings and could only distort the value of the bias if considered. Since analysts make forecasts of the fundamental value of earnings, which is not always equal to the reported value, the forecast bias is defined as:

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[45] We are assuming that forecasts prior to the last forecast contain low forecast error and high forecast bias (if any).

$$bias_{i,m,t} = fe_{i,l,t-1} - fe_{i,m,t-1} \quad (3.6)$$

$$perbias_{i,m,t} = \frac{fe_{i,l,t-1} - fe_{i,m,t-1}}{fe_{i,m,t-1}} \quad (3.7)$$

$$avg\_perbias_{i,m,t} = \sum_{k=t-3}^{t-1} perbias_{i,m,k} \quad (3.8)$$

$$adfe_{i,m,t} = fe_{i,m,t}\left(1 - avg\_perbias_{i,m,t}\right) \quad (3.9)$$

where $bias_{i,m,t}$ is the value of last year's forecast bias for firm *i* and month *m,* as measured by the difference between the forecast made at month *m* of year *t-1* ($fe_{i,m,t-1}$) and the last analysts' forecast made before year *t-1* earnings are released ($fe_{i,l,t-1}$); $perbias_{i,m,t}$ is the percentage forecast bias for firm *i*, month *m*, and year *t-1*; $avg\_perbias_{i,m,t}$ is the average forecast bias for month *m* over the past three years, which we assume investors will use to adjust any current forecasts for year *t* earnings made at month *m* leading to our adjusted forecast formulation $adfe_{i,m,t}$; $adfe_{i,m,t}$ is the bias-corrected forecast of earnings made at month *m* of year *t*, which is the adjusted forecast subsequently used in the empirical work; $fe_{i,l,t-1}$ is the last (*l*) analysts' forecast made before earnings of firm *i* at the end of fiscal year *t-1* are released; and $fe_{i,m,t-1}$ is analysts' forecast for month *m* for earnings of firm *i* at the end of fiscal year *t-1*.[46] Forecast biases for years 2 and 3 are constructed in a similar fashion.[47]

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[46] The averaging procedure used when estimating the bias could underestimate the bias since positive and negative biases of similar magnitudes average out.

[47] This method leads to the elimination of the one-year ahead bias only. Two- and three-year-ahead biases are not eliminated.

3.3. SAMPLE AND DATA

The data used herein is collected from three sources: daily returns from CRSP, book-value of equity from Compustat, and monthly consensus analysts' forecasts from I/B/E/S. The sample period extends from 1976 (the beginning of I/B/E/S coverage) to 2003, when we use a two-period forecast horizon only, and is restricted to 1982 to 2003 when we include the three-year forecast horizon, since these forecasts are only available starting from 1982. To maintain accounting consistency between firms, only companies with calendar fiscal year-ends are considered.[48] A stock is included in the sample if it has positive book-value of equity, return data in a particular month and a series of monthly earnings forecasts for one-, two- and three-years. When three-year-hence earnings' forecasts are not available, we use the long-term growth forecasts, whenever available, to construct the series of monthly three-year forecasts. For each month, both adjusted and unadjusted earnings forecasts are computed where adjusted forecasts are based on the bias correction for the past three-years, as described in equations (3.6)-(3.9) above.

Changes in (un)adjusted median monthly earnings forecasts are used to calculate the sample variance of changes in expected returns on equity (EROE), which is given by the monthly EPS forecast multiplied by the number of common shares used to calculate EPS (data item 54 in Compustat) and divided by the book value of equity. The book value of equity is the total common equity (data item 60 in Compustat) at the beginning of the year. The last change in monthly forecasts is computed with respect to reported earnings, which are computed using Net Income (Compustat data item 172). Dates of reported earnings are deduced from IBES, and they correspond to the months when forecasts shift

[48] This restriction is also imposed since earnings forecast adjustment models, which depend on the distribution of prior earnings changes, would be easier to estimate in the cross-section when all firms are aligned in calendar time.

horizons. This usually occurs three months after the end of the fiscal year. To be consistent with the idiosyncratic volatility literature, which usually computes excess return values, all ROE values are computed in terms of excess values relative to the monthly risk-free rate. To reduce the impact of outliers and to avoid spurious inferences due to extreme values, the series of expected ROE (EROE), adjusted expected ROE (AEROE) and reported ROE are truncated at -100% and +100%. The sample variance of the changes in EROE (AEROE) is computed using a trailing 12-month window for each month and each forecast horizon. Due to this requirement, our variance measures start from 1977 for the one- and two-year forecasts and from 1983 for the three-year forecasts. Since such data construction leads to many overlapping observations, we use autocorrelation and heteroscedasticity correction procedures to obtain our estimates. We also prefer to interpret our findings on an overall model basis as opposed to examining the impact of each individual variable.

3.4. DESCRIPTIVE STATISTICS

Table 3.1 reports descriptive statistics for the volatility and covariance of unadjusted monthly changes in EROE of different forecast horizons. In order to assess how the volatility changes over time, the entire sample period is divided into several five-year subperiods. For each subperiod, the time-series average of the volatility and the covariance of changes in EROE across all firms are computed for all months in the subperiod. Panel A reports equal- and value-weighted volatilities of changes in EROE for one-, two- and three-year horizons for all CRSP firms that satisfy our data requirements. The average number of firms for which one-year IBES forecasts exist is about 953 during the subperiod 1977-1981 but increases to reach 3476 during the 1996-2000 subperiod.

The latter figure represents more than 90% of the available CRSP firms with December fiscal year-ends for that subperiod. The number of firms for which two-year (three-year) IBES forecasts are available is comparable (more modest) and shows a similar pattern of growth. The average number of firms for which we have one-, two- or three-year forecasts over the whole sample period are 2081, 1994 and 932, respectively.

[Please place table 3.1 about here]

The statistics reported in panel A of table 3.1 show that the variance of changes in EROE exhibits an increasing pattern for the one- and two-year (not three-year) forecast horizons. The mean variance of changes in one-year expected ROE more than quadruples from 1977-1980 to 2001-2003. The same phenomenon is observed for the two-year horizon forecasts. These results are consistent with the findings of Wei and Zhang (2006) and Irvine and Pontiff (2005) who also document an increase in the volatility of ROE and cash-flows, respectively. Many explanations could be offered for such an increase. For instance, this could indicate an increase in informational uncertainty in the investment environment, or the inclusion of smaller firms which were not as well represented in the earlier subperiods. The average variance of changes in EROE for the one-year horizon is usually lower than that for the two- and three-year horizons. The only exception is the 1977-1980 subperiod, where the volatility of changes in one-year EROE was almost double the volatility of changes in two-year EROE. The consistent increase in the volatility of the three EROE variables starts to revert in the last subperiod, 2001-2003, which is consistent with the findings of Brandt, Brav and Graham (2005) who document that idiosyncratic volatility measures have declined from 2000 to 2004 to levels commonly observed in the 1970s and early 1980s. The equal-weighted averages of changes in EROE volatilities are higher than their value-weighted counterparts, indicating that small firms have more volatile changes in their earnings and ROE forecasts.

Panel B of table 3.1 reports descriptive statistics for the covariances of changes in EROE for the one-, two- and three-year horizons. All the mean covariances are positive, which indicates that updates in forecasts based on cash-flow surprises, tend to take the same direction for different horizon forecasts. This provides some support for the evidence of earnings persistence. Unlike the three-year related covariances (COV13 and COV23), the covariance between the changes in one- and two-year forecasts (COV12) shows an increasing trend. This suggests that the impact of news has increasingly a more correlated impact for both the one- and two-year horizons, and a neutral impact for the three-year horizon.

Panel C of table 3.1 reports the correlation matrix between volatilities and the covariances for the different horizons. One correlation value exceeds 0.8 and three exceed 0.7. This indicates that our results should be interpreted with some caution, and that we should examine them based on the overall (not individual) impact of different horizon forecasts on idiosyncratic volatility.

The patterns presented in table 3.1 are also illustrated graphically. Panel A of figure 3.1 presents the time-series plots of the average monthly equal-weighted volatilities of unadjusted changes in ROE expectations for one-, two- and three-year forecasts (i.e., $V\Delta EROE1_{ew}$, $V\Delta EROE2_{ew}$, and $V\Delta EROE3_{ew}$, respectively). As noted earlier, the plots show a clear increasing trend for the one- and two-year forecast series. The three-year forecast series is characterized by higher swings around a somewhat increasing trend, and some seasonality that might reflect the surprise effect around the earnings announcement dates. All the series of volatilities exhibit a decrease in volatility starting from 2002. This trend is also shared by the idiosyncratic volatility as is shown subsequently in figure 3.3.

[Please place figure 3.1 about here]

Panel B of figure 3.1 presents the time-series plots of the value-weighted volatilities of the unadjusted changes in ROE expectations for one-, two- and three-year forecasts ($V\Delta EROE1_{vw}$, $V\Delta EROE2_{vw}$, and $V\Delta EROE3_{vw}$, respectively). All the series show lower values of volatility compared to their equal-weighted counterparts, which suggests that changes in forecasts are more volatile for small versus large firms. Similar to the equal-weighted volatility measures, the value-weighted volatilities for one- and two-year forecasts have an increasing trend with some evidence of seasonality for the two- (and three-) year forecasts. As is the case for the equal-weighted counterparts, seasonality and large swings around a somewhat increasing trend up to 2001 are also clearly observed in the three-year forecasts of the value-weighted volatility, $V\Delta EROE3_{vw}$.

Table 3.2 reports descriptive statistics on the volatility of the bias-adjusted changes in EROE expectations, AEROE. The mean equal- and value-weighted volatilities of bias-adjusted changes in ROE expectations for all horizon forecasts and sample periods are higher than their unadjusted counterparts (panel A of table 3.2). As expected, this indicates that biased forecasts are smoother and less volatile than their corrected counterparts. The increasing trends observed in the unadjusted volatilities are also present in the bias-adjusted volatility measures. Based on panel C of table 3.2, the correlations between the bias-adjusted volatilities and covariance variables are lower on average than their unadjusted counterparts. Based on panel D of table 3.2, both the unadjusted and bias-adjusted changes in ROE expectations have similar covariances.

[Please place table 3.2 about here]

As depicted in panels A and B of figure 3.2, both the equal- and value-weighted bias-adjusted volatilities have an increasing trend for one-, two- and three-year forecast horizons. Since the trend is modest for the value-weighted volatility measures, this indicates that an important part of the trend is related to smaller firms.

[Please place figure 3.2 about here]

We measure idiosyncratic volatilities for individual stocks using the single-factor CAPM market model as well as the Carhart (1997) model, which includes the three Fama and French (1993) factors and a momentum factor. In every month, daily excess returns of individual stocks are regressed as follows:

$$r_{i,t} = \alpha + \beta_{i,1} \cdot MKT_t + \varepsilon_{i,t}^{1F} \quad (3.10)$$

$$r_{i,t} = \alpha + \beta_{i,1} \cdot MKT_t + \beta_{i,2} \cdot SMB_t + \beta_{i,3} \cdot HML_t + \beta_{i,4} \cdot MOM_t + \varepsilon_{i,t}^{4F} \quad (3.11)$$

where $MKT_t = R_{m,t} - R_{f,t}$, SMB is the difference between the returns on portfolios of small and large stocks, HML is the difference of the returns on portfolios of high and low book-to-market stocks, and MOM is the difference in returns between portfolios of high and low prior return stocks, as downloaded from the website of Kenneth R. French. The time-series regressions are run for each stock for each month, and the idiosyncratic volatility of a stock is computed as the standard deviation of the regression residuals. Similar to Fu (2005), we require a minimum of 15 days per month for which daily return and non-zero trading volumes are reported on CRSP. Each variance of daily return residuals is multiplied by the number of trading days for each month in order to get an estimate of the stock's variance for that month.

In order to assess how volatility changes over time, the entire sample period is divided into five-year subperiods. The time-series averages of idiosyncratic volatilities across all firms are computed for all months in each subperiod. Based on panel A of table 3.3, the number of firms ranges from 1566 in 1977-1980 to 6346 in 2001-2005. Consistent with previous work, the means of the monthly equal- and value-weighted idiosyncratic volatilities for the all-firm sample have an increasing trend over the five-year subperiods from 1977 to 2000. The values range from 1% to 4.7% for IV^{1f}_{ew} and from 0.3% to 1.4% for IV^{1f}_{vw}. This trend reverses in the last subperiod (2001-2005). The value-weighted volatility mean values are systematically lower than their equal-weighted counterparts indicating that larger firms have, on average, lower idiosyncratic volatilities. These lower values still show an increasing trend. This is consistent with the Campbell *et al.* (2001) findings that the increase in idiosyncratic volatility is not caused only by small firms. Both measures of volatility are positively skewed with positive kurtosis. Similar to previous studies, results based on the 3- and 4-factor models are quite comparable.

[Please place table 3.3 about here]

Descriptive statistics for the idiosyncratic volatilities of CRSP firms that satisfy our data requirements for IBES forecasts are reported in panel B of table 3.3. The number of such firms ranges from 712 during 1977-1980 to 2971 during 2001-2005 with an average number of 1914 over the whole sample period. For this sample, we find that the descriptive statistics for both the equal- and value-weighted idiosyncratic return volatilities, $IV^{1f}_{ew,ibes}$ and $IV^{1f}_{vw,ibes}$, are comparable to the descriptive statistics for all CRSP firms (i.e., for IV^{1f}_{ew} and IV^{1f}_{vw}, respectively).

The time-series patterns presented in table 3.3 are illustrated graphically in figure 3.3 for $IV^{1f}_{ew,ibes}$ and $IV^{1f}_{vw,ibes}$ based only on the single-market factor since they are similar to those from the 4-factor model and for all CRSP firms. Both series show an increasing trend in volatility, with a higher slope for the equal-weighted measure. The increase is moderate prior to 1987 and becomes more pronounced during the 1990s for both series. As noted previously, the trend reverses after 2001 indicating a sharp decrease in idiosyncratic volatilities.

[Please place figure 3.3 about here]

3.5. CROSS-SECTIONAL REGRESSION RESULTS

The descriptive statistics and preliminary analysis discussed in the previous section show that the idiosyncratic volatilities of stock returns are increasing over time, and that the volatilities of bias (un)adjusted changes in ROE expectations for one- and two-year forecasts (and to a lesser extent for their three-year counterparts) are also increasing over time. The cross-sectional analysis conducted in this section allows us to better understand the dynamics of any relationship between the volatility of changes in expected ROE and idiosyncratic volatility, and to make sure that any time-series relationship is not spurious.

At the end of each month, the return idiosyncratic volatility is regressed against the bias unadjusted changes in expected ROE for one-, two- and three-year horizons, as described previously in equation (3.7). This leads to the following empirical formulation:

$$\begin{aligned} IV_{i,t}^{4f} &= \beta_0 + \beta_1 * \rho^{\tau} * V\Delta EROE1_{i,t} + \beta_2 * \rho^{\tau+1} * V\Delta EROE2_{i,t} + \beta_3 * \rho^{\tau+2} * V\Delta EROE3_{i,t} \\ &+ \beta_4 * \rho^{2\tau+1} * COV12_{i,t} + \beta_5 * \rho^{2\tau+2} * COV13_{i,t} + \beta_6 * \rho^{2\tau+3} * COV23_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3.12)$$

To reduce the impact of cross-sectional correlations, we use the Fama and MacBeth procedure and average the slopes of the monthly regressions and their time-series standards errors to draw inferences. The Newey and West (1987) procedure is used to correct the t-statistics for autocorrelation and conditional heteroscedasticity in the return volatilities and the changes in EROE volatilities for the different forecast horizons. To capture the impact of discounting, we assume a constant value of ρ, ρ=0.95.[49] The impact of any within-year discounting for time value is captured by τ, or the number of months before the next fiscal year-end divided by 12. This allows us to capture the changes in the sensitivities of the return volatilities to the volatilities of forecast changes as the EPS reporting date approaches.[50] A similar procedure is used to examine the relationship between idiosyncratic volatilities and the volatilities of one-, two- and three-year bias-adjusted changes in expected ROE.

Regression results related to the bias-unadjusted changes in expected ROE based on the four-factor idiosyncratic volatility model using two different specifications are reported in table 3.4.[51] The restricted model specification assumes that the market only considers changes in the closest two forecasts to assess the impact of changes in all future ROE expectations on return volatility. The regressions for this specification are first conducted over the whole sample period (1977-2003), and then over successive five-year subperiods to assess how the relationships change over time. Based on panel A of table 3.4, the relationship between monthly return idiosyncratic volatilities and the volatilities

[49] This is the standard assumption in the literature (e.g., Campbell, 1991). Although discount rate estimation introduces noise into the parameters estimation, its impact should be small and would not alter our major conclusions.
[50] However, results and inferences do not differ substantially if we do not correct for this change in the discounting effect.
[51] Results based on the single-factor model are similar.

of monthly changes in forecasts of both one- and two-year ROE is significant and positive over the whole time period and the subperiods. The relationship is significant and negative for the covariance term between the two series over the whole period and subperiods (but only significant for the 1977-1980 and 1981-1985 subperiods). A positive covariance in forecast changes implies market confidence in its forecasts and can be perceived as a signal which reduces return volatility. Such covariance could also signal a steady state for the firm (economy) and thus lower volatility. The R^2 values range from 3% to 7% for the subperiods, and the R^2 is 5% for the whole time period.

[Please place table 3.4 about here]

The regression results that also include the three-year forecasts are summarized in panel B of table 3.4. Since IBES starts recording analysts' LTG and three-year forecasts in 1982, these results are for the restricted time period of 1985-2003. Idiosyncratic volatility continues to be positively related to the volatilities of changes of monthly forecasts of ROE expectations for this less restricted specification for the whole (but shorter) time period and for all but one subperiod. For the 1986-1990 subperiod, the volatility of monthly changes in one-year ROE expectations and the volatility of monthly changes in three-year ROE expectations are both non-significant. The relationship is significant (and negative) with the covariance between changes in one- and two-year forecasts and with the covariance between changes in two- and three-year forecasts, and not significant with the covariance between changes in one- and three-year forecasts. The covariance terms are not consistently significant across all subperiods. The only exception is the covariance between changes in ROE expectations of one- and three-year forecasts, which is consistently negative and significant across all subperiods. These results show that monthly changes in three-year ROE expectations have an impact on the volatility of stocks. The negative covariances can be caused by time-varying reversals of the accrual errors that are incorporated in ROE expectations. The overall model improves in terms of fit when changes in three-year forecasts are also included. The overall R^2 goes from 0.05 to 0.11 and ranges from 0.05 to 0.11 for the different subperiods.

The regression results when changes in ROE forecasts are corrected for analysts' bias using the method as described in equations (3.6) to (3.9) are reported in table 3.5. The overall results are similar to the ones reported earlier in panels A and B of table 3.4. They confirm that there is a positive relationship between monthly idiosyncratic volatility and volatility of changes in monthly forecasts of one-, two- and three-year forecasts of ROE. However, the impact of the covariance terms is lower in panel B of table 3.5 for this less restricted specification. The results across the different subperiods are also comparable although more instances occur where the independent variables are less significant and where the coefficient values are somewhat lower. This seems to indicate that the market does not easily detect the bias in earnings forecasts and reacts more to the bias-unadjusted forecasts, which leads to an argument in support of the deteriorating quality of financial reporting as an explanatory variable of the increase in volatility. However, the overall model significance increases when bias-adjusted variables are used, which indicates that the bias-corrected model has the higher explanatory power.

[Please place table 3.5 about here]

Overall, the cross-sectional results indicate a positive and significant relationship between idiosyncratic volatility of stock return and volatility of changes in monthly forecasts of expected ROE for one-, two-, and three-year horizons, or which could be stated as the volatility in cash-flow news.[52] This relationship is detected through the whole sample period but is also consistent throughout the different five-year sub-periods, indicating that the association is consistent through time.

3.6. TREND AND TIME-SERIES RESULTS

We now conduct a trend analysis to ensure that the cross-sectional relationship is consistent through time and a time-series association exists between the variables. The following cross-sectional time-series regression which controls for time-trend in volatility is conducted, where regressions are estimated using the GMM method and the White standard error correction:[53]

$$\begin{aligned} IV_{i,t}^{4f} &= \delta_0 + \delta_1 * time + \delta_2 * \rho^{\tau} * V\Delta EROE1_{i,t} + \delta_3 * \rho^{\tau+1} * V\Delta EROE2_{i,t} \\ &+ \delta_4 * \rho^{\tau+2} * V\Delta EROE3_{i,t} + \delta_5 * \rho^{2\tau+1} * COV12_{i,t} \\ &+ \delta_6 * \rho^{2\tau+2} * COV13_{i,t} + \delta_7 * \rho^{2\tau+3} * COV23_{i,t} + \xi_{i,t} \end{aligned} \quad (3.13)$$

Panel A of table 3.6 reports the regression results when using the bias unadjusted changes in expected ROE for one-, two- and three-year horizons. The first regression uses the 1977-2003 time period and only one- and two-year horizon changes in expected ROE plus the trend. The trend slope coefficient is positive and significant confirming the existence of an increasing trend in stock return idiosyncratic volatilities. However, this does not subsume the significance of the ROE volatility-related variables. The coefficients for the one- and two-year horizon changes in expected ROE volatilities are both positive and significant, confirming the robustness across time of the cross-sectional regression results. The coefficient on the covariance variable is also positive but not

[52] The two terms are not exactly equivalent since the cash-flows are adjusted by the value of equity in the former case which would affect the volatility of cash-flows by the changes in equity.
[53] We use firm fixed effects to control for omitted variables which could be correlated with the explanatory variables.

significant. The coefficients of the variables and their significance remain quite similar when the sample period is restricted due to data availability to 1985-2003.

[Please place table 3.6 about here]

When the three-year horizon volatility of changes in ROE is added, the one-year horizon volatilities coefficient and its significance are slightly reduced while the three-year horizon volatility coefficient which has a positive sign is non-significant. The two phenomena could be due to the correlation between the two explanatory variables, since the significance of the overall model slightly increases when we add the three-year explanatory variable. None of the cross-sectional correlation variables is significant. The significance of the overall time-series model ranges from 20% to 22%, which is much higher than the cross-sectional model, most likely because it is capturing both cross-sectional and time-series effects.

Panel B of table 3.6 reports the regression results when using the bias-adjusted changes in expected ROE for one-, two- and three-year horizons. Compared to panel A results, the sign of the variables and the significance of their coefficients are maintained except for the covariance variables which become negative but remain non-significant. The coefficients of all but the time variable are consistently lower (as at the cross-sectional level). This could be due to the market fixating on non-bias versus bias-corrected forecasts.[54] However, the overall model significance is higher when we control for the bias which is consistent with the view that the market understands and corrects somewhat for the bias. The overall time-series results indicate that even after controlling for the trend effect in idiosyncratic volatility, variability in changes in expected ROE

[54] We do not exclude the possibility that our naïve method of bias correction is responsible for the lower coefficients.

plays a role in explaining the upward trend in idiosyncratic volatility and accounts for a big part of the increase in idiosyncratic volatility.

We also conduct a series of unit root tests, which are reported in table 3.7, to verify whether the variables contain a unit root and/or are cointegrated. To better capture the individual movements of firms, we use panel-based unit root tests since they have higher power and provide more information than unit root tests based on aggregate time series. This procedure has the advantage of testing for unit root or persistence in individual cross-sectional time series unlike the unit-root tests usually applied on average/aggregate time-series without testing for individual persistence and specification. Although the latter tests provide good results when examining aggregate persistence, they are not appropriate for detecting individual persistence.

The following three types of panel unit root tests are used based on their performance and efficiency:[55] Levin, Lin and Chu (2002), Breitung (2000) and Im, Pesaran, and Shin (2003). The first two assume a common autoregressive structure for all the series, whereas the third test allows for different autoregressive coefficients in each series. Since our previous results show the existence of a trend, we only conduct the unit root tests with a trend, as we would expect the non-trend tests to provide support for a unit root. To control for autocorrelation in volatilities, we set the number of lags to 4. Table 3.7 reports unit root results on stock return idiosyncratic volatility as well as the volatility of monthly changes in ROE expectations for one-, two-, and three-year horizons for bias-(un)adjusted forecasts. The three test results show evidence of the absence of a unit root for the stock return idiosyncratic volatility. The results for the volatility of changes in

[55] See, for instance, Baltagi (2005), and Hlouskova and Wagner (2005).

ROE expectations are usually supportive of an absence of a unit root. Mixed evidence for a unit root exists for bias-unadjusted volatility for the three-year horizon.

[Please place table 3.7 about here]

3.7. ROBUSTNESS CHECKS AND OTHER TESTS

Recent studies argue that newly listed firms could be responsible for the increase in idiosyncratic volatility (Wei and Zhang, 2006; Irvine and Pontiff, 2005; Fink, Fink, Grullon and Weston, 2005; Fama and French, 2004). If such is the case, we expect that the different volatility measures would be more stable after controlling for newly-listed firms. The importance of newly-listed firms in the increasing trend of idiosyncratic volatility is investigated by introducing a dummy variable into the following time-series cross-sectional regression:[56]

$$
\begin{aligned}
IV_{i,t}^{4f} &= \delta_0 + \delta_1 * time + \delta_2 * \rho^{\tau} * V\Delta EROE1_{i,t} + \delta_3 * \rho^{\tau+1} * V\Delta EROE2_{i,t} + \delta_4 * \rho^{\tau+2} * V\Delta EROE3_{i,t} \\
&+ \delta_5 * \rho^{2\tau+1} * COV12_{i,t} + \delta_6 * \rho^{2\tau+2} * COV13_{i,t} + \delta_7 * \rho^{2\tau+3} * COV23_{i,t} + \lambda_n * \delta_1' * time \\
&+ \lambda_n * \delta_2' * \rho^{\tau} * V\Delta EROE1_{i,t} + \lambda_n * \delta_3' * \rho^{\tau+1} * V\Delta EROE2_{i,t} + \lambda_n * \delta_4' * \rho^{\tau+2} * V\Delta EROE3_{i,t} \\
&+ \lambda_n * \delta_5' * \rho^{2\tau+1} * COV12_{i,t} + \lambda_n * \delta_6' * \rho^{2\tau+2} * COV13_{i,t} + \lambda_n * \delta_7' * \rho^{2\tau+3} * COV23_{i,t} + \xi_{i,t}'
\end{aligned}
\quad (3.14)
$$

In (3.14), λ_n is a dummy variable which is equal to 1 when observations are for newly-listed firms and zero otherwise. Newly-listed firms are defined as firms for which CRSP data has existed for five years or less. All other variables are as previously defined.[57]

Panel A (B) of table 3.8 presents results when using (non-)bias-adjusted volatility variables. Although the time-trend for newly listed firms has the expected positive sign in both panels, it is significant for only the 1985-2003 period using one- and two-year

[56] Equation (3.14) and subsequently (3.15) and (3.16) are estimated using GMM and White standard error correction.
[57] This methodology presents the advantage of not being tainted by sample selection bias which is characteristic of sub-sample investigations.

horizons of bias-unadjusted forecasts. None of the independent variables is significant for the newly listed firms indicating that the relationship between idiosyncratic volatility and volatility for changes of ROE is consistent between newly listed and more mature firms. Although the increasing trend is higher for newly listed firms, it does not subsume the similar increase in volatility for more mature firms.

[Please place table 3.8 about here]

A caveat related to our findings is that our sample is inherently more tilted towards large and mature firms for which analysts forecasts are available. However, this bias is reduced in the more recent years as IBES forecasts increase in coverage. Our results are in line with Irvine and Pontiff (2005) who find that mature firms have also experienced increases in volatility. They are also consistent with Wei and Zhang (2006) who despite their findings that new firms play a higher role in increasing volatility, acknowledge that the total increase in volatility is attributed to both existing and new firms. However, our results differ somewhat from Fink, Fink, Grullon and Weston (2005) who find that firm age is related to lower idiosyncratic risk.

Landsman and Maydew (2002) document an increasing trend in return volatility around earnings announcements. To examine whether the relationship between idiosyncratic volatility and volatility of changes in expected ROE is due to the increase of the volatility characteristics of earnings announcement periods, we estimate the time-series and cross-sectional specification in equation (3.13) while controlling for earnings announcement dates using a dummy variable. This leads us to the following time-series and cross-sectional regression:

$$
\begin{aligned}
IV_{i,t}^{4f} &= \delta_0 + \delta_1 * time + \delta_2 * \rho^{\tau} * V\Delta EROE1_{i,t} + \delta_3 * \rho^{\tau+1} * V\Delta EROE2_{i,t} \\
&+ \delta_4 * \rho^{\tau+2} * V\Delta EROE3_{i,t} + \delta_5 * \rho^{2\tau+1} * COV12_{i,t} + \delta_6 * \rho^{2\tau+2} * COV13_{i,t} \\
&+ \delta_7 * \rho^{2\tau+3} * COV23_{i,t} + \lambda_a * \delta_1'' * time + \lambda_a * \delta_2'' * \rho^{\tau} * V\Delta EROE1_{i,t} \\
&+ \lambda_a * \delta_3'' * \rho^{\tau+1} * V\Delta EROE2_{i,t} + \lambda_a * \delta_4'' * \rho^{\tau+2} * V\Delta EROE3_{i,t} \\
&+ \lambda_a * \delta_5'' * \rho^{2\tau+1} * COV12_{i,t} + \lambda_a * \delta_6'' * \rho^{2\tau+2} * COV13_{i,t} \\
&+ \lambda_a * \delta_7'' * \rho^{2\tau+3} * COV23_{i,t} + \xi_{i,t}''
\end{aligned}
\qquad (3.15)
$$

In (3.15), λ_a is a dummy variable which is equal to 1 during the month of the earnings announcement and zero otherwise. All the other variables are as previously defined.

Panels A and B of table 3.9 present regression results when using unadjusted and bias-adjusted forecasts, respectively. In both panels, the time-trend related to earnings announcements is lower and weakly significant compared to the time-trend for periods outside earnings announcements as indicated by the negative and weakly significant coefficients on the dummy time trend. The time-trend coefficient also changes sign but is non-significant when the complete forecasts for the one-, two- and three-year horizons are used.[58] The coefficients of the different independent variables are sometimes negative during the announcements periods but are not always significant.

Our results indicate that the upward trend in idiosyncratic volatility and the explanatory power of the independent variables are not exclusive to earnings announcement dates. The significance of the different explanatory variables is robust to earnings announcement dates and seems to be more powerful during non-announcement periods. The lower coefficient values during earnings announcements could be consistent with declining earnings quality and informativeness and/or declining earnings surprises. Furthermore, the increasing trend in idiosyncratic volatility is sometimes even higher

[58] Non-reported F-statistics indicate that the total time-trend coefficient is significantly positive during the earnings announcement dates.

during non-announcement periods. This suggests that the increase in volatility might be linked more to the volatility related to fundamental variables for earnings announcement than non-earnings announcement periods. Overall our findings show that the temporal and cross-sectional relationships between idiosyncratic volatility and volatility in changes in expected ROE are robust to earnings announcement dates.

[Please place table 3.9 about here]

As a last robustness check, we investigate whether our findings are sensitive to the inclusion of other firm fundamentals that have been used extensively in the idiosyncratic volatility literature (namely, size, leverage and book-to-market) using the following regression:

$$\begin{aligned} IV_{i,t}^{4f} &= \delta_0 + \delta_1 * time + \delta_2 * \rho^{\tau} * V\Delta EROE1_{i,t} + \delta_3 * \rho^{\tau+1} * V\Delta EROE2_{i,t} \\ &+ \delta_4 * \rho^{\tau+2} * V\Delta EROE3_{i,t} + \delta_5 * \rho^{2\tau+1} * COV12_{i,t} + \delta_6 * \rho^{2\tau+2} * COV13_{i,t} \\ &+ \delta_7 * \rho^{2\tau+3} * COV23_{i,t} + \delta_8 * SZ_{i,t} + \delta_9 * LV_{i,t} + \delta_{10} * BM_{i,t} + \xi_{i,t} \end{aligned} \quad (3.16)$$

In (3.16), SZ is measured as the logarithm of market capitalization;[59] LV is measured as the ratio of long-term debt (including debt in current assets) to book-value of total assets; and BM is measured as the ratio of book to market value of equity.[60] All the other variables are as previously defined.

As reported in table 3.10, size has the expected sign and significance confirming the results of Pastor and Veronesi (2003) that firm size is related to the increasing trend in idiosyncratic volatility. The BM coefficient is not significant whereas the Leverage coefficient is significant but with the opposite sign, which could be due to the endogeneity of this variable. Our most important finding is that the relationship between

[59] Market values are computed at the end of the first quarter following the end of the current fiscal year so that prices reflect all available accounting information for the year.
[60] Book value of equity is measured as total assets minus total liabilities.

idiosyncratic volatility and volatility in changes in expected ROE is not subsumed by any of these firm fundamentals. This confirms the robustness of the relationship between idiosyncratic volatility and the volatility of the fundamentals.

[Please place table 3.10 about here]

3.8. SUMMARY AND DISCUSSION

Overall, our results indicate that the upward trend in idiosyncratic volatility is associated with a similar increasing trend in the volatility of cash-flow news, as measured by the volatility of monthly changes in expected ROE of one-, two- and three-year horizon forecasts. This relationship is persistent through time and is robust to the inclusion of other fundamental variables (such as size, leverage and book-to-market) and for both newly-listed and mature firms as well as earnings (non-)announcement periods. While investors seem to place greater weights on variables related to forecasts unadjusted for bias, overall model significance improves when correcting for the bias. Investors do not focus only on the information content of the nearest horizon forecast, they also use the two- and three-year forecasts to better assess return volatility. Volatilities of cash-flow news related to these forecasts generally show the expected coefficient sign and are significant both cross-sectionally and across time. However, cross-correlation impacts are not always clearly interpreted by the market and might not always be accounted for when assessing return volatility. Nonetheless, the association between cash-flow news and idiosyncratic volatility is clearly established in all our findings. Our results are consistent with Wei and Zhang (2006), Irvine and Pontiff (2005), Rajgopal and Venkatachalam (2006) and Jiang and Lee (2006) who use different measures of cash-flows and/or cash-flow volatility, and find that they are related to idiosyncratic volatility. Our results are also consistent with those of Pastor and Veronesi (2006) who argue that the level and volatility of stock prices are positively linked through firm-specific uncertainty about future profitability.

Our results are consistent with the deteriorating earnings quality and informativeness hypothesis (Lev and Zarowin, 1999; Rajgopal and Venkatachalam, 2006) since a decline in earnings quality and financial statement informativeness leads to an increase in the volatility of cash-flow news. In turn, this is reflected in the increase of idiosyncratic returns. For instance, higher earnings smoothing, the increasing trend in accounting conservatism (Givoly and Hayn, 2000) and/or the more opportunistic management manipulation of earnings might mask actual firm profitability, mislead analysts and induce higher volatility in expected earnings news which would lead to poorer earnings quality when reported earnings fail to provide a good indicator of sustainability.[61] However, since analysts use sources of forecasts other than financial statements, the information content hypothesis could be challenged by the increase in individual risk hypothesis. We examine this latter hypothesis and find that the results do not differ between newly-listed firms (i.e., those with no past earnings, higher risk, and low information quality) and more mature firms (i.e., those with lower risk and an established quality).[62] This suggests that informativeness and the deteriorating earnings quality hypothesis present a more appealing explanation for the increase in idiosyncratic volatility of stocks.

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[61] See Healy and Wahlen (1999) for a review of the literature on earnings manipulation.

[62] These results should be interpreted with some caution since our sample is tilted towards more mature firms which results in an unspecified bias against the informativeness hypothesis.

3.9. CONCLUSION

Using the Campbell (1991) return decomposition framework, we related idiosyncratic volatility to volatility of changes in expected ROE for one-, two- and three-year horizon forecasts (i.e., the volatility of cash-flow news). We found that the upward trend in idiosyncratic volatility documented by Campbell et al. (2001) is associated with a similar increasing trend in the volatility of cash-flow news for these horizon forecasts. The relationship is not only persistent through time but also robust to the inclusion of other fundamental variables (such as size, leverage and book-to-market) and consistent for both newly-listed and earnings (non-)announcement periods.

Idiosyncratic volatility is related to a similar phenomenon in the volatility of cash-flow news, which persists even after correcting for bias in analysts' forecasts. Our findings are consistent with the market efficiency hypothesis which suggests that stock return volatility is caused by changes in fundamental variables, and are in favor for an informational explanation to the increasing trend in idiosyncratic volatility since a decline in earnings quality and financial statement informativeness leads to an increase in the volatility of cash-flow news. In turn, this is reflected by in increase in the idiosyncratic volatility of stock returns.

CHAPTER 4

CAPITAL COSTS FOR DOMESTIC AND CROSS-LISTED CANADIAN FIRMS

4.1. INTRODUCTION

The cost of capital and its components (such as equity) are among the most important numbers in financial economics. An accurate measure of capital costs is necessary for financial managers and investors to make optimal investment and capital budgeting decisions. A vast literature in finance deals with the estimation of the cost of capital/equity and the equity risk premium. While traditional studies may use asset-pricing models such as the CAPM and APT to provide such estimates, most of these asset-pricing approaches provide partial guidance on how to estimate the cost of equity or the market risk premium. Also, empirical investigations find that the realized equity risk premium on the U.S. stock market over the last century has been considerably higher than predicted by standard equilibrium models (see Kocherlakota (1996), Cochrane (1997) and Siegel and Thaler (1997) for summaries).

Due to the mixed results generated by different equilibrium asset pricing models, a recent thrust in the literature focuses on ex-ante and/or fundamental information such as earnings or dividends or analysts' earnings forecasts and variations of Discounted Cash Flows (DCF) to estimate the cost of capital and/or the cost of equity.[63] These models usually rely on fewer assumptions than the standard equilibrium models and provide estimates which potentially may be more consistent with firm and market fundamentals. Usually, analysts' forecasts of earnings are used to estimate the ex-ante cost of capital

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[63] Examples include Blanchard (1993), Claus and Thomas (2001), Gebhardt, Lee and Swaminathan (2001), Fama and French (1999, 2002), Easton and Monahan (2003), Gode and Monahan (2003) and Botosan and Plumlee (2005).

(Gebhardt, Lee and Swaminathan, 2001). However, this method requires analysts' forecasts for all firms if the aggregate cost of capital is to be estimated. It also requires the estimation of terminal values and long-term (LT) earnings growth rates. Fama and French (1999) use an ex post approach which they argue is less fraught with measurement errors, does not rely on any estimated variables, and uses readily available financial statement and market data to infer the cost of capital for the nonfinancial corporate sector. We demonstrate below that this approach, which rests crucially on the assumption of realized returns being a good proxy for expected return, may aid in identifying when such an assumption may be suspect.

In this chapter, we use the IRR model of Fama and French (1999) to estimate the costs of capital and equity for domestic and cross-listed Canadian firms, nine GICS sectors and portfolios based on market capitalization from 1960 to 2003.[64] An advantage of the IRR methodology is that it provides an independent estimate of the aggregate cost of capital that can be compared to historical or realized values, or those emitted by the various asset pricing models such as the CAPM. At a minimum, this helps in understanding the likely ranges for historical cost of capital or equity and how to relate that range to the expected cost of capital or equity. Such estimates are provided without making assumptions on asset pricing models or the firm's capital structure. The IRR approach allows an assessment of investors' returns from investing in all corporate securities and could be used to indicate how such returns could vary among different subsamples (for example, industries, cross-listed securities, and market capitalization). When applied to individual firms or industries, the estimated IRRs allow investors to

[64] The GICS (Global Industry Classification Standard) classification is jointly developed by Morgan Stanley Capital International (MSCI) and Standard & Poor's (S&P). Since its inception in 2000, the GICS has been widely used in sector-based investing in global financial markets. See http://www.msci.com/equity/gics.html for details.

better match their return requirements with the past profitability of these individual firms or industries. An interesting application of the IRR approach is that it allows for the computation of two types of IRRs. These are the IRR on value which is the return required by investors, and the IRR on cost which is the return delivered by the corporate sector. A comparison of the two values provides evidence on whether corporate investment adds value (economic profit) on average.[65]

This chapter makes a number of contributions to the literature. First, similar to Fama and French (1999), we provide estimates of the historical IRRs, specifically IRR on value for the Canadian nonfinancial corporate sector, and produce interesting insights regarding initial pricing of firms, post-entry investments, earnings on investment and terminal values at the aggregate level. Our results suggest that corporate investments produced an average return that exceeded the cost of capital. Over the 1960-2003 sample period, the IRR on value or the real return on value for the nonfinancial corporate sector is 5.90 percent which is lower than the IRR on cost or the real return on cost which is 6.58 percent. The IRR on value [cost] for equity over the period 1960-2003 is 6.58 [7.78] percent which suggests that equity-based investments add higher value to the corporate sector. As this might be partially due to the use of the historical book-values of assets when computing the IRR on cost, we adjust book-values for replacement costs reducing the IRR on cost for equity to 7.51 percent, which still provides evidence of economic profit. The IRR on value for equity could also be used to determine the equity risk premium in the non-financial Canadian corporate sector, which would amount roughly to

[65] A firm or industry which generates returns higher than those required by investors is making an economic profit or creating an added value. A firm or industry which generates returns lower than those required by investors is generating losses and destroying economic value.

4.80 percent in real terms over the period 1960-2003, assuming a risk-free rate of 6% in nominal value.

Second, our findings shed light on the difference between rates of return and cost of capital estimates using market models with those based on fundamental values. We find that sectors such as IT (Information Technology) and small firms suffer from a huge discrepancy when fundamental instead of market values are used to estimate their profitabilities and costs of capital.

Third, we show how the costs of capital as estimated using the IRR on value and IRR on cost differ between domestic and cross-listed firms. We also explicitly examine the impact of cross-listing on the cost of equity for Canadian firms without assuming any market model.[66] Our results confirm that cross-listing reduces both the cost of equity and the cost of capital for the cross-listed firms. The estimate of IRR on real value [cost] for cross-listed firms over the 1960-2003 time period is 5.65 [6.07] percent. Both of these estimates are slightly lower than their corresponding values for domestic firms.

Fourth, by applying the IRR procedure to nine GICS sectors, we assess the historical performance and profitability across Canadian industrial sectors. By examining how the IRR on value and on cost differ by sectors, we are able to determine which sectors provide the highest [lowest] value added. We interpret material differences in the costs based on the IRR procedure from those obtained using equilibrium asset-pricing models as signalling material differences between realized and expected returns over the estimation periods used to measure the costs of capital and/or equity. As another

[66] Previous work such as Jorion and Schwartz (1986), Alexander et al. (1987, 1988), Foerster and Karolyi (1993) and Errunza and Miller (2000) study the impact of cross-listing on the cost of equity but assume a market model to infer the cost of capital. Recently, Hail and Leuz (2005) use forward looking residual income models to examine the costs of equity for cross-listed firms but do not include Canadian companies.

application of the IRR procedure, we examine the costs of capital and equity based on market capitalization. Consistent with the 3-factor model, we find that portfolios of the largest firms show lower costs of capital and equity than portfolios of the smallest firms.

Fifth, by correcting the IRR on cost estimates for the replacement costs of assets, we confirm that investments in the corporate non-financial sector still produce, on average, a return which exceeds their cost of capital. We infer that replacement cost adjustments, which reduce the IRR on cost, do not alter the positive value creation conclusion for the aggregate market, industries and firms of different market capitalization. Since some GICS sectors may experience large and persistent extraordinary items, we test the sensitivity of our IRR estimates to the inclusion of such items. This leads to somewhat lower IRR values, which indicates that the extraordinary items are, on average, negative across the studied sample period.

Sixth, we measure the impact of assumed inflation illusion on the part of investors on the market valuation of equity, and find evidence that the market misvalues equity when inflation is high. Our results in terms of the misvaluation proportion are similar to the findings of Modigliani and Cohn (1979).

The remainder of the chapter is organized as follows. The methodology is presented in the next section. The sample and data collection are discussed in the third section. Section 4.4 presents the empirical results when using the IRR approach to measure the cost of capital. Section 4.5 presents the empirical results when replacement cost adjustments and extraordinary items are considered, as well as the IRR estimates based on firm size. Section 4.6 presents and discusses the empirical results for the market valuation of equity in the presence of inflation illusion. Section 4.7 concludes the chapter.

4.2. METHODOLOGY

The internal rate of return is defined as the discount rate that equates the aggregate current market value (or book value) to the future cash flows generated by the non-financial Canadian corporate sector for the years 1960-2003. The cost of capital as computed herein describes the actual cost that the nonfinancial corporate sector bears to make use of investors' funds. Initially, we make the assumption that the market value of equity is a good proxy of the intrinsic value of the firm for shareholders. Since the estimations use realized and not forecasted values, this approach rests on the validity of assuming that realized and expected returns are equal, on average, over longer periods of time. As we show below, this is a more tenuous assumption when estimating the costs of capital and equity for GICS sectors.

The specific model used to compute the cost of capital (or equity) is as follows:

$$IV_0 = \sum_{t=1}^{T} \frac{X_t - I_t}{\left(1+r_v\right)^t} + \sum_{t=1}^{T} \frac{FS_t - FBV_t}{\left(1+r_v\right)^t} + \frac{TV_T}{\left(1+r_v\right)^T} \quad (4.1)$$

$$IC_o = \sum_{t=1}^{T} \frac{X_t - I_t}{\left(1+r_c\right)^t} + \sum_{t=1}^{T} \frac{FS_t - FBC_t}{\left(1+r_c\right)^t} + \frac{TV_T}{\left(1+r_c\right)^T} \quad (4.2)$$

$$IV_{eq,o} = \sum_{t=1}^{T} \frac{X_{eq,t} - I_{eq,t}}{\left(1+r_{v,eq}\right)^t} + \sum_{t=1}^{T} \frac{FS_{eq,t} - FBV_{eq,t}}{\left(1+r_{v,eq}\right)^t} + \frac{TV_{eq,T}}{\left(1+r_{v,eq}\right)^T} \quad (4.3)$$

$$IC_{eq,o} = \sum_{t=1}^{T} \frac{X_{eq,t} - I_{eq,t}}{\left(1+r_{c,eq}\right)^t} + \sum_{t=1}^{T} \frac{FS_{eq,t} - FBC_{eq,t}}{\left(1+r_{c,eq}\right)^t} + \frac{TV_{eq,T}}{\left(1+r_{c,eq}\right)^T} \quad (4.4)$$

where,

IV_0 is the aggregate initial market value of firms that enter the sample at the beginning of the IRR estimation period;

$IV_{eq,0}$ is the aggregate initial market value of equity of firms that enter the sample at the beginning of the IRR estimation period;

IC_0 is the aggregate initial total book value of the firms that enter the sample at the beginning of the IRR estimation period;

$IC_{eq,0}$ is the aggregate initial total book value of equity of firms that enter the sample at the beginning of the IRR estimation period;

X_t is aggregate cash earnings for the firms in year t;

$X_{eq,t}$ is aggregate cash earnings for shareholders in year t;

I_t is the aggregate gross investment by the firms in year t;

$I_{eq,t}$ is the aggregate gross investment by shareholders in year t;

FS_t is the terminal market value of firms that leave the sample in year t;

$FS_{eq,t}$ is the terminal market value of equity of firms that leave the sample in year t;

FBV_t is the initial market value of firms that enter the sample in year t;

$FBV_{eq,t}$ is the initial market value of equity of firms that enter the sample in year t;

FBC_t is the book value of firms bought at cost during year t;

$FBC_{eq,t}$ is the book value of equity of firms bought at cost during year t;

TV_T is the terminal market total (equity) value of firms that exist at the end of the sample period (2003 herein); and

$TV_{eq,T}$ is the terminal market value of equity of firms that exist at the end of the sample period (2003 herein).

Equation (4.1) computes the IRR on value, r_v, which represents an estimate of the overall cost of capital on the whole nonfinancial corporate sector, and is computed using the market values of the firms in the sample (initial, entering and leaving) and the value of any other inflows or outflows of cash. The IRR on value is an indicator of the profitability of the public corporate sector and to a lesser extent the profitability of the economy as a whole. Equation (4.2) computes the IRR on cost, r_c, which represents the actual IRR generated by the investment in the corporate sector and is computed using the book value of the sample at the initial period and upon subsequent entrance in the sample, as well as the market value of leaving firms and the value aggregate cash-earnings net of investments costs. Equation (4.3) computes what we call the IRR on value of equity, $r_{v,eq}$, which represents the cost of equity invested in the whole nonfinancial corporate sector or the return realized on equity, or the market equity risk premium. This IRR is computed using the market value of the sample equity at the initial period, the market value of equity of firms entering or exiting the market over the period, and any other inflows and outflows of cash. Equation (4.4) computes what we call the IRR on the cost of equity, $r_{c,eq}$, which represents the actual return on equity that the nonfinancial corporate sector realizes if equity enters the market at its book value.

Equations (4.1), (4.2), (4.3) and (4.4) are similar to the standard IRR expression for an investment project, although we are using slightly different notations. $X_t - I_t$ is the aggregate annual cash-flow net of the aggregate annual gross investment, $FS_t - FBV_t$ is the cash inflow from firms sold or being liquidated net of cash outflows for firms bought or which have just entered the market. $FS_t - FBC_t$ is the cash inflow from firms sold or being liquidated net of the book value of firms bought or which have just entered the market. TV_T is the terminal market value of firms at the end of the sample period and firms which leave the market at the end of 2003. When computing the IRR on equity, we restrict the measures to book and market value of equity. Therefore, $X_{eq,t} - I_{eq,t}$ is the aggregate annual shareholders' cash-flow net of aggregate annual shareholders' gross investment.[67] $FS_{eq,t} - FBV_{eq,t}$ is the market value of equity of firms sold or being liquidated net of the market value of equity of firms bought or which have just entered the market. $FS_{eq,t} - FBC_{eq,t}$ is the market value of equity of firms sold or being liquidated net of the book value of equity of firms bought or which have just entered the market. $TV_{T,eq}$ is the terminal market value of equity for firms that exist at the end of the sample period (2003 herein).

4.3. SAMPLE, DATA COLLECTION AND FIRM CHARACTERISTICS

The sample consists of all publicly traded nonfinancial firms listed on the Toronto Stock Exchange (TSX) during the period of 1960 to 2003 and for which data are available on the Financial Post (FP) database. The IRRs are calculated using fundamental FP data for two periods; from 1960 to 2003 and from 1980 to 2003. The first period encompasses a longer estimation period which should theoretically provide more reliable estimates given that we are using realized returns to estimate expected returns. The second period is chosen to reduce the impact of survivor bias since FP coverage prior to 1979 is not complete and is tilted towards large successful firms. Incidentally, empirical findings also show that realized returns are closer to expected values in recent years in the US market. Therefore, we believe that the shorter and more recent sample still represents a reasonable framework for our study based on this assumption.

[67] We use net changes in book value of equity plus depreciation to estimate the value of annual gross investment of shareholders, I_t, and earnings after taxes plus depreciation to estimate the shareholders' cash-flow, X_t.

4.3.1. Evolution in Number of Firms

The evolution in the number of nonfinancial Canadian firms through time is summarized in table 4.1. The number of firms grows from an average of 104 per year in 1960-1964 to 1112 in 2000-2003. The combined book capital of the firms in the sample also grows steadily and expands from 51.13 billion dollars in 1960-1964 to 1799.64 billion dollars in 2000-2003 in constant 1992 dollars. The number of firms entering and exiting the sample on an annual basis is also provided in table 4.1. The number of firms grows by an average of more than 7 percent per year, and is highest during the 1985-1989 and 1990-1994 time periods, where the percentage of entering firms is around 19 percent and 12 percent, respectively. This increase in the number of firms corresponds to the beginning of the market boom following the 1982 recession. However, this does not coincide with the period of highest entering firms' book-value which is the 1980-1984 period, and which represents an increase of 9.84 percent in firms' book-values. The average annual increase in book capital during the overall period is around 3 percent, which indicates that firms which enter the market are usually small in size.

[Please insert table 4.1 about here.]

No firms exit the sample during the first 15 years, which is evidence of data backfilling. The rate of departures increases steadily to reach a peak of 7.64 percent of the firms and 12.97 percent of capital book value during the 1995-99 period. These are followed by the 2000-2003 period with 5.94 percent of firms and 7.74 percent of the capital book value of firms leaving the market. This is not surprising since it corresponds to the burst of the IT bubble. The average annual departure rate over the studied period is 2.05 percent of the firms in number, which is slightly lower than the corresponding departure rate of book capital of 2.83 percent. A firm is deemed to have departed if it has no data available on the FP database for three successive years. Similar to Fama and French, firms for which we have incomplete data (specifically, firms for which we do not have data on Income before Extraordinary Items and change in Assets), are considered to be missing since we are not able to compute their annual net cash-flows. A firm also is considered as being missing if no data are available to determine its market value for that year; that is, if the end-of-year closing price or the number of outstanding shares is missing. Missing firms are not considered in the computation of cash-flows for the years during which their data are missing. Table 4.1 shows that over the sample period only a small fraction of the firms is missing the critical data needed. The average during the 1960-2003 period is 0.33 percent of the firms in number and 0.29 percent of the firms in terms of book capital.

Table 4.2 reports the GICS composition of the firms as well as the GICS composition of the entering and leaving firms. Over the sample period, Energy, Materials and Consumer Discretionary represent the sectors with the highest rates of firm entry. The rates are mostly stable or increasing between the successive five-year sub-periods for Energy, bell shaped for Materials, and decreasing for Consumer Discretionary. Energy, Materials and Consumer Discretionary also represent the sectors with the highest rate of departing firms throughout the overall time period. The sectors with the highest firm stability when it comes to entering and exiting the market are Utilities and Telecom, which both have rates lower than 2 [3] percent of firms in number entering [leaving] the sample. This could be due to the high barriers to entry for such sectors. Book-value results are similar, with Energy, Materials and Consumer Discretionary as the sectors with the highest book values for entering firms, and Industrials, Telecom and Utilities as the sectors with the highest book values of departing firms. The average percentage number of firms per GICS sector shows an increasing trend or a stable value for Energy, Materials, Industrials, Health Care and IT versus a declining trend in Consumer Discretionary, Consumer Staples, Telecom and Utility. Overall, the GICS sectors with the highest presence in the aggregate nonfinancial market during the 1960-2003 sample period are unsurprisingly Materials, Energy and Consumer Discretionary.

[Please insert table 4.2 about here.]

4.3.2. Relative Importance of Major Capital Structure Components

When computing the different IRRs, we measure initial and terminal market values of firms using the market-values of common stock but book-values of other capital components (long-term debt, short-term debt and preferred stock). We are thus making the implicit assumption that using book values for certain capital components does not create huge biases in the IRR values. In the following, we investigate this assumption by measuring the market and book values of the different components of the firm's capital structure. Panel A of table 4.3 reports the components of market capital for all firms. Over the entire 1960-2003 period, common stock, preferred stock, long-term debt and short-term debt represent 67.83 percent, 3.43 percent, 26.60 percent and 2.14 percent of the aggregated capital of the sample firms. Compared to the US results over the period 1951-1996 reported in Fama and French (1999), the aggregate capital structure of this sample of Canadian firms has similar equity and long-term debt financing, but lower short-term debt. However, when comparing the market capital components for the 1974-1996 sub-period, we find that the Canadian firms have more stable capital structures over time than the firms in the U.S. The ten-year period 1975-1984 represents the lowest percentage of common stock market value and the highest percentage of long-term debt at market value. The low market value of equity may be linked to the beginning of the 1980s recession.

The increase in the debt value in the mid-1970s is also observed in Fama and French (1999) and other studies (e.g., Taggart, 1985), and is usually explained as a normal return to higher leverage which was depressed after World War II. This explanation might not be the most convincing for the Canadian market since long-term debt's share starts to decline in the mid-1980s. The increase in debt values in the mid-1970s occurs in the aftermath of the 1973 oil shock. Contrary to the case for U.S. firms where the least important source of financing is preferred stock, short-term debt is the least important source of financing for Canadian firms. This could be due to the higher importance of utilities, which are the main issuers of preferred stock in the Canadian market.

Panel B of table 4.3 reports the components of book capital for all firms and shows that book-value components of preferred stock and short-term debt are quite similar to their market-capital components over the sample period. Common equity and long-term book-value measures are slightly different with lower common equity and higher long-term debt book values. Nevertheless, these values are still comparable to the market value measures. By examining the aggregate results in panels A and B for the overall sample period and the sub-periods, we are inclined to believe that firms target leverage to book values of capital since the latter show higher average stability than leverage to market values of capital.

The components of the market capital structures in the first and last years of the life of a firm are reported in panels C and D of table 4.3, respectively. Prior to 1989, start-ups have slightly more debt and lower market values of equity than all firms, on average. However, this trend is reversed after 1989 with start-ups having slightly higher market values of common stock and lower long-term debt values than the average firm. This could be linked to the bull market of the 1990s where the values of stocks were consistently on the rise. On average, the capital structures of departing firms seem to be similar to that of all firms with slightly higher short-term debt and lower preferred stock. Since distressed firms that leave the sample are characterized by low market values, our findings indicate that most firms that leave the sample are acquired by other firms rather than via bankruptcy.

Panels E and F report the components of the market and book capital structures for cross-listed firms. Compared to all firms, common equity [long-term debt] market shares of cross-listed firms are slightly higher [lower]. Book value components of both domestic and cross-listed firms are comparable. This indicates that cross-listed firms are firms that enjoy, on average, higher valuations for their common stock.

[Please insert table 4.3 about here.]

Overall, book values could be considered as a good proxy for market values of short-term debt and preferred shares for all firms both cross-listed and domestic during their life and for firms entering the market for the first time. This is not always the case for the book values of long-term debt during the life of the firm or when firms leave the sample because of distress or bankruptcy. However, as Fama and French argue, this still should not create serious biases in the IRR when using book values of long-term debt, short-term debt and preferred share equity instead of market values.

4.3.3. Relative Importance of the Components of the Basic Budget Equations

In this section we investigate the components of cash inflows and outflows of a firm which will be used in the IRR computations. The aggregate annual cash inflows and outflows as measured through the following budget equation for domestic and cross-listed firms are reported in table 4.4:

$$Y_t + Dp_t + dS_t + dLTD_t + dSTD_t = I_t + Div_t + Int_t \qquad (4.5)$$

In (4.5), the inflows are cash earnings (i.e., earnings before interest but after taxes, Y_t, plus depreciation, Dp_t), the net flow from issuing and repurchasing common and preferred stock (dS_t), and the net flows from issuing and paying back long-term debt (dLTD_t) and short-term debt (dSTD_t). The outflows are gross investments (I_t), dividends (Div_t), and interest expense (Int_t). The flows are expressed as percentage values of the aggregate beginning-of-year book capitals of the firms in the sample.

[Please insert table 4.4 about here.]

Panel A of table 4.4 reports the cash inflows and outflows for domestic firms. The results show that internally generated funds ($Y_t + Dp_t$) are, on average, higher than investment outlays (I_t) at 20.86 and 17.07 percent of book capital, respectively. Internally generated funds tend, however, to decrease through time and fluctuate between 35 percent to less than 10 percent. Due to important payments to stake-holders via dividends and interest, which average 4.43 percent and 4.36 percent of book capital during the whole time period, firms resort to external funding and/or new share issues to face their financial commitments. From 1960 to 1979, we observe that this financing is mainly conducted through debt given the consistent erosion in equity financing. This trend is reversed starting from the 1980s where both internal issues of securities and debt are used to finance outflows of funds. This could be due to the bull market following the 1982 recession and its positive impact on equity values. Despite the volatility of internally generated funds, the stability of dividends lends support to the dividend smoothing hypothesis (Lintner, 1956; Fama and Babiak, 1968; Lee et *al.*, 1987).

Panel B reports the cash inflows and outflows for cross-listed firms. Average internally generated funds over the whole sample period are slightly lower than that for the domestic firms. However, they are still higher than the investment outlays which average 17.53 percent. On average, cross-listed firms pay slightly lower dividends and interest, and have similar funding decisions as domestic firms.

If these results are compared to those for the U.S. during the 1950-1996 period, we find that debt financing is more important for Canadian firms, and expectedly leads to higher debt service with interest payments that exceed that of their U.S counterparts of more than 4 percent of book capital. The internally generated funds in the U.S. are more stable and fluctuate less than their Canadian counterparts. This could be partially explained by the increasing weight of depreciation on the Canadian nonfinancial sector in which industrials, utilities and energy represent important industries. This importance could also explain the preponderance of debt since firms in such industries are mainly financed through debt.

To better understand the financing of investments, Table 4.5 splits investment (I_t) into internal financing or retained cash earnings, (RCE_t), and external financing or net new issues of stock, (dS_t) plus long-term debt ($dLTD$) plus short-term debt ($dSTD$). Panel A of table 4.5 reports the values of aggregate investments and the forms of financing for domestic firms. The average value of investment and retained cash earnings are 17.07 percent and 12.47 percent of book capital during the sample period. Thus, internally generated funds finance about 73 percent of new investments once dividends and interest are paid. Long-term debt represents the second source of financing since it covers around 26 percent of the gross investments needed, followed by short-term debt which covers around 2 percent of such investments. New equity issues are nearly absent during the first 20 years of the sample. Starting from the beginning of the 1980s, new issues are used as a source of funding but their proportion remains lower than long-term debt on average and in most sub-periods. Thus, debt is preferred to equity issues to accommodate annual variations in investments in the Canadian non-financial sector. This result lends support to the M&M capital structure theory.

Panel B reports the values of aggregate investments and the forms of financing for cross-listed firms. Most of the results are comparable to the domestic firms with internally generated funds as the first source of financing followed by long-term debt and then short-term debt. Equity issues are consistently the smallest source of funding.

[Please insert table 4.5 about here.]

4.4. EMPIRICAL ESTIMATES OF COSTS OF CAPITAL BASED ON THE FAMA AND FRENCH (1999) METHODOLOGY

4.4.1. IRR on Value and on Cost for Domestic and Cross-listed Nonfinancial Firms

For comparison purposes, we begin by providing IRR estimates based on the same assumptions made by Fama and French, while extending their work by providing estimates for the cost of equity and the costs of capital for nine GICS sectors. One important assumption is that market values correctly reflect the fundamentals in a forward-looking sense. The nominal and real rates of return on the market values of nonfinancial firms and on the costs of their investments are reported in table 4.6.[68]

The nominal IRR on value [cost] of total capital for nonfinancial Canadian firms for the 1960-2003 period is 10.44 [11.22] percent. Thus, as expected, Corporate Canada added value over the studied period. Similarly, the nominal IRR on value [cost] of equity is 10.99 [12.19] percent. As expected, IRR on equity is higher than the overall IRR on capital for both value and cost, which is indicative of the higher risk assumed by equity holders. These estimates are comparable to cost of capital and cost of equity estimates documented in the literature for various time periods (e.g., He and Kryzanowski, 2007; Athanassakos, 1997), and are indicative of a profitable corporate sector, on average.

The corresponding real values are 5.90 [6.64] percent for IRR on capital at value [cost] and 6.58 [7.78] percent for IRR on equity at value [cost]. For the 1980-2003 time period, nominal and real rates of return are lower for all costs but they are still indicative of profitability in the nonfinancial corporate sector since IRR on cost is consistently higher than the IRR on value for both total capital and equity. The decrease in the cost of capital seems to be indicative of a slight decrease of overall market risk or expected improvements in overall economic outcomes. Since we use the Fama and French methodology, our work bears the same limits as theirs.

Compared to the U.S. results for the sample period 1950-1996, the IRR at value is comparable between the two markets whereas the IRR at cost is lower for Canadian

[68] Despite the presence of negative cash-flows in the IRR equations during the estimation periods 1960-2003, there is only one positive IRR for each set of cash-flows (except for the IT sector). Thus, the multiple IRR problem is not an issue here.

firms. Although the sample period that we use is different from the Fama and French sample period, our results show at a minimum that the U.S. firms create, on average, more added value than their Canadian counterparts.[69] Contrary to the US market where the costs of capital seem to increase by all measures when the more recent 1973-1996 period is considered, the Canadian market shows lower capital costs when we focus on the more recent 1980-2003 period. This trend discrepancy between the two markets could be explained by our inclusion of the IT bubble period which is not considered in the Fama and French sample that stops at 1996, and which exhibited large losses.

[Please insert table 4.6 about here.]

Table 4.7 reports rates of return on total capital and on equity at value and at cost for cross-listed non-financial firms.[70] The number of nonfinancial Canadian firms listed in U.S. venues at any time between 1960 and 2003 is 314, and ranges from 13 during the 1960-1964 subperiod to 192 during the 2000-2003 subperiod. For each year, we consider the sample of cross-listed firms as our basis to compute the different IRR values. The nominal IRR on capital at value [cost] for nonfinancial cross-listed Canadian firms for the 1960-2003 period is 10.07 [10.52] percent. Similarly, the nominal IRR on equity at value [cost] is 10.75 [11.36] percent. As expected and consistent with previous findings by Jorion and Schwartz (1986) and Forester and Karolyi (1993), these values are lower than the costs of capital for domestic nonfinancial firms for the same time period. Our findings are also consistent with Hail and Leuz (2005) who document a decrease in the cost of equity following cross-listing. These findings may be due to a lower risk for

[69] This could be linked to the productivity literature which finds that productivity growth in Canada has been lower than in the U.S. However, recent research shows that Canadian productivity has been improving in the more recent years.

[70] Despite the presence of negative cash-flows in the IRR equations during the estimation period 1960-2003, there is only one positive nominal IRR for each set of cash-flows. The only exception is for the IT sector which exhibits negative IRRs.

cross-listed firms or better cash-flow performance related to cross-listing. The difference in IRR values is usually less than 1 percent and indicates that firms which are cross-listed enjoy a lower cost of capital and equity, albeit at a lower added value as measured by the difference between the cost and value measures of IRR. This may be due to the more competitive nature of markets for firms trading in more integrated markets.

[Please insert table 4.7 about here.]

4.4.2. IRR on Value and on Cost for GICS Sectors

We now measure the costs of total capital and equity for Canadian nonfinancial GICS sectors. Table 4.7 reports the rates of return on capital and equity at value and at cost for 9 GICS sectors.[71] The nominal IRR on capital at value for the 1960-2003 sample period varies between -2.04 percent and 12.55 percent with IT [Consumer Discretionary] having the lowest [highest] realized cost of capital. The dramatically lower IRR for IT can be partially explained by huge investments by Nortel Networks in the late 1970s and the beginning of the 1980s coupled with a series of low or negative earnings.[72] If we dampen the effect of the IT bubble by removing data from 1999 and 2000, the sector shows a nominal IRR on capital at value of 14.48 percent over the 1960-2003 sample period. This performance remains however very sensitive to the terminal value which indicates that most of the required return is linked to future expected growth rates and not to the current or past fundamental performance of the sector.

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[71] To be consistent with our methodology, we exclude the Financials sector.

[72] The net value of PPE (Power, Plant and Equipment) almost quadrupled between 1975 and 1979. Income before extraordinary items did not show the same performance and was consistently lower than the change in PPE value. Interestingly, starting from 1992 and as a clear indication of the stock market boom, the combined market value of IT firms entering the market was at least twice their book value. At the end of 1997, the market value of entering IT firms represented around 8 times their book value. However, this was not enough to reverse the overall sector performance due to the huge losses registered following the market crash at the beginning of 2000.

When the IRR of capital at cost is considered, the highest cost is assumed by Consumer Staples followed very closely by Consumer Discretionary. The IRR on cost is systematically higher than the IRR on value for all GICS sectors, with the exception of Industrials which has a lower IRR on cost than on value during the 1960-2003 period. This may be partially explained by the discrepancy between the market and book values of assets in place, and may indicate that the market value is lower than the book value in certain cases. Therefore, all sectors except Industrials create positive value over the 1960-2003 sample period.[73] Sectors with high barriers to entry such as Energy and Utilities show the highest added values. When the shorter and more recent sample subperiod of 1980-2003 is considered, IRRs at cost and at value are lower for 5 out of 9 sectors. For example, Energy, Materials and Industrials exhibit decreasing trends in their costs of capital, whereas sectors such as Consumer Discretionary, Telecom and Utilities exhibit increases in their costs of capital. Value added increases in Energy, Consumer Discretionary and Health Care, and decreases in Materials, Consumer Staples, Telecom and Utilities.

Consistent with the cost of capital theory, the cost of equity is higher than the overall cost of capital for all but IT. The negative cost of equity, which is lower than the overall cost of capital for IT, is due to value-destroying investments in the period up to and including the IT bubble. For the Industries sector, a cost of equity which is lower than the cost of capital might indicate that realized returns were indeed persistently lower than expectations for this sector. The sector with the highest [lowest] cost of equity during the 1960-2003 period is Consumer Staples [IT]. When comparing the IRR on value with that

[73] The IT sector does not create positive value per se but the value destruction is lower using the IRR at cost.

on cost for both overall capital and equity, we note that sectors create, on average, slightly higher added values from their equity financings.

We now compare our cost of equity estimates to those of He and Kryzanowski (2007) who use a CAPM approach to generate cost of equity estimates for 10 GICS sectors in Canada and the U.S. over the period 1988-2005. Not surprisingly, we find some differences between our estimates and their estimates for some GICS sectors. For instance, our results show unexpectedly higher cost of equity estimates for Consumer Staples, Consumer Discretionary, Telecom and Utilities, and somewhat lower estimates for Industrials and Health Care over the sample period 1980-2003. The most interesting difference is for the IT sector, which shows the highest cost of equity when estimates are based on the CAPM as opposed to the lowest and conspicuously negative cost of equity when estimates are based on the IRR approach. Our results also exhibit some counter-intuitive inferences. For example, both the costs of capital and equity for utilities exceed their counterparts for all firms (the market) for many of the reported values, although utilities are considered to be of considerable lower risk. Thus, although the IRR approach avoids the reliance on the use of industry betas and market risk premiums, both of which are subject to estimation errors (Fama and French, 1997; He and Kryzanowski, 2007),[74] this methodology can generate counter-intuitive estimates of sector- or firm-specific costs of capital or equity. However, our results do indicate that the IRR method may be useful in identifying return series where realizations differ materially from expectations.

Overall, our findings suggest that estimates of the cost of capital and equity for industries are still unresolved. Thus, practitioners are well advised to compare estimates

[74] Also, we would expect our estimates to differ from theirs since we do not assume that Canadian/U.S. markets are integrated as in He and Kryzanowski (2007).

based on market models to those based on fundamental variables before making major investment decisions.

[Please insert table 4.8 about here.]

4.4.3. IRR on Value and on Cost Per Year

To mitigate the discrepancy between the use of a non-stochastic discount rate and the true, underlying rates of return (and risk premiums) expected by investors, we apply the IRR approach to different estimation horizons. This reduces the discrepancies between internal and expected rates of return, and provides a description on how the cost of capital evolves over time.[75] Using a rolling window approach which calculates the IRR initially based on data from 1960 to 1965, and then adds data as the estimation period is extended from 1960 to 2003, we examine how the various IRR values and the costs of equity vary over the sample period. Figure 1 depicts the IRR at value and at cost in real terms for the costs of capital and equity for the nonfinancial corporate sector. Returns decrease from 1965 to 1977, with a slight spike in 1973 following the oil crisis, then increase and become more or less stable during the 1980-98 period, rise dramatically with the peak of the IT boom in 1999, and then decrease sharply thereafter due to the burst of the bubble and the beginning of the economic slowdown in the early 2000's. These multiple IRR results also show the sensitivity of the overall sample IRRs to the terminal values and to economic news.

[Please insert figure 1 about here.]

[75] Strictly speaking, the nonstochastic discount or internal rate of return used in the literature differs from the true underlying and stochastic expected rate of return (Samuelson, 1965), and such differences increase with increases in the variance of the expected rates of return.

4.5. EMPIRICAL ESTIMATES BASED ON THE ADJUSTED FAMA AND FRENCH (1999) METHODOLOGY

In this section, we provide empirical adjustments to better estimate the cost of equity. Although the IRRs on value have few problems since they are based on accurate market values, the IRRs on cost which are based on book-values could be improved if better measures of asset values are introduced.[76] As a correction, we use replacement cost of reported assets in lieu of historical book values to calculate more accurate estimates of the IRR on costs. As a second investigation, we examine the sensitivity of our IRR estimates to the inclusion of Extraordinary Items as part of aggregate cash-flows. This assessment not only provides better estimates of actual realized returns but also provides information on the impact of Extraordinary Items on the returns of the Canadian Corporate sector. It also provides information on the actual added value achieved in sectors such as Energy and Materials, which are known for the reoccurrence of extraordinary items.

4.5.1. IRR on Cost using Replacement Costs

The use of reported book values to measure the values of the assets that firms hold when entering the market understates the value of the assets of existing firms and consequently overstates the value of the IRR on cost. In the following, we use replacement costs to compute the IRR on cost. This allows us to examine whether corporate investments still generate a positive value on average once we correct for the replacement cost of the assets. To correct for replacement costs, we use the Ritter and

[76] We do not correct for pre-entry investments in intangible assets (which are expensed but do not appear in the balance sheet) since we do not have the appropriate data. This would maintain the upward bias in the IRR on cost but an important part of this bias should disappear once we correct for replacement cost. Other problems which are not corrected for include the impact of mergers which understates the IRR on cost and the impact of bankruptcy which usually leads to the overestimation of the terminal value of the firm leaving the sample. But since both phenomena are small in size, they should not have a large impact on the IRRs.

Warr (2002) estimates of annual investments in assets needed to replace depleted assets. This estimate is computed as follows:

$$X = \frac{Book}{\sum_{i=1}^{n}\left[\frac{(i/n)}{(1+G)^{n-i}}\right]}, \tag{4.6}$$

$$G = ROE \times (1 - div), \tag{4.7}$$

where X is an estimate of the annual investments in assets to replace depleted assets that grow at the nominal rate G; $Book$ is the book value of equity; ROE is return on equity; div is the dividend payout ratio; and $n/2$ is accumulated depreciation over depreciation costs which represents an estimate of half the depreciable life of the assets.

Table 4.9 reports the IRR on cost estimates for domestic and cross-listed firms as well as the IRR on cost for 9 GICS sectors, once we correct for replacement cost. In each case, the IRR on cost equation [(4.2) and (4.4)] is solved using the replacement cost of assets, which is equal to the book value of assets plus, X, the annual investments in assets needed to replace the depleted assets. As expected the replacement cost-adjusted IRR at cost for both capital and equity is slightly lower than the book-value IRR at cost for all firms and for all nine GICS sectors. However, all IRR at cost estimates remain higher than the corresponding IRRs at value, which confirms that the Canadian corporate sector creates value even if replacement costs are considered in computing the rates of return.

[Please insert table 4.9 about here.]

4.5.2. IRR Sensitivity to Extraordinary Items

Table 4.10 reports estimation results for the IRRs on capital and equity at value and at cost when replacement costs and Extraordinary Items are accounted for.

Interestingly, the IRR on capital and equity at value and at cost for both domestic and cross-listed firms are reduced when Extraordinary Items are considered, which indicates that the aggregate value of extraordinary items is negative on average. This result occurs for most industries with the exception of Consumer Discretionary, IT and Consumer Staples. The first two sectors show higher IRR values when Extraordinary Items are included in the aggregate cash-flows for both sub-periods 1960-2003 and 1980-2003, and Consumer Staples shows such a tendency mainly for the more recent sub-period. The percentage changes in the real IRR on capital at value [cost] for the 9 GICS sectors vary between -37 [-29] percent and 4 [8] percent over the 1980-2003 time period, with Health Care and Consumer Discretionary having the most extreme changes in their cost of capital values. The percentage changes for the real IRR on equity at value [cost] for the 9 GICS sectors vary between -7 [-11] percent and 11 [3] percent, with Materials, Industrials and Consumer Discretionary having the highest changes in their cost of equity values over the time period 1960-2003. The overall results show that, although some industries have their costs of capital increase when Extraordinary Items are considered, Extraordinary Items are negative on average over the 1960-2003 time period, which leads to a decrease in the realized returns when these items are considered.

[Please insert table 4.10 about here.]

4.5.3. IRR on Value and on Cost for Cap-based Portfolios

In this subsection, we apply the IRR procedure to estimate the cost of capital and cost of equity for firm quintiles based on market capitalization. At the end of each year of the sample period, firms are ranked into quintiles based on their market values. The IRR procedure is used to compute the cost of equity and cost of capital for each quintile over the sample periods 1960-2003 and 1980-2003. Table 4.11 reports estimation results using different IRR specifications. Panel A reports results of cost of capital and cost of equity on value and on cost when we use the IRR methodology as developed by Fama and French (1999). The cost of capital (equity) on value for the smallest firms (quintile 1) is negative for both the 1960-2003 and 1980-2003 sample periods. This poor performance is due to the IT bubble, where most IT firms were also small firms. Restricting our sample data to end with 1994 leads to positive costs of capital (equity) of around 7% in real value for IT firms. Quintiles of higher order show a tendency for a decreasing cost of capital (equity) with firms with the highest market capitalization (quintile 5) having the lowest cost of capital (equity). The IRR on cost is consistently higher than the IRR on value across quintiles, which indicates that economic value creation is independent of firm size. Interestingly, the IRR on cost for the lowest quintile is positive across the overall sample period, which confirms that the IT crash was mainly triggered by speculation and is not indicative of poor fundamentals. The costs of equity for each quintile are slightly higher than their cost of capital counterparts which indicates that equity-holders endure a higher risk than debt-holders independent of firm size. We also observe that the differential between the costs of equity and capital is higher for firms with the largest size (quintile 5).

Panels B and C report results when IRR values are corrected, respectively, for replacement costs and for both replacement costs and extraordinary items. In both cases and for all quintiles, the IRR on cost is reduced when replacement costs and/or replacement costs and extraordinary items are included. However, it remains higher than the IRR on value which indicates that firms create value after correction of replacement costs and extraordinary items independently of their size. These results are in line with results based on industries and firm listing (domestic or cross-listed).

[Please insert table 4.11 about here.]

4.6. MARKET VALUE OF EQUITY IN THE PRESENCE OF INLATION ILLUSION

In this section, we investigate the impact of inflation illusion on the market value of equity. By allowing for inflation illusion among investors, we are assuming that market values no longer correctly reflect the fundamentals. This builds on the work of Modigliani and Cohn (1979) and Ritter and Warr (2002) who show that investors undervalue equity in the presence of inflation. Modigliani and Cohn (1979) define inflation illusion as a set of two errors committed by investors when valuing equity in the presence of inflation. The first error occurs when investors capitalize real cash-flows at nominal rates. The second error occurs when investors fail to recognize the capital gain that accrues to equity holders of firms with fixed dollar liabilities in the presence of inflation.

4.6.1. Earnings Adjustments Assuming Investor Inflation Illusion

We focus on two adjustments to the cash-flow (earnings) stream in the case where investors are assumed to suffer from inflation illusion over our test period. The first refinement is related to the understatement of book equity when benchmarked against the actual replacement cost of assets in place. The second refinement is related to the higher interest payments to compensate bondholders for anticipated inflation, which does not represent an economic expense.[77] As Ritter and Warr (2002) explain, this reduction in earnings is offset by the capital gains that accrue to equity holders because of the reduction in the real value of the firm's debt. To implement the Ritter and Warr adjustments, we make their implicit assumption that all observed market values suffer from inflation illusion.

To correct for the capital gain error, and following Sharpe (2002), we multiply the nominal book-value of debt by the contemporaneous inflation rate.[78] In computing the depreciation and replacement cost of equity adjustments, we make the same assumptions as Ritter and Warr (2002). They are: first, the depreciable and economic lives of assets are equal; second, replacement of assets occurs at a constant rate over time; and third, inflation is steady over the lives of the assets.[79] The replacement-cost-based depreciation is then estimated as follows:

$$DepR_t = Dep_t \times \left[\frac{GDP_t}{GDP_{t-(n/2)}} \right] \tag{4.8}$$

where Dep_t is the annual depreciation and amortization costs reported; GDP_t is the level of the GDP deflator at year t; and $n/2$ is accumulated depreciation over depreciation costs which represents an estimate of half the depreciable life of the assets.

The replacement value of book equity, $\operatorname{Re} B$, is adjusted for the effects of inflation on historical cost depreciation and is computed as follows:

[77] Ritter and Warr (2002) also correct for the understatement of economic depreciation (overstatement of earnings) due to the use of original-cost versus replacement-cost depreciation when calculating earnings. We do not include that correction since it does not influence the terminal values of cash-flows that we consider. The reason is that the depreciation effect cancels out when we net investments from cash-flows.

[78] The implicit assumption is that all debt is trading at par.

[79] When making the inflation adjustments, we assume that expected inflation is equal to realized inflation.

$$\operatorname{Re} B = \sum_{i=1}^{n} \left[\frac{(i/n) X (1+\pi)^{n-i}}{(1+G)^{n-i}} \right], \tag{4.9}$$

$$\pi = \left(\frac{GDP_t}{GDP_{t-n}} \right)^{1/n} - 1, \tag{4.10}$$

where π is the average rate of inflation over the estimated life of the assets; GDP_t is the level of the GDP deflator at year t; and X and G are as previously defined.

4.6.2. Misvaluation Estimates of Equity Assuming Inflation Illusion Among Investors

To gauge the extent to which the market misvalues equity during inflationary periods when investors are assumed to suffer from inflation illusion, we use the adjustments detailed in the previous section to correct for values of inflows and outflows of cash in the IRR equation. We then use the IRR on value equation, where we discount the inflation-adjusted values of inflows and outflows of cash in real terms by the real IRR at value for equity which was calculated in the previous section using non-inflation-adjusted flows.[80] Our computations are updated annually to obtain the implicit market values of the firm's equity (i.e., the market values if investors did not suffer from inflation illusion). These implicit values are compared to their corresponding actual market values in order to compute the percentages of market misvaluations for the period 1960-1997, which we attribute to the "inflation illusion". Our estimates stop in 1997 because we use a minimum of five-years for forward-looking cash-flows in the calculation of the IRRs.

[80] Campbell and Vuolteenaho (2004) show that inflation illusion does not have any impact on real rates of return.

Table 4.11 reports the average percentage misvaluations for five-year sub-periods. Consistent with Modigliani and Cohn (1979) and Ritter and Warr (2002), undervaluation is highest during periods of high inflation and decreases over the sample period as inflation moderates. Over the whole time period, equity is undervalued by 17.13 and 11.58 percent for domestic and cross-listed firm, respectively. This indicates that the equity misvalutions of firms are persistently lower for cross-listed firms. Following the bullish market that starts around 1982, the market still undervalues equity albeit by decreasing values. The annual changes in percentage misvaluations for the equities of both domestic and cross-listed firms, which are depicted in Figure 2, present a similar story.

[Please insert table 4.12 and figure 4.2 about here.]

4.7. CONCLUSION

The IRR approach of Fama and French (1999) was used to estimate the costs of total capital and of equity for domestic and cross-listed Canadian firms and nine GICS sectors. The IRR approach enabled us to distinguish between the IRR at value or the cost of capital as expected by stakeholders and the IRR at cost which represents the real cost that the firm/corporate sector bears for its investments. Since the IRR on cost is persistently higher than the IRR on value, we infer that the Canadian nonfinancial corporate sector creates value. As expected, cross-listed firms have lower costs of total capital and of equity, which confirms similar previous findings. Rates of return based on fundamentals are slightly different from the expected returns based on the market when individual GICS sectors are examined, especially for the IT sector. This suggests that certain bubbles (such as the IT bubble) could have been avoided if fundamental values were correctly anticipated. IRR values based on market capitalization indicate that costs of capital and equity are lower for larger firms.

Both IRR at value and at cost decrease on average but all our qualitative conclusions are maintained after applying adjustments for replacements costs and considering extraordinary items in the computations. This indicates that the corporate sector creates added value even if replacement costs are used instead of historical book values. Not only is there a high persistence of extraordinary items in certain Canadian sectors but their aggregate impact is negative over the 1960-2003 time period. Computing IRR values for firm portfolios based on market capitalisation leads to similar conclusions.

To gauge the impact of inflation illusion on the Canadian market, we use the Ritter and Warr (2002) and Modgliani and Cohn (1979) methods to estimate the market misvalution of equity. Our results show that equity values were not only underestimated prior to the 1980s but equity values remained undervalued during most of the bull market. Interestingly, equity misvaluation is lower for cross-listed firms.

A caveat of our analysis is that it contains low statistical power since our results are based on a single point estimate. The findings are, however, in line with previous work and could be used to help investors/bondholders in deriving an assessment of the cost of equity (capital) for aggregate entities based mainly on fundamentals.

CHAPTER 5

CONCLUSION

This thesis examined a number of firm fundamental related variables; specifically earnings, earnings growth and earnings volatility and their use to answer certain issues in the empirical literature of finance. The first major issue was whether earnings show evidence of persistence and predictability in growth rates. The second issue was whether the increase in stock return idiosyncratic volatility was related to a similar phenomenon in fundamentals' volatility. The third issue was how to estimate the cost of capital and cost of equity using fundamentals and a forward-looking approach with minimum assumptions in terms of asset pricing models.

One of the major conclusions which follow from the second chapter on growth rate persistence is that consistent with economic intuition there is little long-run persistence in aggregate growth rates. This conclusion is somehow challenged when we examine individual firms' long-term growth rates. Cross-sectional results show evidence of short-term persistence in earnings growth and mean-reversion in cash-flow growth. Long-term earnings growth rates are mean-reverting and seem to be predictable to a certain extent using certain firm characteristics such as past book-to-market, earnings yield, and size. Also, the introduction of firm and industry attributes through an interactive variable framework shows that certain attributes (such as age, industry characteristics, the listing exchange, and the number of analysts following the stock) have an impact on growth persistence of individual firms. Results on individual firms' growth rate predictability could be used to provide better estimates of long-term growth when using forward-looking approaches such as the residual income model to estimate the cost of equity and the equity risk premium. Future research could also investigate the impact of technological obsolescence and innovations on growth rate persistence.

The major conclusions which follow from the third chapter which investigates the relationship between stock return idiosyncratic volatility and volatility of cash-flow news are as follows: Firstly, the upward trend in idiosyncratic volatility is associated with a similar increasing trend in the volatility of cash-flow news, as measured by the volatility of monthly changes in expected ROE of one-, two- and three-year horizon forecasts. Secondly, results using bias-(un)adjusted forecasts show that investors seem to give higher weights to variables related to unadjusted forecasts, which means that investors do not always detect or correct for the analysts' forecast bias when building their return expectations. Finally, our major conclusion is that our findings which stem from a fundamental view of expected returns decomposition are consistent with an informational explanation of the increasing trend in idiosyncratic volatility and with an efficient market hypothesis. An extension of this chapter would be to better investigate the variables and hypotheses that could explain the increasing trend in fundamentals volatility. Our starting hypothesis is related to earnings informativeness and deterioration of earnings quality, but controlling for other variables such as changes in corporate governance practices might also shed more light on this issue. Investigating the idiosyncratic volatility sensitivity to negative as opposed to positive changes in earnings could be also informative about the market informational asymmetry.

Using the IRR approach we were able to provide estimates of cost of capital and cost of equity which are based mostly on fundamental firm value. Our major conclusions are:

First, whether we use market value or fundamentals cross-listed firms seem to enjoy lower costs of capital than domestic firms. Second, the nonfinancial corporate Canadian sector creates value which is distributed among GICS sectors albeit unequally. Third, IRR results based on fundamentals are consistent with the negative relationship between market cap and costs of capital. Fourth, sensitivity results to replacement costs and extraordinary items shows that both the IRR on value and on cost decrease on average but their relationship preserves the positive value creation findings. Finally, after correcting for the "inflation illusion" we find that the Canadian market misvalued equity from 1960 through 1997. This misvaluation is lower for cross-listed firms. Possible future avenues of research include an investigation of the relationship between the market added value and growth in productivity and other economic macro-variables. It will be also interesting to investigate which variables would trigger the discrepancy between cost of capital results based on fundamentals and/or forward-looking approaches and the cost of capital based on market risk (beta), such variables could be used to better control bubbles and market crashes such as the one that followed the IT bubble.

REFERENCES

Abarbanell, Jeffery S. and Victor L. Bernard, 1992. Tests of analysts' overreaction/underreaction to earnings information as an explanation for anomalous stock price behavior, *Journal of Finance* 47:3, 1181-1208.

Abarbanell, Jeffery S., 1991. Do analysts' earnings forecasts incorporate information in prior stock price changes, *Journal of Accounting and Economics* 14:2, 147-165.

Albrecht, W. Steve, Larry L. Lookabill, and James C. McKeown, 1977. The time series properties of annual earnings, *Journal of Accounting Research* 51:2, 226-244.

Alexander, G., C. Eun, and S. Janakiramanan, 1987. Asset pricing and dual listing on foreign capital markets: A note, *The Journal of Finance* 42: , 151-158.

Alexander, G., C. Eun, and S. Janakiramanan, 1988. International listings and stock returns: Some empirical evidence, *Journal of Financial and Quantitative Analysis* 23: , 35-151.

Athannassakos, George, 1997. Estimating the cost of equity and equity risk-premia of Canadian firms, Multinational Finance Journal 1:3, 229-254.

Baginski, S., K. Lorek, G. Willinger, and B. Branson, 1999. The relationship between economic characteristics and alternative annual earnings persistence measures, *Accounting Review* 74:1, 105-120.

Ball, R. and P. Brown, 1968. An empirical evaluation of accounting income numbers, *Journal of Accounting Research* 6:2, 159-178.

Ball, Ray and Ross Watts, 1972. Some time series properties of accounting income, *Journal of Finance* 27:3, 663-681.

Baltagi, H. Badi, 2005. Econometric analysis of panel data, *John Wiley and Sons Ltd, Third Edition.*

Basu, S., 1983. The relationship between earnings' yield, market value and return for NYSE common stocks: Further evidence, *Journal of Financial Economics* 12:1, 129-156.

Basu, Sudipta, 1997. The conservatism principle and the asymmetric timeliness of earnings, *Journal of Accounting and Economics* 24, 3-37.

Bathke, Jr. A. W., K. S. Lorek, and G. L. Willinger, 1989. Firm-size and the predictive ability of quarterly earnings data, *The Accounting Review* 64:1, 49-68.

Beaver, W. H., 1968. The information content of annual earnings announcements, *Journal of Accounting Research* 6:Supp, 67-92.

Beaver, William H., 1970. The time series behavior of earnings, *Journal of Accounting Research* 8, 62-99.

Beaver, William H., Richard A. Lambert, and Stephen G. Ryan, 1987. The information content of security prices: A second look, *Journal of Accounting and Economics* 9:2, 139-157.

Beneish, Messod D., Charles M.C. Lee and Robin L. Tarpley, 2001. Contextual fundamental analysis through the prediction of extreme returns, *Review of Accounting Studies* 6:2/3, 165-189.

Blanchard, Olivier J., 1993. Movements in the equity premium, *Brookings Papers* 24:2, 75-118.

Botosan, C. A. and M. A. Plumlee, 2005. Assessing alternative proxies for the expected risk premium. *The Accounting Review* 80:1, 21-54.

Brandt, M. W., A. Brav, and J. R. Graham, 2005. The idiosyncratic volatility puzzle: time trend or speculative episodes? Available at SSRN: http://ssrn.com/abstract=851505

Brown, Lawrence D. and Michael S. Rozeff, 1979. Univariate time-series models of quarterly accounting earnings per share: A proposed model, *Journal of Accounting Research* 17:1, 179-189.

Brown, P. and R. Ball, 1967. Some preliminary findings on the association between the earnings of a firm, its industry, and the economy, *Journal of Accounting Research* 5, 55-77.

Brown, Stephen, Kin Lo and Thomas Lys, 2002. Erratum: use of R-square in accounting research: Measuring changes in value relevance over the last four decades, *Journal of Accounting and Economics* 33:1, 141.

Burgstahler, D. and I. Dichev, 1997. Earnings management to avoid earnings decreases and losses, *Journal of Accounting & Economics* 24, 99-126.

Campbell, J. Y. and R. J. Shiller, 1988. The dividend-price ratio and expectations of future dividends and discount factors, *Review of Financial Studies* 1:3, 195-228.

Campbell, J. Y., A. W. Lo, and A. C. Mackinlay, 1997. The Econometrics of financial markets, Princeton University Press, Princeton New Jersey.

Campbell, J., 1991. A variance decomposition for stock returns, *Economic Journal* 101, 157-179.

Campbell, John Y. and Tuomo Vuolteenaho, 2004. Inflation illusion and stock prices, *The American Economic Review* 94:2 19-23.

Campbell, John Y., Martin Lettau, Burton G. Malkiel and Yexiao Xu, 2001. Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk, *Journal of Finance* 56:1, 1-43.

Chan, Konan, Louis K.C. Chan, Narasimhan Jegadeesh, and Josef Lakonishok, 2006. Earnings quality and stock returns, *Journal of Business* 79:3, 1041-1085.

Chan, Louis K.C., Jason Karceski, and Josef Lakonishok, 2003. The level and persistence of growth rates, *The Journal of Finance* 58:2, 643-685.

Chen, J., H. Hong and J. Stein, 2002. Breadth of ownership and stock returns, *Journal of Financial Economics* 66: 171-205.

Chung, Richard and Lawrence Kryzanowski, 2000. Market timing using strategists' and analysts' forecasts of S&P500 earnings per share, *Financial Services Review* 9, 125-144.

Claus, James and Jacob Thomas, 2001. Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stocks, *Journal of Finance* 56:5, 1629-1666.

Cochrane, John H., 1997. Where is the market going? Uncertain facts and novel theories, *Economic Perspectives* 21, 3–37.

Collins, D. and P. Hribar, 2000. Earnings-based and accrual-based market anomalies: One effect or two? *Journal of Accounting and Economics* 29:1, 101-123.

Collins, D. and S. Kothari, 1989. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients, *Journal of Accounting and Economics* 11:2/3, 143-181.

Collins, Daniel W., S. P. Kothari, and Judy D. Rayburn, 1987. Firm size and the information content of prices with respect to earnings, *Journal of Accounting and Economics* 9:2, 111-138.

DeBondt, Werner F. M. and Richard M. Thaler, 1990. Do security analysts overreact?, *American Economic Review* 80: 2, 52-57.

Dechow, Patricia M. and Douglas J. Skinner, 2000. Earnings management: reconciling the views of accounting academics, practitioners, and regulators, *Accounting Horizons* 14, 235-250.

Dechow, Patricia M. and Ilia D. Dichev, 2001. The quality of accruals and earnings: The role of accrual estimation errors. Available at SSRN: http://ssrn.com/abstract=277231.

Dechow, Patricia M. and Richard G. Sloan, 1997. Returns to contrarian investment strategies: Tests of naive expectations hypotheses, *Journal of Financial Economics* 43:1, 3-27.

Dechow, Patricia M., Amy P. Hutton and Richard G. Sloan, 1996. Economic consequences of accounting for stock-based compensation, *Journal of Accounting Research* 34:Supp, 1-20.

Dechow, Patricia M., Amy P. Hutton and Richard G. Sloan, 1999. An empirical assessment of the residual income valuation model, *Journal of Accounting and Economics* 26:1, 1-34.

Dechow, Patricia M., Amy P. Hutton and Richard G. Sloan, 2000. The relation between analysts' forecasts of long-term earnings growth and stock price performance following equity offerings, *Contemporary Accounting Research* 17:1, 1-32.

Dechow, Patricia M., Amy P. Hutton, Lisa Meulbroek and Richard G. Sloan, 2001. Short-sellers, fundamental analysis, and stock returns, *Journal of Financial Economics* 61:1, 77-106.

Dechow, Patricia M., Scott Anthony Richardson, and Richard G. Sloan, 2004. The persistence and pricing of the cash component of earnings, Working Paper 01-05, Rodney L. White Center for Financial Research, Wharton School, University of Pennsylvania, December. Available at: http://finance.wharton.upenn.edu/~rlwctr/papers/0501.pdf.

Degeorge, Francois, Jayendu Patel, and Richard Zeckhauser, 1999. Earnings management to exceed thresholds, *Journal of Business* 72, 1–33.

Dichev, Ilia D. and Wei Vicki Tang, 2005. Matching and the volatility of earnings, *Working Paper*, AAA 2007 Financial Accounting & Reporting Section (FARS) Meeting Paper. Available at SSRN: http://ssrn.com/abstract=927312.

Diether, K., C. Malloy and A. Scherbina, 2002. Differences of opinion and cross-section of stock returns, *Journal of Finance* 57, 2113-41.

Dugar, Amitabh and Siva Nathan, 1995. The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations, *Contemporary Accounting Research* 12:1 131-165.

Easton, P. and M. Zmijewski, 1989. Cross-sectional variation in the stock market response to accounting earnings announcements, *Journal of Accounting and Economics* 11:2/3, 117-141.

Easton, P. D. and P. Monahan, 2003. The empirical relation between realized return and accounting based measures of expected returns. *University of Chicago Working Paper, Chicago, IL.*

Elgers, Pieter T. and May H. Lo, 1994. Reduction in analysts' annual earnings forecast errors using information in prior earnings and security returns, *Journal of Accounting Research* 32:2, 290-303.

Errunza, V. R. and D. P. Miller, 2000. Market segmentation and the cost of equity capital in international equity markets, *Journal of Financial and Quantitative Analysis* 35, 577–600.

Fairfield, Patricia M. and Teri Lombardi Yohn, 2001. Using asset turnover and profit margin to forecast changes in profitability, *Review of Accounting Studies* 6:4, 371-385.

Fama, E. F. and J. D. MacBeth, 1973. Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81:3, 607-636.

Fama, E. F. and H. Babiak, 1968. Dividend policy: An empirical analysis, *Journal of the American Statistical Association* 63: , 1132-61.

Fama, E. F. and K. R. French, 1992. The cross-section of expected stock returns, *Journal of Finance* 47:2, 427-466.

Fama, E. F. and K. R. French, 1993. Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33:1, 3-56.

Fama, E. F. and K. R. French, 1995. Size and book-to-market factors in earnings and returns, *Journal of Finance* 50:1, 131-155.

Fama, E. F. and K. R. French, 1997. Industry costs of equity, *Journal of Financial Economics* 43:2, 153-193.

Fama, E. F. and K. R. French, 1999. The corporate cost of capital and the return on corporate investment, *Journal of Finance* 54:6, 1939-1967.

Fama, E. F. and K. R. French, 2000. Forecasting profitability and earnings, *Journal of Business* 73:2, 161-175.

Fama, E. F. and K. R. French, 2002, The equity premium, *Journal of Finance* 57:2, 637-659.

Foerster, S. R. and G. A. Karolyi, 1998. The effects of market segmentation and investor recognition on asset prices: Evidence from foreign stock listings in the U.S., Working Paper, Ohio State University.

Foster, G., 1977. Quarterly accounting data: time-series properties and predictive-ability results, *Accounting Review* 52:1, 1-21.

Francis, J., R. LaFond, P. M. Olsson, and K. Schipper, 2004. Costs of equity and earnings attributes, *The Accounting Review* 79:4, 967-1010.

Francis, Jennifer and Katherine Schipper, 1999. Have financial statements lost their relevance?, *Journal of Accounting Research* 37:2, 319-352.

Frankel, Richard and Charles M. C. Lee, 1998. Accounting valuation, market expectation, and cross-sectional stock returns, *Journal of Accounting and Economics* 25:3, 283-319.

Freeman, Robert N. and Senyo Y. Tse, 1992. A nonlinear model of security price responses to unexpected earnings, *Journal of Accounting Research* 30:2, 185-209.

Freeman, Robert N., 1987. The association between accounting earnings and security returns for large and small firms, *Journal of Accounting and Economics* 9:2, 195-228.

Freeman, Robert N., James A. Ohlson, and Stephen H. Penman, 1982. Book rate of return and predictions of earnings changes: An empirical investigation, *Journal of Accounting Research* 20:2, 639-653.

Fried, Dov and Dan Givoly, 1982. Financial analysts' forecasts of earnings: A better surrogate for market expectations, *Journal of Accounting and Economics* 4:2, 85-107.

Fu, Fangjian, 2005. Idiosyncratic risk and the cross-section of Expected stock returns, *Proceedings: European Finance Association*, Moscow.

Fudenberg, D., and Tirole, J., 1995. A theory of income and dividend smoothing based on incumbency rents, *Journal of Political Economy* 103: , 75-93.

Fuller, Russell J., Lex C. Huberts, and Michael Levinson, 1992. It's not higgledy-piggledy growth, *Journal of Portfolio Management* 18:2, 38-45.

Fuller, Russell J., Lex C. Huberts, and Michael Levinson, 1993. Returns to E/P strategies, higgledy-piggledy growth, analysts' forecast errors, and omitted risk factors, *Journal of Portfolio Management* 19:2, 13-24.

Gebhardt, William R., Charles M. C. Lee and Bhaskaran Swaminathan, 2001. Toward an implied cost of capital, *Journal of Accounting Research* 39:1, 134-176.

Ghosh A., Z. Gu and P. C. Jain, 2005. Sustained earnings and revenue growth, earnings quality, and earnings response coefficients, *Review of Accounting Studies* 10:1.

Givoly, Dan and Carla Hayn, 2000. The changing time-series properties of earnings, cash-flows and accruals: Has financial reporting become more conservative?, Journal of Accounting and Economics, 29: 287-320.

Givoly, Dan and Josef Lakonishok, 1979. The information content of financial analysts' forecasts of earnings: Some evidence on semi-strong inefficiency, *Journal of Accounting and Economics* 1:3, 165-185.

Givoly, Dan and Josef Lakonishok, 1980. Financial analysts' forecasts of earnings: Their value to investors, *Journal of Banking and Finance* 4:3, 221-234.

Gode, D. and P. Monahan, 2003. What affects the implied cost of equity capital?, *Review of Accounting Studies* 8, 399-431.

Goel, A. M., and A. V. Thakor, 2003. Why do firms smooth earnings?, *The Journal of Business* 76:1, 151-192.

Griffin, Paul A., 1976. Competitive information in the stock market: An empirical study of earnings, dividends and analysts' forecasts, *Journal of Finance* 31:2, 631-650.

Griffin, Paul A., 1977. The time-series behaviour of quarterly earnings: Preliminary evidence, *Journal of Accounting Research* 15:1, 71-83.

Gu, Z., C. J. Lee, and J. G. Rosett, 2005. What determines the variability of accounting accruals?, *The Review of Quantitative Finance and Accounting* 24:3, 313-334.

Hail, Luzi and Christian Leuz, 2005. Cost of capital and cash-flow effects of U.S. cross-listings, Working Paper,

Han, Bong H., David Manry, and Wayne Shaw, 2001. Improving the precision of analysts' earnings forecasts by adjusting for predictable bias, *Review of Quantitative Finance and Accounting* 17:1, 81-98.

Harris, R., 1999. The accuracy, bias and efficiency of analysts' long run earnings growth forecasts, *Journal of Business Finance and Accounting* 26, 725-755.

He, Zhongzhi and Lawrence Kryzanowski, 2007. Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2, 215-229.

Healy, P. M. and J. M. Wahlen, 1999. A review of the earnings management literature and its implications for standard setting, *Accounting Horizons* 13, 365-383.

Healy, Paul M., 1985. The effect of bonus schemes on accounting decisions, Journal of Accounting and Econmics, 7: , 85-107.

Hlouskova, J., and M. Wagner, 2005. The performance of panel unit root and stationary tests: Results from a large scale simulation study, *Working Paper*.

Hopwood, William S., 1980. On the automation of the Box-Jenkins modeling procedures: An algorithm with an empirical test, *Journal of Accounting Research* 18:1, 289-296.

Hou, K. and D. T. Robinson, 2006. Industry concentration and average stock returns, *The Journal of Finance* 61:4, 1927-1956.

Imhoff, Eugene A., Jr. and Gerald J. Lobo, 1984. Information content of analysts' composite forecast revisions, *Journal of Accounting Research* 22:2, 541-554.

Irvine, P. and J. Pontiff, 2005. Idiosyncratic return volatility, cash-flows and product market competition, *Univeristy of Georgia working paper*.

Ismail, B. and K. Choi, 1996. Determinants of time-series properties of earnings and cash flows, *Review of Financial Economics* 5:2, 131-145.

Jiang, X. and B. S. Lee, 2006. The dynamic relation between returns and idiosyncratic volatility, *Financial Management* 35:2, 43:65

Jorion, P. and E. Schwartz, 1986. Integration vs segmentation in the Canadian stock market, *Journal of Finance* 41: 603-616.

King, B. F., 1966. Market and industry factors in stock price behaviour, *Journal of Business* 39:1, 139-190.

Kinney, W. R., Jr., 1971. Predicting earnings: Entity versus subentity data, *Journal of Accounting Research* 9:1 , 127-136.

Kocherlakota, Naryana, 1996. The equity premium: It's still a puzzle, *Journal of Economic Literature* 34, 42–71.

Kormendi, R. and R. Lipe, 1987. Earnings innovations, earnings persistence, and stock returns, *Journal of Business* 60:3, 323-346.

La Porta, Rafael, 1996. Expectations and the cross-section of stock returns, *Journal of Finance* 51:5, 1715-1742.

Lakonishok, J., A. Shleifer, and R. Vishny, 1994. Contrarian investment, extrapolation, and risk, *Journal of Finance* 49:5, 1541-1578.

Lamont, O., 1998. Earnings and expected returns, *Journal of Finance* 53, 1563-87.

Landsman, Wayne R. and Edward L. Maydew, 2002. Has the information content of quarterly earnings announcements declined in the past three decades?, *Journal of Accounting Research* 40:3, 797-808.

Lee, Bong Soo, 1996. Time-series implications of aggregate dividend behavior, *Review of Financial Studies* 9:2, 589-618.

Lee, C.F., C. Wu, and M. Djarraya, 1987. A further empirical investigation of the dividend adjustment process, *Journal of Econometrics* 58: , 267-85.

Lee, Charles M.C., James Myers and Bhaskaran Swaminathan, 1999. What is the intrinsic value of the Dow?, *Journal of Finance* 54:5, 1693-1741.

Lev, B. and S. R. Thiagarajan, 1993. Fundamental information analysis, *Journal of Accounting Research* 31:2, 190-215.

Lev, B., 1983. Some economic determinants of time-series properties of earnings, *Journal of Accounting and Economics* 5:1, 31-48.

Lev, Baruch and Paul Zarowin, 1999. The boundaries of financial reporting and how to extend them, *Journal of Accounting Research* 37:2, 353-385.

Lev, Baruch., 1969. Industry averages as targets for financial ratios, *Journal of Accounting Research* 7:2, 290-299.

Lintner, J., 1956. Distribution of incomes of corporations among dividends, retained earnings and taxes, American Economic Review 46:2, 97-113.

Lintner, John and Robert Glauber, 1967. Higgledy piggledy growth in America, *Modern Developments in Investment Management*, Hinsdale: Dryden Press.

Little, I.M.D., 1962. Higgledy piggledy growth, *Bulletin of the Oxford University Institute of Economics and Statistics* 4, 387-412.

Liu, Jing and Jacob Thomas, 2000. Stock returns and accounting earnings, *Journal of Accounting Research* 38:1, 71-101.

Liu, Jing, Dorion Nissim, and Jacob Thomas, 2002. Equity valuation using multiples, *Journal of Accounting Research* 40:1, 135-173.

Liu, Jing, Dorion Nissim, and Jacob Thomas, 2007. Is cash-flow king in valuation? Financial Analysts Journal 63:2, 56-69.

Lorek, Kenneth S., 1979. Predicting annual net earnings with quarterly earnings time-series models, *Journal of Accounting Research*, 1, 190-204.

Malkiel, B. G., and Y. Xu, 2003. Investigating the behaviour of idiosyncratic volatility, *Journal of Business* 76: 613-644.

Marsh, Terry A. and Robert C. Merton, 1987. Dividend behavior for the aggregate stock market, *Journal of Business* 60:1, 1-40.

May, Robert G., 1971. The influence of quarterly earnings announcements on investor decisions as reflected in common stock price changes, *Journal of Accounting Research* 9, 119-163.

Michaely, R. and K. L. Womack, 1999. Conflict of interest and the credibility of underwriter analyst recommendations, *Review of Financial Studies* 12:Spec, 653-686.

Miller, M. and F. Modigliani, 1961. Dividend policy, growth, and the valuation of shares, *Journal of Business* 34 (October), 411-33.

Minton, B. A., C. M. Schrand, and B. R. Walther, 2002. The role of volatility in forecasting, *Review of Accounting Studies* 7, 195-215.

Modigliani, Franco and Richard A. Cohn, 1979. Inflation and the stock market, *Financial Analyst Journal* 35:2, 24-44.

Moses, O. D., 1987. Income smoothing and incentives: Empirical tests using accounting changes, *Accounting Review* 62: , 358-377.

Mueller, D. C., 1977. The persistence of profits above the norm, *Economica* 44, 369-380.

Myers, James N., Linda A. Myers, and Douglas J. Skinner, 2006. Earnings momentum and earnings management, *Working Paper*.

Ou, J. and S. Penman, 1989. Accounting measurement, price-earnings ratio, and the information content of security prices, *Journal of Accounting Research* 27:Supp, 111-152.

Ou, J. and S. Penman, 1989. Financial statement analysis and the prediction of stock returns, *Journal of Accounting and Economics* 11:4, 295-329.

Ou, Jane A. and Stephen H. Penman, 1989. Financial statement analysis and the prediction of stock returns, *Journal of Accounting and Economics* 11:4, 295-329.

Park, C., 2005. Stock return predictability and the dispersion in earnings forecasts, *Journal of Business* 78:6, 2351-2375.

Pastor, L. and P. Veronesi, 2003. Stock valuation and learning about profitability, *Journal of Finance* 58, 1749-89.

Pastor, L. and P. Veronesi, 2006. Was there a Nasdaq bubble in the late 1990s?, Journal of Financial Economics 81:1, 61-100.

Patell, James M. and Mark A. Wolfson, 1984. The intraday speed of adjustment of stock prices to earnings and dividend announcements, *Journal of Financial Economics* 13:2, 223-252.

Penman, Stephen H. and Theodore Sougiannis, 1997. The dividend displacement property and the substitution of anticipated earnings for dividends in equity valuation, *Accounting Review* 72:1, 1-21.

Penman, Stephen H., 1991. An evaluation of accounting rate-of-return, *Journal of Accounting, Auditing and Finance* 6:2 , 233-255.

Rajgopal, S. and M. Venkatachalam, 2006. Financial reporting quality and idiosyncratic return volatility over the last four decades, *University of Washington working paper*.

Richardson, Scott A., Richard G. Sloan, Mark T. Soliman, and Irem Tuna, 2005. Accrual reliability, earnings persistence and stock prices, *Journal of Accounting and Economics* 39, 437-485.

Ritter, Jay R. and Richard S. Warr, 2002. The decline in Inflation and the bull market of 1982 to 1999. *Journal of Financial and Quantitative Analysis* 37:1

Salamon, Gerald L. and E. Dan Smith, 1977. Additional evidence on the time-series properties of reported earnings per share: Comment, *Journal of Finance* 32, 1795-1801.

Salamon, Gerald L. and Thomas L. Stober, 1994. Cross-quarter differences in stock price responses to earnings announcements: Fourth-quarter and seasonality influences, *Contemporary Accounting Research* 11:1, 297-330.

Scharfstein, David S. and Jeremy C. Stein, 1990. Herd behavior and investment, *American Economic Review* 80:3, 465-479.

Sharpe, Steven A., 2002. Reexamining stock valuation and inflation: The implications of analysts' earnings forecasts, *The Review of Economics and Statistics* 84:4, 632-648.

Shiller, R., 1984. Theories of aggregate stock price movements, *Journal of Portfolio Management* 10:2, 28-37.

Siegel, Jeremy J. and Richard H. Thaler, 1997. The equity risk premium puzzle, *Journal of Economic Perspectives* 11, 191–200.

Sloan, R., 1996. Do stock prices fully reflect information in accruals and cash flows about future earnings?, *Accounting Review* 71:3, 289-315.

Sorensen, Roy A., 1983. An 'essential reservation' about the EMH, *Journal of Portfolio Management* 9:4, 29-30.

Stickel, Scott E., 1991. Common stock returns surrounding earnings forecast revisions: More puzzling evidence, *Accounting Review* 66:2, 402-416.

Stigler, G. J., 1963. Elementary economic education, *American Economic Review* 53:2, 653-659.

Subramanyam, K. R., 1996. The pricing of discretionary accruals, *Journal of Accounting and Economics* 22, 249-281.

Taggart, Robert A., Jr., 1985. Effects of regulation on utility financing: Theory and evidence, *Journal of Industrial Economics* 33:3, 257-276.

Teoh, Siew Hong and T. J. Wong, 1993. Perceived auditor quality and the earnings response coefficient, *Accounting Review* 68:2, 346-366.

Trueman, B., and Titman S., 1988. An explanation of accounting income smoothing, *Journal of Accounting Research* 26: , S127-S139.

Vuolteenaho, Tuomo, 2002. What drives firm-level stock returns?, *Journal of Finance*, 57:1, 233-264.

Wei, S. X., and C. Zhang, 2006. Why did individual stocks become more volatile?, *Journal of Business* 79:1, 259-292.

Welch, Paul R., 1984. A generalized distributed lag model for predicting quarterly earnings, *Journal of Accounting Research* 22:2, 744-757.

Xie, Hong, 2001. The mispricing of abnormal accruals, *The Accounting Review* 76:3, 357-373.

Zmijewski, M., and R. Hagerman, 1981. An income strategy approach to the positive theory of accounting standard setting/choice, *Journal of Accounting and Economics* 3, 129-149.

Table 2.1. Descriptive Statistics and Unit Root Tests, 1950-2006

This table reports summary statistics and results of unit root tests for the time-series of mean and value-weighted annual growth rates (decimal) of earnings per share (EPSG rates), cash-flows per share (CFG rates) and four macro-variables using data for 1950-2006 for EPSG rates and the macro-variables and for 1962-2006 for *CFG* rates. Growth rates are computed for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate EPS for at least two successive years over the 57-year period, 1950-2006. EPS values are computed using Income before Extraordinary items and Number of Common shares outstanding from COMPUSTAT. Summary statistics and unit root test results are reported for real EPSG for the average or mean firm portfolio ($EPSG_{mean}$) and for the total-asset-weighted portfolio ($EPSG_{vw}$). $CF1G$ is the growth rate of the cash component of *EPS* obtained by reflecting the adjustments to accrual flows for changes in net working capital and depreciation to obtain cash flows. *CFG* rates are calculated using data from 1962 to 2006 since prior to 1962 there was not enough data to compute the cash-flow growth component of earnings. Summary statistics and unit root tests results are reported for real growth for the average or mean firm portfolio ($CF1G_{mean}$) and the total-asset-weighted portfolio ($CF1G_{vw}$). Index EPS growth rate ($EPSG_{index}$) is computed using the sum of the EPS of individual firms multiplied by the number of shares outstanding at the end of each year. A similar approach is used to compute the index cash-flow growth rate based on cash-flow adjustments ($CF1G_{index}$). Expected Industrial Production growth (*EIPG*) is computed using median forecasts of IP from the Livingston Forecasts from 1950 to 2006. The actual real GDP growth rate (*GDPG*) is extracted from the U.S. Bureau of Economic Analysis from 1950 to 2006. Term Premium (*TERM*) and Default Premium (*DEF*) are extracted from Ibbotson Associates over the period 1950 to 2006. Unit root tests are conducted using the Augmented Dickey Fuller (ADF1) with intercept and Augmented Dickey Fuller with trend and intercept (ADF2). [a], [b], and [c] indicate significance at the 10%, 5% and 1%, respectively.

	Mean	Median	Std Dev	Skew	Kurt	ADF1	ADF2	N
$EPSG_{mean}$	0.043	0.056	0.070	-0.187	2.620	-5.860 [c]	-5.871[c]	56
$EPSG_{vw}$	0.020	0.024	0.067	0.051	3.153	-5.658 [c]	-5.601 [c]	56
$CF1G_{mean}$	0.185	0.177	0.063	0.861	7.845	-7.304 [c]	-7.563 [c]	43
$CF1G_{vw}$	0.081	0.068	0.076	1.331	5.517	-7.960 [c]	-8.320 [c]	43
$EPSG_{index}$	0.065	0.061	0.134	0.459	3.096	-5.690 [c]	-5.632 [c]	56
$CF1G_{index}$	0.050	0.007	0.130	1.091	4.024	-8.094 [c]	-8.230 [c]	43
GDPG	0.034	0.035	0.022	-0.300	2.738	-7.263 [c]	-7.258 [c]	56
EIPG	0.041	0.038	0.031	-0.263	3.420	-6.176 [c]	-6.162 [c]	56
TERM	0.015	-0.001	0.097	0.601	2.883	-8.163 [c]	-8.983 [c]	56
DEF	0.004	0.011	0.030	-0.348	2.967	-8.274 [c]	-8.437 [c]	56

Table 2.2. Correlation Matrix, 1962-2006

This table reports Pearson (on the bottom) and Spearman (on the top) correlation coefficients for the time-series of mean, median and value-weighted annual growth rates (decimal) of earnings per share (EPSG rates), cash-flows per share (CFG rates) and four macro-variables using data for 1962-2006. Growth rates are computed for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate EPS for at least two successive years over the 57-year period, 1950-2006. EPS growth values ($EPSG_{mean}$; $EPSG_{med}$; and $EPSG_{vw}$) are computed using Income before Extraordinary items, Number of Common shares outstanding and total assets from COMPUSTAT. *CFPS1G* ($CFPS1G_{mean}$; $CFPS1G_{med}$; and $CFPS1G_{vw}$) are the mean, median and value-weighted growth rates of the cash component of *EPS* obtained by reflecting adjustments to accrual flows for changes in net working capital and depreciation to obtain cash flows. *CFPSG* rates are calculated using data from 1962 to 2006 since prior to 1962 there was not enough data to compute the *CFPS* component of accrual earnings. Index growth rate ($EPSG_{index}$; $CF1G_{index}$) is computed using the sum of the EPS and cash-flows of individual firms, respectively, multiplied by the number of shares outstanding at the end of each year. The actual real GDP growth rate (*GDPG*) is extracted from the U.S. Bureau of Economic Analysis from 1950 to 2006. Term Premium (*TERM*) and Default Premium (*DEF*) are extracted from Ibbotson Associates over the period 1950 to 2006. [a], [b], and [c] indicate significance at the 10%, 5% and 1%, respectively.

	$EPSG_{mean}$	$EPSG_{med}$	$EPSG_{vw}$	$CF1G_{mean}$	$CF1G_{med}$	$CF1G_{vw}$	$EPSG_{index}$	$CF1G_{index}$	GDPG	EIPG	TERM	DEF
$EPSG_{mean}$	1.000	***0.973*** [c]	***0.799*** [c]	***0.173***	***0.466*** [c]	***0.166***	***0.678*** [c]	***0.197***	***0.560*** [c]	***0.222***	***0.082***	***0.005***
$EPSG_{med}$	0.981 [c]	1.000	***0.757*** [c]	***0.193***	***0.493*** [c]	***0.155***	***0.676*** [c]	***0.183***	***0.521*** [c]	***0.224***	***0.113***	***-0.005***
$EPSG_{vw}$	0.747 [c]	0.719 [c]	1.000	***0.142***	***0.318*** [b]	***0.322*** [b]	***0.707*** [c]	***0.372*** [b]	***0.539*** [c]	***0.224***	***0.011***	***-0.079***
$CF1G_{mean}$	0.088	0.060	-0.002	1.000	***0.842*** [c]	***0.595*** [c]	***0.229***	***0.503*** [c]	***-0.013***	***0.042***	***-0.035***	***0.172***
$CF1G_{med}$	0.482 [c]	0.488 [c]	0.293 [a]	0.810 [c]	1.000	***0.554*** [c]	***0.354*** [b]	***0.466*** [c]	***0.148***	***0.099***	***0.081***	***0.096***
$CF1G_{vw}$	0.018	-0.005	0.104	0.760 [c]	0.596 [c]	1.000	***0.212***	***0.867*** [c]	***0.102***	***0.297*** [a]	***-0.016***	***0.217***
$EPSG_{index}$	0.627 [c]	0.600 [c]	0.736 [c]	0.102	0.368 [b]	0.048	1.000	***0.257***	***0.539*** [c]	***0.127***	***-0.135***	***0.016***
$CF1G_{index}$	0.132	0.110	0.273 [a]	0.592 [c]	0.535 [c]	0.868 [c]	0.197	1.000	***0.128***	***0.315*** [b]	***0.099***	***0.130***
GDPG	0.651 [c]	0.611 [c]	0.588 [c]	-0.153	0.145	-0.006	0.501 [c]	0.088	1.000	***-0.054***	***-0.151***	***0.042***
EIPG	0.045	0.077	0.110	0.270 [a]	0.176	0.407 [c]	0.098	0.417 [c]	-0.127	1.000	***0.229***	***0.377*** [b]
TERM	0.006	0.059	0.002	0.036	0.063	-0.011	-0.118	0.083	-0.208	0.250	1.000	***-0.354*** [b]
DEF	-0.027	-0.024	-0.140	0.236	0.111	0.262 [a]	-0.021	0.158	-0.058	0.390 [b]	-0.312 [b]	1.000

Table 2.3. Regressions using Market-based Portfolios and 1-year growth rates, 1950-2006

This table reports regression results for 1-year market-based growth rates of earnings and cash-flows on the lagged dependent variable and four macro-variables over the period 1950 to 2006 for EPS growth rates and the period 1962-2006 for cash-flow growth rates. Variables are as defined in table 2.1. Panel A reports regression results on the mean firm-based portfolios, where the individual firms' mean growth rates at the end of each year are used to form the aggregate market growth rate. Panel B reports regression results on the median firm-based portfolios, where the individual firms' median growth rates at the end of each year are used to form the aggregate market growth rate. Panel C reports regression results on the value-weighted growth rate portfolios, where individual firms' total-asset-weighted growth rates at the end of each year are used to form the aggregate market growth rate. Panel D reports results on index-based portfolios, where growth rates are computed on the total market index and not on the firms composing it. T-statistics, which are in the parentheses, are corrected for heteroscedasticity and autocorrelation using Newey and West. ^{a}, ^{b} and ^{c} indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	γ_0	γ_1	γ_2	γ_3	β_{GDPG}	β_{EIPG}	β_{TERM}	β_{DEF}	N	Adj. R^2
Panel A: Mean Firm Growth Based Portfolios										
$EPSG_{mean}$	0.043^{c}	0.281^{a}	-0.130	-0.107					56	0.06
	(3.706)	(1.911)	(-0.996)	(-0.871)						
	0.032^{a}	0.592^{c}	0.099	-0.045	-1.595^{c}	0.733^{c}	0.195^{c}	0.736^{c}	56	0.51
	(1.869)	(5.370)	(0.831)	(-0.656)	(-4.402)	(3.175)	(3.597)	(3.645)		
$CF1G_{mean}$	0.206^{c}	-0.127	-0.185	0.184					56	0.03
	(3.154)	(-0.951)	(-1.322)	(1.460)						
	0.199^{c}	-0.038	-0.207^{b}	0.329^{c}	-1.073	0.188	-0.074	-1.146^{b}	43	0.29
	(3.690)	(-0.300)	(-2.691)	(3.445)	(-1.455)	(0.660)	(-0.756)	(-2.705)		
Panel B: Value-weighted Growth Based Portfolios										
$EPSG_{vw}$	0.021^{c}	0.188^{a}	-0.090	-0.147					56	0.03
	(2.263)	(1.783)	(-0.657)	(-0.743)						
	0.004	0.348^{c}	0.050	- 0.023	-0.519	0.581	0.096	0.768^{c}	56	0.21
	(0.146)	(2.876)	(0.379)	(-0.104)	(-1.006)	(1.579)	(1.294)	(2.745)		
$CF1G_{vw}$	0.134^{c}	-0.436^{c}	-0.314^{b}	0.070					43	0.16
	(3.652)	(-3.337)	(2.389)	(0.367)						
	0.131^{c}	-0.522^{c}	-0.263^{b}	0.085	-1.407^{a}	1.357^{c}	-0.220^{a}	-0.841	43	0.41
	(3.752)	(-4.373)	(-2.465)	(0.668)	(-1.729)	(3.437)	(-1.771)	(-1.690)		
Panel C: Index Growth Based Portfolios										
$EPSG_{index}$	0.058^{c}	0.428^{c}	-0.222	-0.175					56	0.20
	(3.046)	(3.767)	(-1.344)	(-1.302)						
	0.016	0.533^{c}	-0.170	-0.093	-0.845	1.244^{c}	0.167	0.570	56	0.31
	(0.510)	(4.454)	(-1.181)	(-0.707)	(-1.175)	(3.205)	(1.013)	(1.353)		
$CF1G_{index}$	0.071^{b}	-0.280^{a}	-0.263^{a}	-0.073					43	0.03
	(2.175)	(-1.828)	(-1.951)	(-0.313)						
	0.061	-0.399^{b}	-0.160	-0.007	-2.262	2.053^{c}	-0.200	-0.297	43	0.25
	(1.105)	(-2.431)	(-1.237)	(-0.047)	(-1.613)	(2.797)	(-0.984)	(-0.359)		

Table 2.4. Regressions using Market-based Portfolios and 5-year growth rates, 1950-2006

This table reports regression results for 5-year market-based growth rates of earnings and cash-flows on multiple lagged 1-year growth variables and four macro-variables over the period 1950 to 2006 for EPS growth rates and the period 1962-2006 for cash-flow growth rates. Variables are as defined in table 2.1, and 5-year growth rates are computed as annualized 5-year growth for each variable. Panel A reports regression results on the mean firm-based portfolios, where the individual firms' mean 5-year growth rates at the end of each year are used to form the aggregate market 5-year growth rate. Panel B reports regression results on the median firm-based portfolios, where the individual firms' median 5-year growth rates at the end of each year are used to form the aggregate market 5-year growth rate. Panel C reports regression results on the value-weighted growth rate portfolios, where individual firms' total-asset-weighted 5-year growth rates at the end of each year are used to form the aggregate market 5-year growth rate. Panel D reports results on index-based portfolios, where 5-year growth rates are computed on the total market index and not on the firms composing it. T-statistics, which are in the parentheses, are corrected for heteroscedasticity and autocorrelation using Newey and West. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	γ_0	γ_1	γ_2	γ_3	β_{GDPG}	β_{EIPG}	β_{TERM}	β_{DEF}	N	Adj. R^2
Panel A: Mean Firm 5-year Growth Based Portfolios										
$EPSG_{mean,ltg}$	0.023[c]	-0.048	-0.077[a]	-0.036					51	0.01
	(3.146)	(-0.985)	(-1.696)	(-0.745)						
	0.021[a]	0.064	-0.031	-0.001	-0.392	0.186	0.023	-0.021	51	0.01
	(1.702)	(0.690)	(-0.490)	(-0.041)	(-1.448)	(0.963)	(0.652)	(-0.206)		
$CF1G_{mean,ltg}$	0.034	-0.025	-0.043	-0.008					38	-0.06
	(1.176)	(-0.337)	(-0.774)	(-0.131)						
	0.032	-0.024	-0.045	0.000	-0.024	0.004	0.032	-0.020	38	-0.08
	(1.078)	(-0.327)	(-0.746)	(0.011)	(-0.228)	(0.032)	(1.172)	(-0.267)		
Panel B: Value-weighted 5-year Growth Based Portfolios										
$EPSG_{vw,ltg}$	0.009[c]	-0.042	-0.023	-0.019					51	-0.01
	(3.135)	(-1.561)	(-0.778)	(-0.689)						
	0.004	-0.046	-0.011	-0.000	0.019	0.112a	0.002	-0.023	51	0.01
	(0.660)	(-1.368)	(-0.415)	(-0.030)	(0.186)	(1.702)	(0.105)	(-0.444)		
$CF1G_{vw,ltg}$	0.006[a]	-0.022	-0.019	-0.006					38	0.03
	(1.958)	(-1.204)	(-1.281)	(-0.547)						
	0.005	-0.030	-0.024	-0.012	0.026	0.027	-0.000	0.007	38	-0.06
	(1.880)	(-1.720)	(-1.474)	(-0.947)	(0.753)	(0.791)	(-0.618)	(0.346)		
Panel C: Index 5-year Growth Based Portfolios										
$EPSG_{index,ltg}$	0.037[b]	-0.057[a]	-0.035	-0.023					51	0.02
	(2.059)	(-2.006)	(-1.095)	(-0.056)						
	0.047	-0.058[b]	-0.026	-0.025	-0.696	0.446	-0.275[c]	-0.155	51	-0.01
	(1.694)	(-2.171)	(-0.862)	(-0.601)	(-1.301)	(0.646)	(-2.897)	(-0.447)		
$CF1G_{index,ltg}$	0.019	0.020	0.033	0.055					38	-0.06
	(1.206)	(0.404)	(0.545)	(1.086)						
	0.014	0.008	0.039	0.071	-0.234	0.337	-0.074	-0.291	38	-0.07
	(0.586)	(0.227)	(0.651)	(1.206)	(-0.518)	(1.251)	(-1.087)	(-1.038)		

Table 2.5. Regressions using Industry based Portfolios and 1-year growth rates, 1950-2006

This table reports pooled cross-section and time-series regression results of industry-based growth portfolios. Mean growth rates of industries are computed using mean individual firm's growth rates for years for which at least 5 observations are available within the period 1950-2006 for $EPSG_{mean}$ and for 1962-2006 for $CF1G_{mean}$. Panel A reports pooled cross-section and time-series regression results from regressing mean industry growth rates on lagged dependent variables and four macro-variables (as defined in table 2.1). Panel B reports pooled cross-section and time-series regression results from regressing mean growth rates on lagged dependent variables, the industry Herfindal index (HHI), the industry capital intensity (CI), industry type (TYPE) and their interactive effects with the dependent variable. The capital intensity (CI) for each industry is calculated as the average ratio of net property, plant and equipment divided by total assets for the top five firms in terms of market share; the Herfindal Index (HHI) is a proxy of industry concentration and is measured using the top five firms in terms of market share in each industry; and TYPE is a dummy variable that classifies industries as durables or nondurables & services (takes the value of 1 for durables and 0 otherwise). GMM regression T-statistics corrected for herteroscedasticity and autocorrelation using Newey and West are reported in the parentheses. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

Panel A: Mean Industry Growth based Portfolios

	γ_0	γ_1	λ_2	γ_3	β_{GDPG}	β_{EIPG}	β_{TERM}	β_{DEF}	Adj. R^2
$EPSG_{mean}$	0.046 [c]	0.124 [b]	-0.042	-0.054					0.01
	(4.327)	(2.526)	(-0.869)	(-1.146)					
	0.024	0.180 [c]	0.028	-0.032	-1.101 [c]	1.107 [c]	0.268 [c]	0.005	0.05
	(1.233)	(4.448)	(0.684)	(-0.781)	(-2.858)	(3.962)	(3.298)	(0.018)	
$CF1G_{mean}$	0.230 [c]	-0.124 [c]	-0.031	-0.025					0.02
	(5.498)	(-3.711)	(-1.075)	(-0.865)					
	0.281 [c]	-0.119 [c]	-0.028	-0.021	-1.056	-0.475	0.034	0.225	0.03
	(5.803)	(-3.704)	(-0.987)	(-0.730)	(-1.504)	(-1.051)	(0.337)	(0.548)	

Panel B: Panel regressions of Mean Industry Growth using Industry characteristics

	γ_0	γ_1	γ_2	γ_3	*HHI*	*CI*	*TYPE*	*Lag1*HHI*	*Lag1*CI*	*Lag1*Type*	Adj. R^2
$EPSG_{mean}$	0.054 [c]	0.155 [c]	-0.039	-0.049	0.001	-0.012 [a]	-0.014 [a]				0.04
	(4.170)	(3.068)	(-0.781)	(-0.986)	(-0.113)	(-1.885)	(-1.852)				
	0.057 [c]	0.112	-0.042	-0.045	0.000	-0.013 [a]	-0.017 [b]	-0.009	0.071	0.067	0.04
	(4.203)	(1.371)	(-0.836)	(-0.915)	(-0.010)	(-1.832)	(-2.286)	(-0.478)	(0.903)	(1.407)	
$CF1G_{mean}$	0.269 [c]	-0.139 [c]	-0.039	-0.010	-0.003	-0.061 [a]	-0.001				0.02
	(7.713)	(-3.448)	(-1.107)	(-0.301)	(-0.576)	(-1.825)	(-0.033)				
	0.264 [c]	-0.196 [c]	-0.043	-0.006	0.003	-0.474 [b]	-0.017	-0.005	0.686	0.089	0.03
	(8.267)	(-3.047)	(-1.239)	(-0.185)	(1.345)	(-2.254)	(-1.108)	(-1.293)	(1.101)	(1.565)	

Table 2.6. Regressions using Industry Based Portfolios and 5-year Growth Rates, 1950-2006

This table reports pooled cross-section and time-series regression results fOR industry-based growth portfolios. Mean 5-year growth rates of industries are computed using annualized mean individual firm's growth rates for years for which at least 5 observations are available within the period 1950-2006 for $EPSG_{mean}$ and for 1962-2006 for $CF1G_{mean}$. Panel A reports pooled cross-section and time-series regression results from regressing 5-year mean industry growth rates on lagged 1-year growth rates and four macro-variables (as defined in table 2.1). Panel B reports pooled cross-section and time-series regression results from regressing 5-year mean growth rates on lagged 1-year growth rates, the industry Herfindal index (HHI), the industry capital intensity (CI), industry type (TYPE) and their interactive effects with the dependent variable. The capital intensity (CI) for each industry is calculated as the average ratio of net property, plant and equipment divided by total assets for the top five firms in terms of market share; the Herfindal Index (HHI) is a proxy of industry concentration and is measured using the top five firms in terms of market share in each industry; and TYPE is a dummy variable that classifies industries as durables or nondurables & services (takes the value of 1 for durables and 0 otherwise). GMM regression T-statistics corrected for herteroscedasticity and autocorrelation using Newey and West are reported in the parentheses. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	γ_0	γ_1	λ_2	γ_3	β_{GDPG}	β_{EIPG}	β_{TERM}	β_{DEF}			Adj. R^2
Panel A: Mean Industry Growth Based Portfolios											
$EPSG_{mean,ltg}$	0.060[c]	0.002	0.002	0.016							-0.00
	(17.813)	(0.151)	(0.149)	(1.396)							
	0.063[c]	0.004	0.0006	0.015	-0.037	-0.031	-0.004	0.003			-0.00
	(15.139)	(0.301)	(0.045)	(1.258)	(-0.372)	(-0.472)	(-0.294)	(0.048)			
$CF1G_{mean,ltg}$	0.069[c]	0.009	-0.001	0.005							-0.00
	(18.890)	(1.562)	(-0.132)	(0.883)							
	0.068[c]	0.009	-0.001	0.005	0.004	0.011	0.021	0.044			-0.00
	(12.916)	(1.573)	(-0.160)	(0.908)	(0.056)	(0.158)	(1.373)	(0.543)			
Panel B: Panel Regressions of Mean Industry Growth using Industry Characteristics											
	γ_0	γ_1	γ_2	γ_3	*HHI*	*CI*	*TYPE*	*Lag1*HHI*	*Lag1*CI*	*Lag1*Type*	Adj. R^2
$EPSG_{mean,ltg}$	0.067[c]	-0.001	-0.006	0.005	0.446	0.059	-0.024 [c]				0.02
	(17.147)	(-0.070)	(-0.489)	(0.589)	(1.380)	(1.220)	(-4.773)				
	0.065[c]	0.023	-0.004	0.005	0.368	0.084	-0.024[c]	0.001	-0.508	0.004	0.02
	(16.124)	(0.980)	(-0.340)	(0.477)	(1.086)	(1.557)	(-4.479)	(1.033)	(-1.599)	(0.131)	
$CF1G_{mean,ltg}$	0.060 [c]	0.009	0.002	0.002	-0.143	0.177[c]	0.0009				0.01
	(13.433)	(1.421)	(0.302)	(0.317)	(-0.404)	(3.104)	(0.825)				
	0.061 [c]	0.002	0.003	0.002	-0.247	0.149[a]	0.004	0.497	0.197	-0.016	0.01
	(11.126)	(0.154)	(0.344)	(0.300)	(-0.644)	(1.924)	(0.943)	(0.612)	(0.835)	(-1.130)	

Table 2.7. Matrix of correlations for the cross-sectional regressions, 1962-2006

This table reports correlation values for the time series of firms' growth rates and other attributes. Correlation matrices are computed for each firm from 1963 to 2006 and then averaged across firms. Growth rates are computed for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate EPS for at least two successive years over the 45-year period, 1962-2006. EPS values are computed using Income before Extraordinary items and Number of Common shares outstanding from COMPUSTAT. Summary statistics and correlation values are reported for real EPSG for the typical or median firm portfolio ($EPSG_{ew}$), and for the total-asset-weighted portfolio ($EPSG_{vw}$). $CF1G$ is the growth rate of the cash component of *EPS* obtained by reflecting the traditional adjustments to accrual flows for changes in net working capital and depreciation to obtain cash flows. Cash-flow growth rates are calculated using data from 1962 to 2006 since prior to 1962 there was not enough data to compute the cash-flow component of accrual earnings. Summary statistics and correlation values are reported for real growth on the typical or median firm portfolio ($CF1G_{ew}$), and on the total-asset-weighted portfolio ($CF1G_{vw}$). *BM* is the ratio of book equity to market equity and is measured as the book value of stockholders' equity over the market value of equity; *EP* is the total earnings of the last fiscal year end divided by the price at the end of December of the current year; *DP* is the total dividend paid between past July and current June divided by the price at June; *Size* is the log of total assets; *IBESG* is the implied earnings growth rate based on IBES earnings forecasts; *IBESLTG* is the IBES long-term growth forecast; AGE is the firm's age starting from the first year it appears on COMPUSTAT; CI is the average capital intensity of the firm's industry among the past three years; HHI is the average concentration ratio of the firm's industry among the past three years; *Analyst* is the number of analysts covering the stock; *SD EPSG* is the standard deviation of past earnings growth rates measured using a 5-year rolling window; *SD CF1G* is the standard deviation of past cash-earnings growth rates based on the traditional definition of cash-flow and measured using a 5-year rolling window; *RET6* is the six-month compound return. ^{a}, ^{b} and ^{c} indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	EPSG	*CF1G*	*CF2G*	*BM*	*DP*	*EP*	*SIZE*	*IBESG*	*LTG*	*AGE*	*Analyst*	*CI*	*HHI*	*SD EPSG*	*SD CF1G*	*RET*
EPSG	1.000															
CF1G	0.401^{c}	1.000														
BM	-0.158	0.077	0.184	1.000												
DP	-0.126	-0.171	-0.039	0.426^{c}	1.000											
EP	-0.594^{c}	-0.328^{b}	0.014	-0.022	0.591^{c}	1.000										
SIZE	0.058	-0.052	-0.015	0.154	0.249	0.369^{b}	1.000									
IBESG	0.588^{c}	0.247	-0.156	0.010	-0.122	-0.449^{c}	0.049	1.000								
LTG	0.321^{b}	0.028	-0.093	-0.593^{c}	-0.408^{c}	-0.523^{c}	-0.482^{c}	0.248	1.000							
AGE	-0.427^{c}	-0.232	0.013	0.186	0.419^{c}	0.449^{c}	0.609^{c}	-0.175	-0.598^{c}	1.000						
Analyst	0.197	-0.064	-0.151	-0.310^{b}	0.157	-0.022	-0.195	0.204	0.429^{c}	-0.246	1.000					
CI	-0.086	0.060	0.200	0.086	-0.209	0.065	0.061	-0.120	-0.132	-0.011	-0.302^{a}	1.000				
HHI	0.086	0.253^{a}	0.020	0.108	-0.002	-0.043	-0.102	0.258^{a}	-0.220	-0.032	-0.278^{a}	-0.267^{a}	1.000			
SD EPSG	0.205	0.147	0.210	0.095	-0.099	-0.423^{c}	-0.131	0.266^{a}	0.064	0.003	-0.258^{a}	-0.167	0.330^{a}	1.000		
SD CF1G	0.050	-0.122	-0.269^{a}	0.312^{b}	0.312^{b}	0.080	0.302^{a}	0.393^{c}	-0.213	0.216	0.013	0.044	-0.031	0.251	1.000	
RET	-0.008	-0.083	-0.083	0.425^{c}	-0.080	0.037	0.232	0.417	-0.039	0.168	-0.077	0.038	0.115	0.163	0.159	1.000

Table 2.8. Cross-sectional Regressions of 1-year Earnings Growth Rates for Individual Firms, 1950-2006

This table reports results of cross-sectional regressions for annual growth rates of earnings per share (EPS) for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate EPS for at least two successive years. EPS growth rates (EPSG) are computed over the 57-year period, 1950-2006, using Income before Extraordinary items and Number of Common shares outstanding from COMPUSTAT. *BM*, *EP* and *Size* are firm *j*'s book-to-market ratio, earnings yield, and log of firm value, all of which are measured at the end of the year t-1. DP is the dividend yield (i.e., ratio of total dividends paid from July t-2 to June t-1 to share price in June of t-1). IBESG is the implied EPS growth based on the consensus forecast of current year's earnings at the end of Dec of year t-1. *Age* is the firm's age and is proxied by the number of years of Compustat listing. *Exch* is a dummy variable which is equal to 1 if the stock is listed on NASDAQ and is 0 otherwise. *CI* and *HHI* are the firm's average value of capital intensity and concentration during the past 3 years. TYPE is a dummy variable which is equal to 1 for nondurables and 0 otherwise. SD is the standard deviation of EPS (if at least 5 years of data are available). ANA is the number of analysts making such forecasts. RET is the compound six-month return computed at the end of year t-1. Regressions are estimated by GMM and T-statistics which are reported in the parentheses are corrected for heteroscedasticity and autocorrelation using the Newey and West procedure. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$EPSG_t$	0.025 [c]	0.017 [c]	-0.172 [c]	-0.020 [a]	-0.041 [b]	0.183 [c]	-0.131 [c]
	(3.421)	(3.243)	(-4.995)	(-1.815)	(-2.079)	(3.563)	(-2.837)
$EPSG_{t-1}$	-0.019 [c]	-0.021 [c]	-0.027	-0.031	-0.029	-0.014	-0.065 [c]
	(-3.158)	(-3.826)	(-0.968)	(-1.401)	(-1.601)	(-0.635)	(-2.884)
$EPSG_{t-2}$	-0.017 [c]	-0.016 [c]	-0.006	-0.025	-0.029	-0.019	-0.024
	(-2.585)	(-2.959)	(-0.235)	(-1.433)	(-1.566)	(-0.884)	(-0.981)
BM_t		0.0003					-0.067 [c]
		(1.033)					(-3.159)
DP_{t-1}		0.009 [c]					0.0003
		(3.786)					(-1.070)
EP_t		-0.0003					0.0006[b]
		(-0.913)					(-2.368)
$Size_t$		-0.004 [c]					0.005
		(-5.067)					(1.277)
$IBES_t$			0.339 [c]				0.329 [c]
			(5.723)				(5.342)
LTG_t			0.003 [c]				0.003 [c]
			(3.348)				(3.780)
$Age_t * EPSG_t$						-0.004 [c]	-0.003 [c]
						(-3.986)	(-2.999)
$Exch * EPSG_t$					0.042 [a]		0.015
					(1.762)		(0.303)
$CI_t * EPSG_t$						-0.104 [c]	-0.049
						(-3.726)	(-1.291)
$HHI_t * EPSG_t$					0.018 [a]		-0.006
					(1.718)		(-0.430)
$TYPE_t * EPSG_t$					0.060 [b]		0.062
					(2.565)		(1.678)
$ANA_t * EPSG_t$						-0.002	0.0001
						(-1.407)	(0.175)
$SD_t * EPSG_t$						-0.120	-0.004
						(-1.145)	(-2.173)
RET_t				0.976 [c]			1.418 [c]
				(5.155)			(6.529)
$RET_t * EPSG_t$				0.432 [c]	0.223 [b]		0.931[c]
				(2.653)	(2.204)		(3.909)
R^2	0.03	0.06	0.06	0.07	0.09	0.09	0.12

Table 2.9. Cross-sectional Regressions of 1-year Cash-flow Growth Rates for Individual Firms, 1962-2006

This table reports results of cross-sectional regressions for annual growth rates of traditionally measured cash-flows per share for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate cash-flow for at least two successive years. *CF1G* is obtained by reflecting the traditional adjustments to accrual flows for changes in net working capital and depreciation. *BM*, *EP* and *Size* are firm j's book-to-market ratio, earnings yield, and log of the firm value all of which are measured at the end of the year t-1. DP is the dividend yield (i.e., ratio of total dividends paid from July t-2 to June t-1 to share price in June of t-1). *IBESG* is the implied EPS growth based on the consensus forecast of current year's earnings at the end of Dec of year t-1. *ANA* is the number of analysts making such forecasts. *Age* is the firm's age and is proxied by the number of years of Compustat listing. *Exch* is a dummy variable which is equal to 1 if the stock is listed on NASDAQ and is 0 otherwise. *CI* and *HHI* are firm's average values of capital intensity and concentration during the past 3 years. TYPE is a dummy variable which isequal to 1 for durables and is 0 otherwise. SD is the standard deviation of EPS (if at least 5 years of data are available). RET is the compound six-month return computed at the end of year t-1. GMM is used in the estimation and the T-statistics are reported in the parentheses and are corrected for heteroscedasticity and autocorrelation using the Newey and West procedure. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$CF1G_t$	-0.354[c]	-0.354[c]	-0.411[c]	-0.368[c]	-0.219[c]	-0.579[c]	-0.423
	(-10.314)	(-10.292)	(-15.202)	(-11.267)	(-4.798)	(-12.065)	(-14.341)
$CF1G_{t-1}$	-0.113[c]	-0.125[c]	-0.163[c]	-0.138[c]	-0.119[c]	-0.109[c]	-0.179
	(-3.852)	(-4.273)	(-9.155)	(-4.711)	(-4.340)	(-3.783)	(-10.371)
$CF1G_{t-2}$	-0.025	-0.037[a]	-0.045[c]	-0.048[b]	-0.027	-0.026	-0.055
	(-1.190)	(-1.742)	(-2.756)	(-2.223)	(-1.357)	(-1.261)	(-2.795)
BM_t		-0.003[a]					-0.069
		(-1.678)					(-3.831)
DP_{t-1}		-0.001					-0.002
		(-1.227)					(-2.218)
EP_t		0.001[c]					-0.033
		(-2.760)					(-0.813)
$Size_t$		-0.019[c]					-0.035
		(-7.839)					(-0.971)
$IBES_t$			0.209[c]				0.191
			(5.846)				(3.869)
LTG_t			0.007[c]				0.005
			(5.002)				(3.324)
$Age_t * EPSG_t$					-0.004[c]		-0.001
					(-3.177)		(-0.759)
$Exch * EPSG_t$							0.126[a]
							(1.806)
$CI_t * EPSG_t$					-0.105[c]		-0.011
					(-5.741)		(-0.246)
$HHI_t * EPSG_t$						0.032[c]	0.008
						(2.898)	(0.390)
$TYPE_t * EPSG_t$							-0.056
							(-0.947)
$ANA_t * EPSG_t$							0.001
							(0.304)
$SD_t * EPSG_t$						0.248[c]	-0.0003
						(7.920)	(-0.415)
RET_t				-0.141			0.272
				(-0.822)			(1.168)
$RET_t * EPSG_t$				0.298			1.840[c]
				(1.009)			(3.002)
R^2	0.10	0.12	0.14	0.11	0.13	0.13	0.17

Table 2.10. Cross-sectional Regressions of 5-year Earnings Growth Rates for Individual Firms, 1950-2006

This table reports results of cross-sectional regressions for 5-year annual growth rates of earnings per share (EPS) for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate EPS for at least two successive years. EPS growth rates (EPSG) are computed over the 57-year period, 1950-2006, using Income before Extraordinary items and Number of Common shares outstanding from COMPUSTAT. *BM*, *EP* and *Size* are firm *j*'s book-to-market ratio, earnings yield, and log of firm value, all of which are measured at the end of the year t-1. DP is the dividend yield (i.e., ratio of total dividends paid from July t-2 to June t-1 to share price in June of t-1). IBESG is the implied EPS growth based on the consensus forecast of current year's earnings at the end of Dec of year t-1. *Age* is the firm's age and is proxied by the number of years of Compustat listing. *Exch* is a dummy variable which is equal to 1 if the stock is listed on NASDAQ and is 0 otherwise. *CI* and *HHI* are the firm's average value of capital intensity and concentration during the past 3 years. TYPE is a dummy variable which is equal to 1 for nondurables and 0 otherwise. SD is the standard deviation of EPS (if at least 5 years of data are available). ANA is the number of analysts making such forecasts. RET is the compound six-month return computed at the end of year t-1. Regressions are estimated by GMM and T-statistics which are reported in the parentheses are corrected for heteroscedasticity and autocorrelation using the Newey and West procedure. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
$EPSG_t$	-0.030[c]	-0.026[b]	-0.038[a]	-0.035[c]	-0.082	0.071
	(-2.838)	(-2.133)	(-1.722)	(-2.942)	(-2.102)	(1.017)
$EPSG_{t-1}$	-0.027[b]	-0.029[c]	-0.021	-0.030[b]	-0.027	-0.019
	(-2.476)	(-2.588)	(-1.111)	(-2.570)	(-1.833)	(-1.145)
$EPSG_{t-2}$	-0.011	-0.010	-0.009	-0.010	-0.012	0.0005
	(-0.999)	(-0.851)	(-0.681)	(-0.862)	(-0.930)	(0.458)
BM_t		-0.017				-0.016
		(-3.377)				(-1.531)
DP_{t-1}		-0.001[b]				-0.001[b]
		(-2.289)				(-2.523)
EP_t		-0.0007[c]				0.005[b]
		(-3.009)				(1.985)
$Size_t$		-0.001				0.005[c]
		(-1.592)				(3.530)
$IBES_t$			0.010			-0.002
			(0.343)			(-0.080)
LTG_t			0.004[c]			0.004[c]
			(4.938)			(4.145)
$Age_t * EPSG_t$						-0.003[c]
						(-2.998)
$Exch * EPSG_t$					0.089[c]	-0.022
					(3.310)	(-0.545)
$CI_t * EPSG_t$						-0.006
						(-0.302)
$HHI_t * EPSG_t$						-0.009
						(-0.730)
$TYPE_t * EPSG_t$						-0.011
						(-0.360)
$ANA_t * EPSG_t$					0.002	-0.0006
					(1.409)	(-0.379)
$SD_t * EPSG_t$						0.0003[a]
						(1.658)
RET_t				0.113		0.265[c]
				(1.500)		(3.166)
$RET_t * EPSG_t$				0.599[c]	0.794[c]	0.340
				(4.005)	(2.861)	(1.095)
R^2	0.003	0.01	0.04	0.007	0.007	0.14

Table 2.11. Cross-sectional Regressions of 5-year Cash-flow Growth Rates for Individual Firms, 1962-2006

This table reports results of cross-sectional regressions for annual 5-year growth rates of traditionally measured cash-flows per share for all publicly traded U.S. firms in the historical COMPUSTAT database that are incorporated in the United States, have a December fiscal year end, and have data to calculate cash-flow for at least two successive years. *CF1G* is obtained by reflecting the traditional adjustments to accrual flows for changes in net working capital and depreciation. *BM*, *EP* and *Size* are firm j's book-to-market ratio, earnings yield, and log of the firm value all of which are measured at the end of the year t-1. DP is the dividend yield (i.e., ratio of total dividends paid from July t-2 to June t-1 to share price in June of t-1). *IBESG* is the implied EPS growth based on the consensus forecast of current year's earnings at the end of Dec of year t-1. *ANA* is the number of analysts making such forecasts. *Age* is the firm's age and is proxied by the number of years of Compustat listing. *Exch* is a dummy variable which is equal to 1 if the stock is listed on NASDAQ and is 0 otherwise. *CI* and *HHI* are firm's average values of capital intensity and concentration during the past 3 years. TYPE is a dummy variable which is equal to 1 for durables and is 0 otherwise. SD is the standard deviation of EPS (if at least 5 years of data are available). RET is the compound six-month return computed at the end of year t-1. GMM is used in the estimation and the T-statistics are reported in the parentheses and are corrected for heteroscedasticity and autocorrelation using the Newey and West procedure. [a], [b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
$CF1G_t$	-0.040 [c]	-0.043 [c]	-0.061	-0.044	-0.008	-0.631[c]
	(-11.800)	(-12.258)	(-10.703)	(-8.878)	(-1.172)	(-8.772)
$CF1G_{t-1}$	-0.003	-0.009 [c]	-0.024	-0.006	-0.004	-0.021[c]
	(-1.015)	(-2.943)	(-2.933)	(-1.550)	(-1.482)	(-2.757)
$CF1G_{t-2}$	0.004	-0.0004	-0.006	0.002	0.005	-0.010[b]
	(1.300)	(-0.133)	(-1.350)	(0.645)	(1.201)	(-2.256)
BM_t		-0.022 [c]				-0.009
		(-3.220)				(-1.016)
DP_{t-1}		0.0002				-0.001[c]
		(0.116)				(-3.807)
EP_t		-0.0002 [c]				-0.247[c]
		(-2.646)				(-3.071)
$Size_t$		-0.006 [c]				0.005[c]
		(-7.255)				(3.116)
$IBES_t$			0.032[b]			0.020
			(2.255)			(1.087)
LTG_t			0.006[c]			0.004[c]
			(11.016)			(9.015)
$Age_t * EPSG_t$					-0.001[c]	-0.001[c]
					(-3.470)	(-2.684)
$Exch * EPSG_t$						0.019
						(0.672)
$CI_t * EPSG_t$					-0.014[c]	0.014
					(-3.898)	(1.057)
$HHI_t * EPSG_t$						0.002
						(0.131)
$TYPE_t * EPSG_t$						0.005
						(0.210)
$ANA_t * EPSG_t$						0.002[b]
						(1.988)
$SD_t * EPSG_t$						-0.045[c]
						(5.734)
RET_t				0.101[a]		0.225[c]
				(1.815)		(2.822)
$RET_t * EPSG_t$				0.050		0.086
				(0.450)		(0.251)
R^2	0.03	0.06	0.18	0.04	0.04	0.28

Table 3.1. Descriptive Statistics for the Volatilities and Covariances of Bias-unadjusted Changes in EROE (VΔEROE), 1977-2003

This table reports descriptive statistics for the volatilities of monthly changes in expected returns on equity (EROE1, EROE2, and EROE3) for year t, year t+1, and year t+2, respectively. EROE1, EROE2 and EROE3 are measured using monthly IBES EPS forecasts for EPS at the end of year t, t+1 and t+2, respectively, multiplied by the number of common shares, and divided by the value of equity at the end of year t-1. COV12, COV13 and COV23 are the covariances between the changes of forecasts for year t and t+1, t and t+2 and t+1 and t+2, respectively. The sample of forecasts is from 1977 to 2003, except for the 3-year forecasts which start from 1983.

		1977-2005	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2003
Panel A: Volatility of equal-weighted and value-weighted unadjusted changes in EROE								
$V\Delta EROE1_{ew}$	Firms	2081	953	1296	1622	2116	3476	2996
	Mean	0.0021	0.0007	0.0014	0.0023	0.0020	0.0030	0.0031
	Stddev	0.0010	0.0002	0.0004	0.0003	0.0002	0.0003	0.0011
	Skew	0.2136	-0.3209	0.7556	0.6022	0.4395	-0.2381	-0.9409
	Kurt	2.4084	2.1208	2.6123	3.5624	2.9522	2.3892	2.7864
$V\Delta EROE2_{ew}$	Firms	1994	884	1244	1546	2041	3335	2883
	Mean	0.0027	0.0004	0.0016	0.0026	0.0031	0.0045	0.0039
	Stddev	0.0015	0.0001	0.0006	0.0004	0.0004	0.0005	0.0015
	Skew	0.0571	0.6002	0.4341	0.3177	0.1193	0.2476	-0.6303
	Kurt	2.0692	2.3993	2.3399	2.4141	2.8118	3.1927	1.9419
$V\Delta EROE3_{ew}$	Firms	932	*NA*	316	359	826	1370	1423
	Mean	0.0035	*NA*	0.0041	0.0023	0.0034	0.0046	0.0034
	Stddev	0.0015	*NA*	0.0025	0.0017	0.0009	0.0007	0.0012
	Skew	-0.1823	*NA*	-0.4015	1.1545	-0.0785	0.6433	-0.6432
	Kurt	2.4977	*NA*	2.2827	3.1499	2.7015	3.2762	2.3119
$V\Delta EROE1_{vw}$	Firms	2081	953	1296	1622	2116	3476	2996
	Mean	0.0008	0.0002	0.0004	0.0007	0.0010	0.0010	0.0011
	Stddev	0.0005	0.0000	0.0002	0.0002	0.0005	0.0003	0.0009
	Skew	1.3047	0.1538	2.1865	1.2874	0.6040	-0.1298	0.2855
	Kurt	4.6209	2.4985	8.0370	5.6125	1.7371	2.4462	2.0443
$V\Delta EROE2_{vw}$	Firms	1994	884	1244	1546	2041	3335	2883
	Mean	0.0012	0.0002	0.0006	0.0010	0.0019	0.0016	0.0016
	Stddev	0.0008	0.0001	0.0002	0.0002	0.0005	0.0004	0.0013
	Skew	0.6776	0.6090	0.3606	1.1279	-0.0844	0.4480	-0.0335
	Kurt	2.8802	3.2487	1.8758	4.2373	1.9205	3.0235	1.4993
$V\Delta EROE3_{vw}$	Firms	932	*NA*	316	359	826	1370	1423
	Mean	0.0015	*NA*	0.0014	0.0010	0.0019	0.0019	0.0013
	Stddev	0.0009	*NA*	0.0009	0.0009	0.0006	0.0006	0.0010
	Skew	-0.0624	*NA*	-0.4298	1.0656	0.7237	1.9045	-0.3287
	Kurt	2.6006	*NA*	2.3075	2.9740	3.2629	6.3404	1.3481

Table 3.1. Continued.

Panel B: Covariances of unadjusted changes in EROE								
COV12	Mean	0.0004	0.0001	0.0002	0.0003	0.0004	0.0006	0.0009
	Stddev	0.0003	0.0000	0.0001	0.0001	0.0001	0.0001	0.0004
	Skew	1.4460	1.0008	0.5180	0.0791	0.1173	0.1429	-0.4536
	Kurt	4.9819	3.6960	1.7873	2.0957	2.8231	1.8418	2.1657
COV13	Mean	0.0002	*NA*	0.0002	0.0002	0.0002	0.0002	0.0003
	Stddev	0.0001	*NA*	0.0001	0.0001	0.0001	0.0001	0.0002
	Skew	0.7375	*NA*	-0.6495	0.2055	-0.1211	-0.1298	-0.0808
	Kurt	3.6469	*NA*	2.0330	1.9135	2.3285	1.9855	2.1303
COV23	Mean	0.0007	*NA*	0.0012	0.0008	0.0007	0.0008	0.0007
	Stddev	0.0004	*NA*	0.0007	0.0001	0.0003	0.0001	0.0004
	Skew	0.5904	*NA*	-0.8770	0.2607	0.1585	0.3542	-0.3937
	Kurt	3.6963	*NA*	2.0302	2.8061	2.6968	2.9502	2.1074

Panel C: Correlation matrix						
$V\Delta EROE1_{ew}$	1.000					
$V\Delta EROE2_{ew}$	0.801	1.000				
$V\Delta EROE3_{ew}$	0.392	0.531	1.000			
COV12	0.797	0.744	0.335	1.000		
COV13	0.608	0.712	0.581	0.683	1.000	
COV23	0.319	0.363	0.810	0.343	0.592	1.000

Table 3.2. Descriptive Statistics for the Volatilities and Covariances of Bias-adjusted Changes in ROE Expectations (VΔAEROE), 1977-2003

This table reports descriptive statistics for the volatility of monthly changes in bias-adjusted expected return on equity (AEROE1, AEROE2, and AEROE3) for year t, year t+1, and year t+2, respectively. EROE is measured using monthly bias-adjusted IBES EPS forecasts for EPS at the end of year t, t+1 and t+2 multiplied by the number of common shares and divided by the value of equity at the end of year t-1. IBES EPS forecasts are corrected for forecast bias using average historical biases as shown in equations (3.6)-(3.9). COV12, COV13 and COV23 measure the covariances between the bias-adjusted changes of forecasts for year t and t+1, t and t+2 and t+1 and t+2, respectively. The sample of forecasts is from 1977 to 2003, except for the 3-year forecasts where the bias-adjusted values are computed starting from 1986.

		1977-2005	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2003
Panel A: Volatilities of equal- and value-weighted bias-adjusted changes in EROE								
	Firms	1331	604	941	1088	1322	1967	2070
	Mean	0.005	0.002	0.004	0.006	0.005	0.006	0.007
$V\Delta AEROE1_{ew}$	Stddev	0.002	0.001	0.002	0.001	0.000	0.001	0.002
	Skew	-0.277	0.993	-0.365	1.331	0.290	0.180	-1.357
	Kurt	2.726	6.263	1.794	5.071	2.511	1.707	3.816
	Firms	1331	604	941	1088	1322	1967	2070
	Mean	0.003	0.001	0.001	0.002	0.003	0.005	0.007
$V\Delta AEROE2_{ew}$	Stddev	0.002	0.0004	0.001	0.001	0.0004	0.001	0.001
	Skew	0.689	3.808	0.470	1.496	1.152	0.864	-0.201
	Kurt	2.726	17.432	1.831	3.561	3.220	2.757	3.651
	Firms	371	*NA*	*NA*	68	310	512	520
	Mean	0.005	*NA*	*NA*	0.003	0.006	0.004	0.005
$V\Delta AEROE3_{ew}$	Stddev	0.002	*NA*	*NA*	0.002	0.002	0.001	0.002
	Skew	0.658	*NA*	*NA*	-0.147	0.714	0.957	-0.558
	Kurt	3.959	*NA*	*NA*	1.828	1.994	2.811	2.412
	Firms	1331	604	941	1088	1322	1967	2070
	Mean	0.0015	0.0004	0.0010	0.0012	0.0031	0.0014	0.0018
$V\Delta AEROE1_{vw}$	Stddev	0.0014	0.0002	0.0005	0.0002	0.0022	0.0006	0.0012
	Skew	2.2068	2.6674	-0.1068	0.9450	0.6322	1.3480	-0.2405
	Kurt	8.7329	12.9308	1.4657	3.5037	2.1177	4.0802	2.3055
	Firms	1331	604	941	1088	1322	1967	2070
	Mean	0.0013	0.0005	0.0006	0.0010	0.0018	0.0017	0.0024
$V\Delta AEROE2_{vw}$	Stddev	0.0008	0.0004	0.0002	0.0002	0.0005	0.0004	0.0010
	Skew	0.8585	2.6692	0.1417	0.0748	-0.0415	1.0297	-0.4501
	Kurt	3.2359	10.9445	1.8646	2.3053	1.8649	3.7856	2.5432
	Firms	371	*NA*	*NA*	68	310	512	520
	Mean	0.0018	*NA*	*NA*	0.0006	0.0030	0.0019	0.0017
$V\Delta AEROE3_{vw}$	Stddev	0.0014	*NA*	*NA*	0.0005	0.0014	0.0010	0.0009
	Skew	0.8706	*NA*	*NA*	-0.2696	0.1737	1.9431	-0.8308
	Kurt	3.2314	*NA*	*NA*	1.3202	1.4674	6.6664	2.4148

Table 3.2. Continued.

		1977-2005	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2003
Panel B: Covariances of bias-adjusted changes in EROE								
COV12	Mean	0.0003	0.0001	0.0002	0.0003	0.0003	0.0005	0.0006
	Stddev	0.0002	0.0000	0.0001	0.0002	0.0001	0.0001	0.0003
	Skew	1.2523	0.4368	-0.0946	0.0256	-0.6246	0.4060	-0.3700
	Kurt	4.4918	3.0838	2.1960	2.3871	3.9527	1.8196	2.2866
COV13	Mean	0.0002	*NA*	*NA*	0.0002	0.0003	0.0003	0.0003
	Stddev	0.0003	*NA*	*NA*	0.0001	0.0003	0.0001	0.0002
	Skew	0.5915	*NA*	*NA*	3.0317	0.5807	1.5286	-0.4647
	Kurt	3.5098	*NA*	*NA*	21.0601	2.4523	5.2989	2.0812
COV23	Mean	0.0007	*NA*	*NA*	0.0005	0.0008	0.0005	0.0008
	Stddev	0.0003	*NA*	*NA*	0.0002	0.0003	0.0002	0.0004
	Skew	0.1901	*NA*	*NA*	-0.1101	0.7331	0.0982	-0.7270
	Kurt	2.6991	*NA*	*NA*	3.2054	2.9331	2.8181	2.6331

Panel C: Correlation matrix						
$V\Delta AEROE1_{ew}$	1					
$V\Delta AEROE2_{ew}$	0.669	1				
$V\Delta AEROE3_{ew}$	0.148	0.279	1			
COV12	0.718	0.827	0.315	1		
COV13	0.309	0.352	0.577	0.279	1	
COV23	0.413	0.374	0.788	0.428	0.471	1

Table 3.3. Descriptive Statistics of Idiosyncratic Volatility Measures, 1977-2005

This table reports descriptive statistics for stock return idiosyncratic volatilities as measured using a single market factor model (IV^{1f}) and a 4-factor model (IV^{4f}) based on the Fama and French (1992) 3-factor and the Carhart (1997) 4-factor models. The reported equal- and value-weighted average monthly stock return idiosyncratic volatilities are measured using daily data. Weights are computed using market capitalizations at the end of the previous month. Panel A reports descriptive statistics for monthly return idiosyncratic volatilities for all CRSP firms. Panel B reports descriptive statistics for CRSP firms which satisfy our data requirements and have IBES forecasts.

		1977-2005	1977-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005
Panel A: All firms (N = 1501088)								
	Firms	3714	1566	1467	2465	3989	6593	6346
IV^{1f}_{ew}	Mean	0.022	0.010	0.014	0.024	0.031	0.047	0.033
	Stddev	0.019	0.003	0.004	0.011	0.005	0.020	0.019
	Skew	1.305	1.052	0.339	2.521	0.808	1.113	1.067
	Kurt	5.259	3.576	2.453	9.269	4.616	3.316	3.628
IV^{1f}_{vw}	Mean	0.005	0.003	0.004	0.004	0.006	0.014	0.008
	Stddev	0.006	0.001	0.001	0.003	0.001	0.009	0.005
	Skew	2.929	1.559	0.325	5.230	0.655	1.615	1.635
	Kurt	14.793	6.558	2.375	34.958	3.736	5.298	5.076
IV^{4f}_{ew}	Mean	0.018	0.009	0.012	0.019	0.027	0.040	0.028
	Stddev	0.016	0.002	0.003	0.008	0.004	0.016	0.015
	Skew	1.284	0.947	0.295	2.241	0.701	1.145	1.062
	Kurt	5.243	3.641	2.342	7.462	4.318	3.433	3.562
IV^{4f}_{vw}	Mean	0.004	0.002	0.003	0.003	0.005	0.011	0.006
	Stddev	0.004	0.001	0.001	0.001	0.001	0.007	0.004
	Skew	2.745	0.719	0.259	2.455	0.460	1.404	1.547
	Kurt	13.352	2.828	2.305	10.767	3.321	4.396	4.834
Panel B: Firms with IBES forecasts (N = 674746)								
	Firms	1914	712	767	1226	2259	3535	2971
$IV^{1f}_{ew,ibes}$	Mean	0.021	0.008	0.010	0.017	0.023	0.039	0.031
	Stddev	0.016	0.002	0.002	0.009	0.004	0.019	0.019
	Skew	1.890	0.727	1.075	2.732	1.404	1.109	0.999
	Kurt	6.816	3.068	4.326	10.177	5.982	3.321	3.288
$IV^{1f}_{vw,ibes}$	Mean	0.006	0.003	0.003	0.004	0.005	0.012	0.007
	Stddev	0.005	0.001	0.001	0.003	0.001	0.008	0.005
	Skew	3.157	1.610	0.659	5.335	0.905	1.606	1.668
	Kurt	15.490	7.759	2.983	36.037	4.257	5.389	5.329
$IV^{4f}_{ew,ibes}$	Mean	0.018	0.007	0.008	0.014	0.019	0.032	0.026
	Stddev	0.013	0.002	0.002	0.006	0.004	0.016	0.016
	Skew	1.910	0.543	0.956	2.570	1.351	1.165	1.048
	Kurt	7.038	2.928	4.018	9.375	5.992	3.571	3.394
$IV^{4f}_{vw,ibes}$	Mean	0.004	0.002	0.003	0.003	0.004	0.010	0.006
	Stddev	0.004	0.001	0.001	0.001	0.001	0.006	0.003
	Skew	2.988	0.440	0.633	2.419	0.622	1.363	1.594
	Kurt	13.906	3.865	3.236	10.570	3.583	4.346	5.173

Table 3.4. Cross-sectional Regression Results using Unadjusted Forecasts

This table reports regression results of stock return idiosyncratic volatilities and volatilities of unadjusted monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.12).

	β_0	β_1	β_2	β_3	β_4	β_5	β_6	R^2
Panel A: Results using one- and two-year forecasts								
1977-	0.012	0.409	0.427		-0.323			0.05
2003	(22.82)	(9.46)	(15.84)		(-5.27)			
1977-	0.005	0.338	0.836		-1.415			0.05
1980	(22.85)	(3.63)	(7.43)		(-8.34)			
1981-	0.006	0.605	0.419		-0.594			0.07
1985	(35.30)	(3.34)	(6.34)		(-3.27)			
1986-	0.008	0.344	0.264		0.059			0.07
1990	(13.84)	(6.64)	(5.13)		(0.56)			
1991-	0.011	0.460	0.309		-0.204			0.04
1995	(44.69)	(4.23)	(8.51)		(-1.68)			
1996-	0.022	0.334	0.381		0.126			0.03
2000	(15.72)	(10.92)	(10.25)		(1.77)			
2001-	0.022	0.332	0.441		0.004			0.03
2003	(11.97)	(7.48)	(9.89)		(0.04)			
Panel B: Results using one-, two- and three-year forecasts								
1985-	0.011	0.221	0.439	0.167	-0.307	-0.017	-0.463	0.11
2003	(17.06)	(4.79)	(13.94)	(6.60)	(-2.77)	(-0.10)	(-3.37)	
1986-	0.004	0.176	0.474	0.024	-0.817	0.138	-0.814	0.11
1990	(19.39)	(1.39)	(7.48)	(0.38)	(-2.85)	(0.27)	(-2.01)	
1991-	0.006	0.194	0.278	0.220	0.160	-0.131	-0.278	0.11
1995	(32.84)	(4.63)	(7.22)	(6.85)	(1.35)	(-1.24)	(-3.19)	
1996-	0.019	0.301	0.469	0.207	-0.128	0.053	-0.282	0.09
2000	(14.24)	(4.78)	(8.66)	(6.96)	(-0.91)	(0.26)	(-2.15)	
2001-	0.019	0.224	0.582	0.301	-0.334	-0.256	-0.356	0.05
2003	(11.50)	(3.51)	(5.89)	(5.73)	(-1.66)	(-2.07)	(-3.24)	

Table 3.5. Cross-sectional Regression Results using Bias-adjusted Forecasts

This table reports regressions of stock return idiosyncratic volatilities and volatilities of bias-adjusted monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.12). The bias in the forecasts of analysts is adjusted using the model developed in equations (3.6) to (3.9).

	β_0	β_1	β_2	β_3	β_4	β_5	β_6	R^2
Panel A: Results using one-year and two-year forecasts								
1977-2003	0.009	0.145	0.241		-0.224			0.05
	(24.28)	(5.80)	(8.43)		(-5.07)			
1977-1980	0.004	0.117	0.381		-0.658			0.04
	(27.18)	(5.32)	(2.70)		(-3.21)			
1981-1985	0.005	0.225	0.289		-0.434			0.09
	(28.62)	(1.72)	(2.97)		(-4.51)			
1986-1990	0.006	0.097	0.210		-0.145			0.04
	(16.76)	(6.79)	(5.45)		(-1.73)			
1991-1995	0.008	0.121	0.164		-0.099			0.04
	(40.81)	(6.67)	(7.95)		(-1.24)			
1996-2000	0.015	0.158	0.198		0.052			0.05
	(15.10)	(12.57)	(13.05)		(0.84)			
2001-2003	0.016	0.148	0.228		-0.123			0.04
	(13.76)	(10.90)	(8.18)		(-2.45)			
Panel B: Results using one-, two- and three-year forecasts								
1985-2003	0.007	0.174	0.290	0.059	0.247	-1.367	0.507	
	(15.79)	(3.42)	(7.86)	(1.89)	(0.96)	(-0.99)	(0.47)	0.14
1986-1990	0.003	0.522	0.351	-0.087	1.275	-1.336	0.864	0.17
	(9.446)	(2.142)	(2.398)	(-0.595)	(1.045)	(-0.892)	(0.516)	
1991-1995	0.004	0.073	0.195	0.044	0.283	-0.139	-0.056	0.15
	(20.84)	(4.09)	(4.99)	(3.21)	(1.56)	(-2.28)	(-1.26)	
1996-2000	0.010	0.127	0.279	0.149	0.009	-0.177	-0.199	0.13
	(12.15)	(4.50)	(9.59)	(8.36)	(0.09)	(-2.25)	(-2.64)	
2001-2003	0.013	0.051	0.403	0.089	-0.456	-0.200	0.148	0.09
	(10.99)	(0.94)	(4.36)	(1.69)	(-1.22)	(-1.24)	(1.42)	

Table 3.6. Time-Series Regression Results using Bias (un)adjusted Forecasts

This table reports time-series and cross-section results of stock return idiosyncratic volatilities and volatilities of monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.13).

	Time*10^5	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	R^2
Panel A: Results using bias-unadjusted forecasts								
1977-2003	3.170	0.109	0.069		0.04			0.20
	(16.05)	(3.33)	(3.21)		(0.59)			
1985-2003	5.080	0.110	0.069		0.04			0.20
	(15.90)	(3.23)	(3.17)		(0.52)			
1985-2003	3.780	0.099	0.094	0.026	0.092	0.086	-0.061	0.21
	(11.28)	(1.71)	(3.29)	(0.96)	(0.98)	(0.58)	(-0.77)	
Panel B: Results using bias-adjusted forecasts								
1977-2003	2.300	0.046	0.061		-0.081			0.25
	(13.54)	(4.43)	(4.04)		(-1.71)			
1985-2003	3.590	0.045	0.060		-0.085			0.25
	(13.61)	(4.27)	(3.82)		(-1.74)			
1985-2003	4.850	0.029	0.093	0.046	-0.021	-0.032	-0.099	0.28
	(8.81)	(1.74)	(3.06)	(1.05)	(-0.31)	(-0.49)	(-1.40)	

Table 3.7. Panel Unit Root Tests

This table presents unit root test results for the volatilities of monthly changes in forecasts of one-, two- and three-year ROE forecasts for bias (un)adjusted variables. All observations are structured into panels, to better capture the impact of persistence in individual series. The three tests are Levin, Lin and Chu (LLC), Breitung, and Im, Pesaran, and Shin (IPS).

	$IV^{4f}_{ew,ibes}$	$V\Delta EROE_1$	$V\Delta EROE_2$	$V\Delta EROE_3$	$V\Delta AEROE_1$	$V\Delta AEROE_2$	$V\Delta AEROE_3$
LLC	-177.50	-95.42	-120.49	-2.61	-99.72	-104.89	-3.74
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Breitung	-62.56	-6.34	-7.25	-0.27	-9.59	-9.44	-2.27
	(0.00)	(0.00)	(0.00)	(0.39)	(0.00)	(0.00)	(0.00)
IPS	-365.90	-55.85	-96.84	-35.66	-65.55	-78.26	-41.52
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 3.8. Time-series Regression Results Controlling for Newly-Listed Firms

This table reports time-series and cross-section results of stock return idiosyncratic volatilities and volatilities of monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.14).

	Time $*10^5$	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	λ_n *Time $*10^5$	$\lambda_n * \delta_2'$	$\lambda_n * \delta_3'$	$\lambda_n * \delta_4'$	$\lambda_n * \delta_5'$	$\lambda_n * \delta_6'$	$\lambda_n * \delta_7'$	R^2
Panel A: Results using bias-unadjusted forecasts															
1977-	3.120	0.103	0.073		0.089			0.249	0.051	-0.015		-0.206			0.23
2003	(15.58)	(2.82)	(2.85)		(1.12)			(1.56)	(0.72)	(-0.41)		(-1.64)			
1985-	5.03	0.104	0.074		0.087			0.268	0.051	-0.014		-0.212			0.21
2003	(15.66)	(2.72)	(2.85)		(1.08)			(1.64)	(0.71)	(-0.38)		(-1.68)			
1985-	3.74	0.056	0.097	0.026	0.146	0.084	-0.050	0.199	-0.097	0.029	0.005	-0.106	-0.089	-0.049	0.20
2003	(11.00)	(1.97)	(3.09)	(0.73)	(1.51)	(0.45)	(-0.50)	(1.00)	(-0.84)	(0.50)	(0.09)	(-0.77)	(-0.45)	(-0.30)	
Panel B: Results using bias-adjusted forecasts															
1977-	2.26	0.039	0.072		-0.064			0.151	0.028	-0.034		-0.060			0.24
2003	(13.16)	(3.98)	(3.97)		(-1.09)			(1.06)	(0.95)	(-1.48)		(0.75)			
1985-	2.64	0.041	0.071		-0.066			0.179	0.030	-0.035		-0.062			0.24
2003	(13.45)	(3.83)	(3.88)		(-1.10)			(1.24)	(0.96)	(-1.42)		(-0.76)			
1985-	4.780	0.033	0.103	0.041	0.028	-0.091	-0.059	0.132	-0.011	-0.083	0.028	0.001	0.228	-0.193	0.28
2003	(8.78)	(1.34)	(3.05)	(0.87)	(0.36)	(-1.19)	(-0.836)	(0.156)	(-0.24)	(-1.24)	(0.56)	(0.05)	(1.97)	(-1.66)	

Table 3.9. Time-series Regression Results Controlling for Earnings Announcements Dates

This table reports time-series and cross–section regression results of stock return idiosyncratic volatilities and volatilities of monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.15).

	Time*10^5	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	λ_a *Time*10^5	$\lambda_a * \delta_2'$	$\lambda_a * \delta_3'$	$\lambda_a * \delta_4'$	$\lambda_a * \delta_5'$	$\lambda_a * \delta_6'$	$\lambda_a * \delta_7'$	R^2
Panel A: Results using bias-unadjusted forecasts															
1977-2003	3.200	0.107	0.073		0.038			-0.217	0.018	-0.042		0.063			0.21
	(16.04)	(3.13)	(3.36)		(0.50)			(-1.66)	(0.34)	(-1.19)		(0.65)			
1985-2003	5.110	0.108	0.074		0.034			-0.212	0.018	-0.043		0.058			0.20
	(15.90)	(3.03)	(3.31)		(0.44)			(-1.61)	(0.33)	(-1.21)		(0.60)			
1985-2003	3.790	0.030	0.100	0.032	0.084	0.096	-0.07	0.927	-0.018	-0.040	-0.082	-0.080	-0.109	0.158	0.20
	(11.21)	(1.71)	(3.23)	(1.15)	(0.85)	(0.62)	(-0.86)	(0.76)	(-0.311)	(-1.26)	(-2.15)	(0.73)	(-0.63)	(1.49)	
Panel B: Results using bias-adjusted forecasts															
1977-2003	2.320	0.041	0.063		-0.077			-0.138	0.017	-0.015		-0.039			0.26
	(13.64)	(4.17)	(4.06)		(-1.54)			(-1.60)	(0.95)	(-0.64)		(-0.41)			
1985-2003	3.61	0.042	0.063		-0.081			-0.141	0.019	-0.016		-0.043			0.25
	(13.67)	(4.02)	(3.85)		(-1.57)			(-1.61)	(1.01)	(-0.67)		(-0.44)			
1985-2003	4.81	0.032	0.098	0.056	-0.043	-0.040	-0.106	0.213	-0.018	-0.044	-0.116	0.148	0.067	0.145	0.29
	(8.87)	(1.77)	(3.06)	(1.26)	(-0.60)	(-0.61)	(-1.44)	(1.49)	(-0.82)	(-2.70)	(-3.16)	(1.67)	(0.56)	(1.41)	

Table 3.10. Time-series Regression Results Controlling for Size, Leverage, and BM

This table reports time-series and cross-section regression results of stock return idiosyncratic volatilities and volatilities of monthly changes in forecasts of one-, two- and three-year ROE, as described in equation (3.16).

	Time *10^5	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	size*10^1	Lev	BM	R^2
Panel A: Results using bias-unadjusted forecasts											
1977-	3.02	0.187	0.250		-0.05			-0.007	-0.001	-0.001	0.12
2003	(18.08)	(8.08)	(11.41)		(-0.81)			(-2.55)	(-2.33)	(-1.53)	
1985-	8.860	0.076	0.124		-0.06			-0.007	-0.003	0.004	0.13
2003	(9.74)	(2.10)	(4.07)		(-0.81)			(-5.99)	(-3.26)	(-1.06)	
1985-	3.27	0.190	0.277	0.069	0.137	-0.196	-0.211	-0.003	-0.002	-0.001	0.15
2003	(17.38)	(6.04)	(9.44)	(8.60)	(1.56)	(-2.67)	(-4.92)	(-8.80)	(-6.09)	(-1.13)	
Panel B: Results using bias-adjusted forecasts											
1977-	1.87	0.070	0.115		0.018			-0.002	-0.002	-0.001	0.12
2003	(17.45)	(6.22)	(6.45)		(0.32)			(-6.36)	(-3.43)	(-1.17)	
1985-	2.68	0.080	0.124		0.057			-0.002	-0.002	-0.001	0.10
2003	(20.81)	(7.27)	(7.00)		(1.06)			(-6.45)	(-5.10)	(-1.56)	
1985-	3.18	0.050	0.077	0.027	0.117	-0.074	0.001	-0.001	-0.002	-0.001	0.12
2003	(15.44)	(4.31)	(3.95)	(2.30)	(2.81)	(-2.89)	(0.05)	(-3.69)	(-5.33)	(-1.56)	

Table 4.1. Number of Firms and Total Assets in the Sample of Nonfinancial Firms, 1960-2003

This table reports averages of the percent of firms and book capital entering, departing and missing for various five-year periods beginning with 1960-64 and finishing with 2000-03. The sample includes all publicly traded nonfinancial firms in the Financial Post database that are incorporated in Canada and for which data on market and book values of capital for any two years between 1960 and 2003 are available. A firm enters the sample at the end of the first fiscal year for which market and book value data are available, and leaves the sample at the end of the last fiscal year for which such data are available. "Firms" is the number of firms at the beginning of each calendar year. A firm is allocated to calendar year *t* if its fiscal year-end is between July 1 of year *t-1* and June 30 of year *t+1*. Book capital is the total end-of-year book value of long-term debt, short-term debt and equity (in billions of 1992 dollars) for firms in the sample. Net long-term debt is used to measure long-term debt and current long-term debt, and when not available current liabilities are used to measure short-term debt. Book equity is total assets minus total liabilities. If total liabilities are not available, book equity is computed as common share equity plus preferred share equity plus retained earnings. "Percent of Firms" refers to the number of firms: (i) entering the sample, (ii) leaving the sample, or (iii) missing either income before extraordinary items or the change in assets, each divided by the number of firms in the sample at the beginning of that year. "Percent of Book Capital" refers to the comparable ratio of the total book capital of the firms in one of the three categories divided by the total book capital of all firms in the sample.

		Percent of Firms				Percent of Book Capital		
Period	Firms	Entering	Departing	Missing	Book Capital	Entering	Departing	Missing
1960-1964	104	3.76	0.00	0.00	51.13	0.51	0.00	0.00
1965-1969	131	3.02	0.00	0.00	71.02	0.10	0.00	0.00
1970-1974	172	6.03	0.00	0.00	95.00	0.86	0.00	0.00
1975-1979	198	2.93	0.21	0.00	115.52	1.02	0.13	0.00
1980-1984	272	9.73	0.06	0.34	279.23	9.84	0.00	0.08
1985-1989	587	19.73	0.47	1.05	731.87	5.01	0.12	0.05
1990-1994	1130	12.09	5.28	0.90	1712.89	1.67	6.51	0.01
1995-1999	1310	6.79	7.64	0.32	1607.78	2.76	12.97	2.35
2000-2003	1112	3.01	5.94	0.22	1799.64	7.20	7.74	0.01
1960-2003	532	7.75	2.05	0.33	667.93	3.02	2.83	0.29

Table 4.2. Number of Firms, Firms Entering and Firms Departing from the Sample of Nonfinancial Firms by GICS Sector, 1960-2003

This table reports the average percentage compositions in 9 GICS sectors and book capitals entering and departing for various five-year periods beginning with 1960-64 and finishing with 2000-03. A firm enters the sample at the end of the first fiscal year for which market and book value data are available, and leaves the sample at the end of the last fiscal year for which such data are available. "Firms" is the number of firms at the beginning of each calendar year. A firm is allocated to calendar year t if its fiscal year-end is between July 1 of year $t-1$ and June 30 of year $t+1$. Book capital is the total end-of-year book value of long-term debt, short-term debt and equity (in billions of 1992 dollars) for firms in the sample.

		Energy		Materials		Industrials		Cons. Disc.		Cons. Staples		Health Care		IT		Telecom		Utilities	
Period	Firms	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep	Ent	Dep
Panel A: Percentage distribution of number of firms entering (Ent) and departing (Dep) in 9 GICS sectors																			
1960-1964	104	13.33	0.00	13.33	0.0	13.33	0.00	20.00	0.00	20.00	0.00	0.00	0.00	6.67	0.00	6.67	0.00	6.67	0.00
1965-1969	131	5.26	0.00	31.58	0.00	21.05	0.00	42.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970-1974	172	20.93	0.00	23.26	0.00	20.93	0.00	20.93	0.00	4.65	0.00	4.65	0.00	2.33	0.00	0.00	0.00	2.33	0.00
1975-1979	198	40.74	50.00	18.52	0.00	14.81	50.00	11.11	0.00	0.00	0.00	0.00	0.00	11.11	0.00	3.70	0.00	0.00	0.00
1980-1984	272	24.14	0.00	26.72	0.00	14.66	0.00	14.66	0.00	7.76	0.00	0.86	0.00	4.31	0.00	0.86	0.00	6.03	0.00
1985-1989	587	27.72	23.08	37.78	30.77	9.86	7.69	11.09	15.38	3.70	7.69	2.05	0.00	4.93	15.38	1.23	0.00	1.64	0.00
1990-1994	1130	22.41	34.57	27.84	31.97	11.37	9.67	12.19	14.13	3.62	3.35	5.60	0.00	13.34	3.72	2.80	0.74	0.82	1.86
1995-1999	1310	30.48	33.40	19.40	24.95	8.55	9.94	9.70	12.47	2.31	3.81	7.62	1.90	19.40	8.67	1.39	3.38	1.15	1.48
2000-2003	1112	23.44	35.03	16.41	15.57	9.38	11.08	7.81	12.57	1.56	2.99	10.16	3.89	12.50	13.17	0.78	2.99	3.13	2.69
1960-2003	532	26.08	33.68	27.59	24.79	10.88	9.61	11.85	13.53	3.56	3.62	5.01	1.96	11.58	8.47	1.78	2.38	1.67	1.96
Panel B: Percentage distribution of book capital of entering (Ent) and departing (Dep) firms in 9 GICS sectors																			
1960-1964	51.13	2.26	0.00	16.33	0.00	0.00	0.00	0.55	0.00	5.95	0.00	0.00	0.00	53.78	0.00	11.12	0.00	10.02	0.00
1965-1969	71.02	5.49	0.00	54.51	0.00	5.23	0.00	20.08	0.00	14.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970-1974	95.00	13.17	0.00	52.01	0.00	17.62	0.00	6.98	0.00	1.18	0.00	1.35	0.00	0.61	0.00	0.00	0.00	7.08	0.00
1975-1979	115.52	38.01	10.65	2.01	0.00	6.25	89.35	10.08	0.00	0.00	0.00	0.00	0.00	1.54	0.00	42.12	0.00	0.00	0.00
1980-1984	279.23	7.96	0.00	5.57	0.00	1.88	0.00	74.52	0.00	1.51	0.00	0.74	0.00	0.18	0.00	0.00	0.00	7.63	0.00

1985-1989	731.87	52.08	34.71	15.90	52.84	13.07	1.78	11.37	9.96	1.39	0.54	0.09	0.00	2.10	0.16	2.30	0.00	1.70	0.00
1990-1994	1712.89	16.27	7.60	14.28	8.29	7.76	60.86	44.36	0.32	1.97	14.06	0.15	0.00	1.38	0.18	3.85	0.30	9.97	8.39
1995-1999	1607.78	65.68	0.38	17.78	0.84	4.41	0.47	3.53	1.65	1.15	0.57	0.66	0.46	4.87	0.41	1.56	38.63	0.36	56.60
2000-2003	1799.64	4.94	0.51	12.45	18.41	0.68	2.54	56.43	3.54	0.29	1.65	0.72	12.19	20.15	1.41	0.04	31.44	18.92	28.31
1960-2003	667.93	26.72	2.79	13.23	6.36	4.13	17.62	34.00	1.22	1.95	4.38	0.51	2.25	8.98	0.36	1.23	26.65	9.23	38.38

Table 4.2. Cont'd

Panel C: Percentage of number of firms in each of the 9 GICS sectors										
1960-1964	104	11.15	26.35	11.15	19.62	13.08	0.00	2.31	6.92	8.65
1965-1969	131	10.38	26.26	12.06	21.68	12.21	0.00	2.29	5.95	7.48
1970-1974	172	12.09	25.81	13.72	22.21	10.47	0.93	1.86	4.65	6.40
1975-1979	198	15.35	24.14	14.14	21.11	8.89	1.01	3.33	4.14	5.56
1980-1984	272	18.01	25.37	13.24	20.07	7.35	1.10	3.68	3.09	5.00
1985-1989	587	21.29	27.67	11.82	16.87	5.93	1.50	4.46	2.08	3.75
1990-1994	1130	22.09	30.32	11.13	13.40	4.51	2.80	7.01	2.18	2.44
1995-1999	1310	20.96	27.91	11.18	12.17	4.32	4.98	11.27	2.24	2.02
2000-2003	1112	16.49	25.29	10.61	11.01	4.03	6.26	12.73	1.51	2.01
1960-2003	532	19.53	28.07	11.64	14.68	5.60	3.47	8.02	2.54	3.16

Table 4.3. Capital Structures of the Sample of Domestic and Cross-listed Canadian Nonfinancial Corporations, 1960-2003.

This table reports the average shares of the different classes of liabilities and shareholder equities, expressed as percentages of total market or book capital for (i) all firms in the sample at the beginning of the year (All Firms), (ii) firms entering the sample during the year (Initial Year), (iii) firms leaving the sample (Final Year), and (iv) firms cross-listed in both Canadian and US markets. A firm's market capital is the sum of the market value of its common stock plus the book value of its long-term debt, short-term debt (as measured by debt in current liabilities), and preferred stock. A firm's book capital is the total end-of-year book value of its long-term debt, short-term debt, and equity. Book equity is total assets minus total liabilities. If total liabilities are not available, book equity is computed as common share equity plus preferred share equity plus retained earnings. The market value of common stock of a firm is its stock price multiplied by its shares outstanding at the end of its fiscal year.

	Common stock	Preferred stock	Long term debt	Short term debt		Common stock	Preferred stock	Long term debt	Short term debt
Panel A: Components of Market Capital Values for All Firms					**Panel B**: Components of Book Values for All Firms				
1960-1964	68.07	5.23	25.56	1.14	1960-1964	60.02	5.98	32.59	1.41
1965-1969	68.94	4.37	25.34	1.36	1965-1969	59.62	5.42	33.13	1.83
1970-1974	67.16	3.68	27.28	1.89	1970-1974	61.94	4.13	31.61	2.31
1975-1979	61.28	4.01	32.13	2.58	1975-1979	60.00	4.23	33.14	2.62
1980-1984	63.78	4.22	30.22	1.78	1980-1984	58.00	4.91	34.97	2.15
1985-1989	68.09	4.33	25.66	1.92	1985-1989	59.25	4.96	29.73	2.18
1990-1994	67.77	2.47	26.83	2.93	1990-1994	58.51	2.69	29.86	3.17
1995-1999	74.65	0.79	22.07	2.49	1995-1999	61.81	0.96	27.30	3.13
2000-2003	72.63	0.71	22.86	3.80	2000-2003	65.16	0.84	25.49	4.14
1960-2003	67.83	3.43	26.60	2.14	1960-2003	60.26	3.93	31.12	2.47
Panel C: Components of Market Capital Values in Initial Year					**Panel D**: Components of Market Capital Values in Final Year				
1960-1964	45.23	18.77	32.92	3.07	1960-1964	*NA*	*NA*	*NA*	*NA*
1965-1969	75.81	6.29	13.26	4.65	1965-1969	*NA*	*NA*	*NA*	*NA*
1970-1974	67.54	3.65	24.46	4.35	1970-1974	*NA*	*NA*	*NA*	*NA*
1975-1979	53.43	2.87	41.75	1.95	1975-1979	*NA*	*NA*	*NA*	*NA*
1980-1984	58.32	4.08	34.68	2.93	1980-1984	82.57	0.00	15.17	2.25
1985-1989	61.54	4.28	30.96	3.22	1985-1989	25.67	2.32	34.65	37.36
1990-1994	69.43	2.55	23.09	4.93	1990-1994	67.40	3.42	28.69	0.49
1995-1999	81.28	0.28	14.51	3.93	1995-1999	63.41	3.10	28.43	5.05
2000-2003	87.05	0.60	9.23	3.12	2000-2003	72.63	0.41	25.00	1.96
1960-2003	67.48	3.32	25.54	3.66	1960-2003	67.50	1.69	25.84	4.97

Table 4.3 Cont'd

Period	Common stock	Preferred stock	Long term debt	Short term debt	Period	Common stock	Preferred stock	Long term debt	Short term debt
Panel E: Components of Market Capital Values for Cross-listed Firms					**Panel F**: Components of Book Values for Cross-listed Firms				
1960-1964	68.30	4.29	26.29	1.13	1960-1964	60.70	4.25	33.45	1.60
1965-1969	73.52	2.51	22.84	1.14	1965-1969	65.21	2.90	30.43	1.46
1970-1974	69.96	3.04	25.26	1.74	1970-1974	65.62	3.59	28.84	1.96
1975-1979	65.70	3.22	28.42	2.67	1975-1979	60.95	3.74	32.50	2.80
1980-1984	68.52	3.37	26.64	1.46	1980-1984	59.23	4.59	34.42	1.85
1985-1989	71.01	3.53	23.77	1.69	1985-1989	58.46	4.69	31.21	2.37
1990-1994	71.94	2.27	23.50	2.30	1990-1994	60.16	2.61	28.66	2.79
1995-1999	78.04	0.65	19.42	1.89	1995-1999	64.71	1.03	26.01	2.44
2000-2003	76.54	1.35	19.62	2.50	2000-2003	63.87	1.31	24.90	2.88
1960-2003	70.64	2.82	24.67	1.86	1960-2003	62.06	3.39	30.52	2.23

Table 4.4. Aggregate Annual Cash Inflows and Outflows, 1960-2003.

The following cash-flow budget identity is used for the sample firms to determine the value of each of its components:

$$Y_t + Dp_t + dS_t + dLTD_t + dSTD_t \equiv I_t + Div_t + Int_t,$$

where Y_t is the sum of income before extraordinary items, extraordinary items, discontinued operations, interest expenses and deferred income taxes. Dp_t is depreciation expense. $dLTD_t$ is the change in the book value of long-term debt from year t-1 to t. $dSTD_t$ is the change in the book value of short-term debt from year t-1 to t, measured by debt in current liabilities. Investment, I_t, is the change in book capital (i.e., long-term debt, short-term debt and equity) from year t-1 to t, plus depreciation. Int_t is interest expense, and is equal to gross interest expenses, or if not available, it is computed as the sum of short-term interest expenses and long-term interest expenses. Div_t is the sum of dividends paid on common and preferred stock. The net flow from the sale and repurchase of stock, which is given by $dS_t = I_t + Div_t + Int_t - Y_t - Dp_t - dSTD_t - dLTD_t$, is used to balance the cash flow budget identity. All values are expressed as percentages of beginning-of-year book capital.

Time Period	Firms	Y_t	Dp_t	dS_t	$dLTD_t$	$dSTD_t$	I_t	Div_t	Int_t
Panel A: Aggregate annual cash-inflows and outflows for domestic firms									
1960-1964	104	13.59	6.29	-1.58	2.73	0.73	13.97	5.15	2.14
1965-1969	131	18.13	6.33	-3.81	5.51	0.46	18.23	5.01	2.65
1970-1974	172	21.80	6.63	-8.53	5.11	0.58	18.14	4.62	3.33
1975-1979	198	27.12	7.27	-10.50	5.07	0.53	21.47	4.20	4.67
1980-1984	272	13.82	7.95	3.35	5.34	0.26	18.14	4.07	7.39
1985-1989	587	10.69	8.29	3.37	4.17	-0.54	17.16	4.31	5.54
1990-1994	1130	3.93	9.32	3.42	2.57	-0.41	13.52	4.14	5.03
1995-1999	1310	2.78	9.74	1.96	5.86	0.54	18.24	4.03	4.51
2000-2003	1112	-0.33	10.12	1.15	2.28	1.31	12.53	4.37	3.95
1960-2003	532	12.95	7.93	-1.46	4.40	0.33	17.07	4.43	4.36
Panel B: Aggregate annual cash-inflows and outflows for cross-listed firms									
1960-1964	13	12.22	6.79	-1.14	2.71	1.01	14.46	4.19	2.38
1965-1969	21	15.50	7.29	-3.65	5.56	0.42	19.47	4.34	2.62
1970-1974	31	20.69	6.95	-8.49	3.94	0.63	17.26	3.70	2.67
1975-1979	34	28.13	7.50	-12.97	7.36	0.83	24.53	3.50	4.53
1980-1984	48	13.46	8.76	5.05	7.38	0.93	21.17	3.71	6.39
1985-1989	79	8.12	9.12	4.61	3.40	-1.85	16.53	3.44	6.01
1990-1994	128	3.39	9.56	4.42	2.07	0.21	17.31	3.45	4.47
1995-1999	192	0.60	8.91	4.93	5.93	-0.58	19.33	2.73	3.71
2000-2003	192	-4.87	9.55	-0.20	0.50	0.55	9.20	2.60	3.94
1960-2003	80	11.52	8.24	-0.85	4.54	0.21	17.53	3.55	4.13

Table 4.5. Aggregate Investments and Forms of Financing, 1960-2003

The following investment financing identity is used for the sample firms to determine the value of each of the financing investment components:

$$I_t = RCE_t + dS_t + dLTD_t + dSTD_t,$$

where investment, I_t, is the change in book capital (i.e., long-term debt, short-term debt and equity) from year t-1 to t, plus depreciation. Retained cash-earnings, RCE_t, is the sum of income before extraordinary items, extraordinary items and discontinued operations, depreciation expense, and income statement deferred taxes, minus dividends on common and preferred stock. $dLTD_t$ is the change in the book value of long-term debt from year t-1 to t. $dSTD_t$ is the change in the book value of short-term debt from year t-1 to t, measured by debt in current liabilities. The net flow from the sale and repurchase of stock, which is given by $dS_t = I_t + Div_t + Int_t - Y_t - Dp_t - dSTD_t - dLTD_t$, is used to balance the cash-flow budget identity. All values are expressed as percentages of beginning-of-year book capital

Time Period	Firms	I_t	RCE_t	dS_t	$dLTD_t$	$dSTD_t$
Panel A: Aggregate investments and forms of financing for domestic firms						
1960-1964	104	13.97	9.32	-1.58	2.73	0.73
1965-1969	131	18.23	14.02	-3.81	5.51	0.46
1970-1974	172	18.14	18.94	-8.53	5.11	0.58
1975-1979	198	21.47	25.36	-10.50	5.07	0.53
1980-1984	272	18.14	11.34	3.35	5.34	0.26
1985-1989	587	17.16	10.15	3.37	4.17	-0.54
1990-1994	1130	13.52	5.09	3.42	2.57	-0.41
1995-1999	1310	18.24	8.11	1.96	5.86	0.54
2000-2003	1112	12.53	6.80	1.15	2.28	1.31
1960-2003	532	17.07	12.47	-1.46	4.40	0.33
Panel B: Aggregate investments and forms of financing for cross-listed firms						
1960-1964	13	14.46	8.32	-1.14	2.71	1.01
1965-1969	21	19.47	12.94	-3.65	5.56	0.42
1970-1974	31	17.26	19.10	-8.49	3.94	0.63
1975-1979	34	24.53	27.70	-12.97	7.36	0.83
1980-1984	48	21.17	11.21	5.05	7.38	0.93
1985-1989	79	16.53	8.09	4.61	3.40	-1.85
1990-1994	128	17.31	4.95	4.42	2.07	0.21
1995-1999	192	19.33	7.97	4.93	5.93	-0.58
2000-2003	192	9.20	6.47	-0.20	0.50	0.55
1960-2003	80	17.53	12.20	-0.85	4.54	0.21

Table 4.6. Rates of Return on Capital and on Equity at Value and at Cost for Canadian Nonfinancial Firms, 1960-2003

This table reports the rates of return on total capital and on equity capital at value and at cost using the estimation approach of Fama and French. The IRR on value [cost] estimates of the cost of capital estimate the return on corporate investments under the assumption that firms are acquired at their market [cost] values when they enter the sample, and are sold at their market value either when they leave the sample or when the sample is liquidated in 2003. The IRR on value estimates the return on equity under the assumption that the firms pay interest and principal at market [book] values for all firms in the sample, and firms are acquired and sold at their market [book] values.

	Cost of Capital (%)				Cost of Equity (%)			
Time Period	IRR on Value		IRR on Cost		IRR on Value		IRR on Cost	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1960-2003	10.44	5.90	11.22	6.64	10.99	6.58	12.19	7.78
1980-2003	8.98	4.95	9.92	5.85	9.20	5.23	10.30	6.30

Table 4.7. Rates of Return on Capital and on Equity at Value and at Cost for Cross-listed Canadian Nonfinancial Firms, 1960-2003

This table reports the rates of return on capital and on equity capital at value and at cost using the estimation approach of Fama and French. The IRR on value [cost] estimates of the cost of capital estimate the return on corporate investments under the assumption that firms are acquired at their market [cost] values when they enter the sample, and are sold at their market values either when they leave the sample or when the sample is liquidated in 2003. The IRR on value estimates the return on equity under the assumption that firms pay interest and principal at market [book] values for all firms in the sample, and firms are acquired and sold at their market [book] values.

	Cost of Capital (%)				Cost of Equity (%)			
Time Period	IRR on Value		IRR on Cost		IRR on Value		IRR on Cost	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1960-2003	10.07	5.65	10.52	6.07	10.75	6.41	11.36	7.06
1980-2003	8.62	4.71	9.44	5.51	8.97	5.10	9.83	5.94

Table 4.8. Rates of Return on Capital and on Equity at Value and at Cost for Canadian GICS Sectors, 1960-2003

This table reports the rates of return on capital and on equity capital at value and at cost using the unmodified estimation approach of Fama and French for the 9 nonfinancial Canadian GICS Sectors. The IRR on value [cost] estimates of the cost of capital estimate the return on corporate investments under the assumption that firms are acquired at their market [cost] values when they enter the sample, and are sold at their market values either when they leave the sample or when the sample is liquidated in 2003. The IRR on value estimates the return on equity under the assumption that firms pay interest and principal at their market [book] values for all firms in the sample, and firms are acquired and sold at their market [book] values.

		Cost of Capital (%)				Cost of Equity (%)			
		IRR on Value		IRR on Cost		IRR on Value		IRR on Cost	
Sector	Time Period	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
Energy	1960-2003	10.65	6.13	12.29	7.78	11.71	7.16	14.64	10.21
	1980-2003	8.93	5.15	11.31	7.50	9.05	5.24	11.94	8.12
Materials	1960-2003	8.77	4.87	9.90	5.57	9.20	5.03	11.23	7.13
	1980-2003	6.65	3.02	7.52	3.85	6.83	3.25	7.77	3.99
Industrials	1960-2003	11.08	7.43	10.85	7.14	12.95	8.69	12.82	8.56
	1980-2003	10.03	6.76	10.32	7.08	12.58	9.02	13.30	9.77
Cons. Disc.	1960-2003	12.55	7.83	13.27	8.24	12.78	8.13	13.68	9.04
	1980-2003	13.15	9.04	14.47	10.20	13.26	9.19	14.58	10.45
Cons. Staples	1960-2003	12.36	7.53	13.40	8.55	13.53	8.62	14.77	9.86
	1980-2003	14.64	10.43	15.52	11.34	16.46	11.97	17.32	12.93
Health Care	1960-2003	9.40	6.40	9.75	6.57	11.72	9.05	12.33	9.62
	1980-2003	8.61	5.76	9.13	6.29	10.25	7.25	11.10	8.11
IT	1960-2003	-2.04	-4.37	-1.57	-3.92	-5.96	-8.17	-5.38	-7.61
	1980-2003	-2.34	-4.75	-1.73	-4.12	-6.09	-8.34	-5.42	-7.67
Telecom	1960-2003	10.33	5.49	11.00	6.12	11.46	6.63	12.88	8.04
	1980-2003	12.06	7.98	12.16	8.02	13.73	9.39	14.03	9.71
Utilities	1960-2003	10.14	5.35	11.74	6.87	10.65	6.03	11.93	6.98
	1980-2003	11.06	6.86	12.01	7.75	11.29	6.99	12.27	7.91

Table 4.9. Rates of Return on Capital and on Equity at Cost for Domestic Canadian Nonfinancial Firms, Cross-listed Canadian Nonfinancial Firms and 9 GICS Sectors using Replacement Costs, 1960-2003

This table reports the rates of return on capital and on equity capital at cost using the estimation approach of Fama and French adjusted for replacement costs. The IRR on cost estimates of the cost of capital estimate the return on corporate investments under the assumption that firms are acquired at their cost values when they enter the sample, and are sold at their market values either when they leave the sample or when the sample is liquidated in 2003. The cost value of entering firms is corrected for replacement costs using the Ritter and Warr (2002) procedure.

Firm/Sector		Cost of Capital (%)		Cost of Equity (%)	
	Time Period	IRR on Cost		IRR on Cost	
		Nominal	Real	Nominal	Real
Domestic Firms	1960-2003	11.02	6.48	11.86	7.51
	1980-2003	9.71	5.68	9.97	6.04
Cross-listed Firms	1960-2003	10.42	5.99	11.19	6.87
	1980-2003	9.34	5.43	9.67	5.81
Energy	1960-2003	12.00	7.55	14.24	9.88
	1980-2003	11.00	7.25	11.55	7.79
Materials	1960-2003	9.68	5.38	10.85	6.79
	1980-2003	7.36	3.71	6.94	3.40
Industrials	1960-2003	10.61	6.94	13.47	9.20
	1980-2003	10.12	6.90	12.93	9.46
Cons. Disc.	1960-2003	13.13	8.25	13.35	8.79
	1980-2003	14.06	9.87	14.01	9.98
Cons. Staples	1960-2003	13.27	8.45	14.60	9.72
	1980-2003	15.25	11.11	16.87	12.56
Health Care	1960-2003	9.52	6.53	11.99	9.30
	1980-2003	8.92	6.10	10.82	7.85
IT	1960-2003	-1.75	-4.09	-5.55	-7.78
	1980-2003	-1.90	-4.28	-5.59	-7.83
Telecom	1960-2003	10.88	6.10	12.58	7.85
	1980-2003	12.12	7.72	13.82	9.50
Utilities	1960-2003	11.42	6.63	10.82	6.33
	1980-2003	11.55	7.38	11.47	7.55

Table 4.10. Rates of Return on Capital and on Equity at Value and at Cost for Domestic Canadian Nonfinancial Firms, Cross-listed Canadian Nonfinancial Firms and 9 GICS Sectors using Replacement Costs and Extraordinary Items, 1960-2003

This table reports the rates of return on capital and on equity capital at cost using the estimation approach of Fama and French adjusted for replacement costs. The IRR on cost estimates of the cost of capital estimate the return on corporate investments under the assumption that firms are acquired at their cost values when they enter the sample, and are sold at their market values either when they leave the sample or when the sample is liquidated in 2003. The cost value of entering firms is corrected for replacement cost using the Ritter and Warr (2002) procedure. Extraordinary Items are included when computing aggregate cash earnings at the end of each year.

Firm/Sector		Cost of Capital (%)				Cost of Equity (%)			
	Time Period	IRR on Value		IRR on Cost		IRR on Value		IRR on Cost	
		Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
Domestic Firms	1960-2003	10.36	5.84	10.93	6.42	10.81	6.45	11.67	7.38
	1980-2003	8.84	4.84	9.55	5.55	8.91	4.99	9.66	5.77
Cross-listed Firms	1960-2003	9.97	5.58	10.31	5.91	10.53	6.26	10.96	6.71
	1980-2003	8.46	4.58	9.17	5.29	8.37	4.55	9.32	5.51
Energy	1960-2003	10.59	6.09	11.92	7.49	11.65	7.11	14.17	9.82
	1980-2003	8.85	5.08	10.89	7.15	8.96	5.15	11.43	7.68
Materials	1960-2003	8.59	4.31	9.47	5.22	8.75	4.68	10.26	6.33
	1980-2003	6.48	2.87	7.16	3.54	6.64	2.57	7.27	3.69
Industrials	1960-2003	10.81	7.27	10.35	6.78	13.59	9.69	12.60	8.65
	1980-2003	9.70	6.47	9.77	6.60	11.35	7.95	11.61	8.29
Cons. Disc.	1960-2003	12.88	8.10	13.72	8.87	12.93	8.30	13.91	9.25
	1980-2003	13.66	9.50	14.69	10.43	13.94	9.90	14.98	10.86
Cons. Staples	1960-2003	12.18	7.41	13.07	8.32	13.26	8.44	14.28	9.52
	1980-2003	15.06	10.93	14.67	10.62	18.08	13.80	16.70	12.56
Health Care	1960-2003	8.63	4.02	8.75	4.66	11.68	9.01	11.94	9.25
	1980-2003	7.98	5.17	8.25	5.47	10.24	7.25	10.80	7.85
IT	1960-2003	-2.07	-4.40	-1.78	-4.12	-6.00	-8.21	-5.60	-7.82
	1980-2003	-2.37	-4.78	-1.94	-4.32	-6.13	-8.38	-5.64	-7.87
Telecom	1960-2003	10.30	5.46	10.96	6.08	11.43	6.60	12.85	8.01
	1980-2003	12.01	7.87	12.06	7.92	14.62	10.26	13.89	9.56
Utilities	1960-2003	9.99	5.24	11.23	6.49	10.40	5.83	11.57	6.96
	1980-2003	10.79	6.64	11.26	7.14	10.82	6.24	11.87	7.50

Table 4.11. Rates of Return on Capital and Equity at Value and at Cost for Cap-based Portfolios, 1960-2003

This table reports the rates of return on capital and on equity capital at cost and at value for cap-based portfolios. Panel A reports results using the estimation approach of Fama and French (1999). Panel B reports results using the Fama and French (1999) approach adjusted for replacement costs. Panel B reports results using the Fama and French (1999) approach adjusted for both replacement costs and extraordinary items.

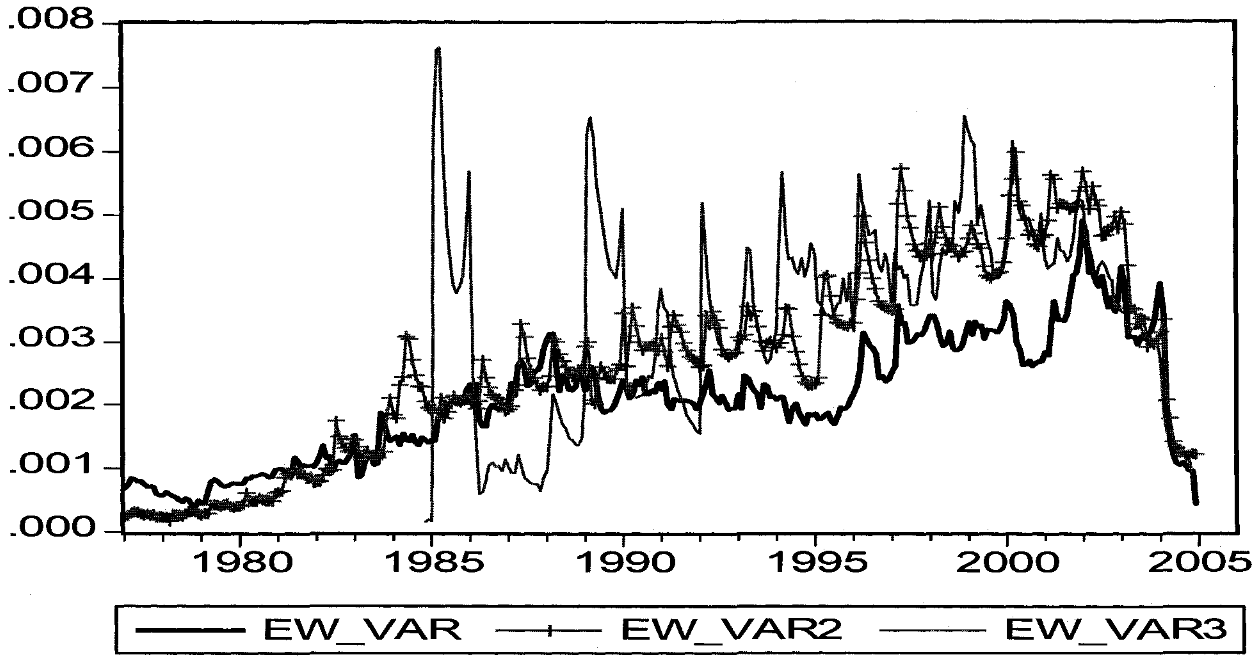
quintile		Cost of Capital (%)				Cost of Equity (%)			
	Time Period	IRR on Value		IRR on Cost		IRR on Value		IRR on Cost	
		Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
Panel A: IRR values using the Fama and French (99) Methodology									
1	1960-2003	-15.38	-19.62	17.18	12.89	-16.23	-20.67	17.84	13.25
	1980-2003	-13.17	-16.92	-0.71	-4.36	-13.56	-16.71	-1.02	-4.54
2	1960-2003	12.42	8.02	12.89	8.44	13.51	9.02	13.84	9.42
	1980-2003	10.56	6.55	11.42	7.39	10.89	6.87	11.77	7.85
3	1960-2003	13.02	8.47	13.82	9.37	13.94	9.35	14.22	9.53
	1980-2003	9.06	5.17	9.96	6.27	9.49	5.65	10.88	6.94
4	1960-2003	12.12	7.73	12.92	8.36	13.45	8.69	13.62	9.03
	1980-2003	11.32	7.29	11.89	8.02	12.24	8.4	12.56	8.64
5	1960-2003	10.03	5.51	10.98	6.32	11.82	7.24	12.08	7.19
	1980-2003	9.61	5.62	10.21	6.22	10.85	6.69	11.04	6.82
Panel B: IRR values after adjusting for Replacement Cost									
1	1960-2003	-15.38	-19.62	17.18	12.87	-16.23	-20.67	17.64	13.17
	1980-2003	-13.17	-16.92	-0.95	-4.59	-13.56	-16.71	-1.09	-4.65
2	1960-2003	12.42	8.02	12.69	8.18	13.51	9.02	13.72	9.27
	1980-2003	10.56	6.55	11.21	7.2	10.89	6.87	11.43	7.45
3	1960-2003	13.02	8.47	13.62	9.14	13.94	9.35	14.03	9.33
	1980-2003	9.06	5.17	9.45	5.71	9.49	5.65	10.52	6.73
4	1960-2003	12.12	7.73	12.71	8.13	13.45	8.69	13.49	8.84
	1980-2003	11.32	7.29	11.8	7.92	12.24	8.4	12.21	8.29
5	1960-2003	10.03	5.51	10.84	6.19	11.82	7.24	11.92	7.03
	1980-2003	9.61	5.62	10.02	6.07	10.85	6.69	10.88	6.76
Panel C: IRR values after adjustment for Replacement Cost and Extraordinary Items									
1	1960-2003	-15.42	-19.7	17.12	12.83	-16.37	-20.84	17.57	13.1
	1980-2003	-13.26	-16.9	-1.02	-4.65	-13.73	-17.29	-1.14	-4.71
2	1960-2003	12.38	7.87	12.61	8.1	14.37	9.92	13.79	9.35
	1980-2003	10.45	6.44	11.14	7.14	10.71	6.73	11.54	7.55
3	1960-2003	12.98	8.5	13.61	9.13	14.89	10.19	14.11	9.4
	1980-2003	9.04	5.3	9.39	5.64	9.21	5.42	10.59	6.79
4	1960-2003	12.08	7.5	12.62	8.05	12.25	7.6	13.57	8.92
	1980-2003	11.25	7.37	11.72	7.85	11.73	7.81	12.12	8.19
5	1960-2003	9.97	5.32	10.73	6.07	10.89	6.01	11.8	6.9
	1980-2003	9.54	5.59	9.96	6.02	10.66	6.54	10.75	6.62

Table 4.12. Market Equity Misvaluations Attributed to Inflation Illusion

This table reports percentage market misvaluations of overall firm and equity values attributed to inflation illusion. At the end of each year, the IRR on value for capital and equity are computed and then used to generate the implied market values of each firm and its equity after correcting for the inflation illusion effect.

Time Period	Misvaluation of Domestic Firms (%)	Misvaluation of Cross-listed Firms (%)
1960-1964	-26.51	-21.15
1965-1969	-25.23	-19.63
1970-1974	-24.21	-17.62
1975-1979	-17.33	-8.38
1980-1984	-19.94	-14.34
1985-1989	-10.57	-5.58
1990-1994	-4.74	0.04
1995-1997	-2.82	-2.16
1960-1997	-17.13	-11.58

Panel A: Equal-weighted Volatilities of Monthly Changes in Unadjusted Forecasts of ROE



Panel B: Value-weighted Volatilities of Monthly Changes in Unadjusted Forecasts of ROE

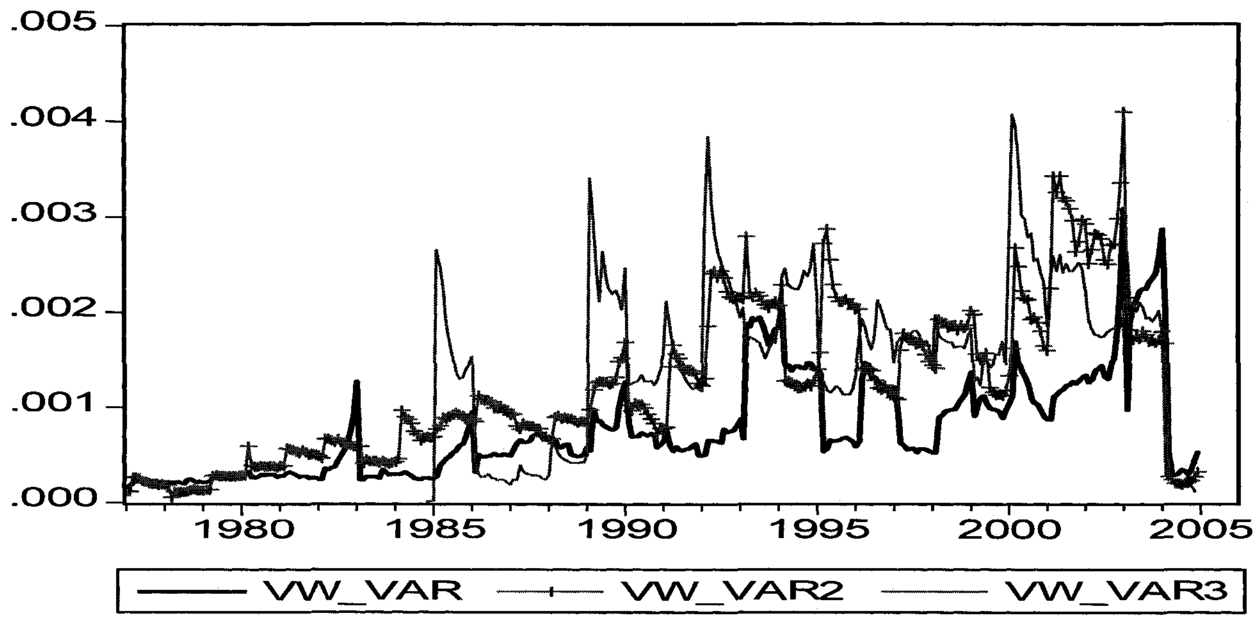
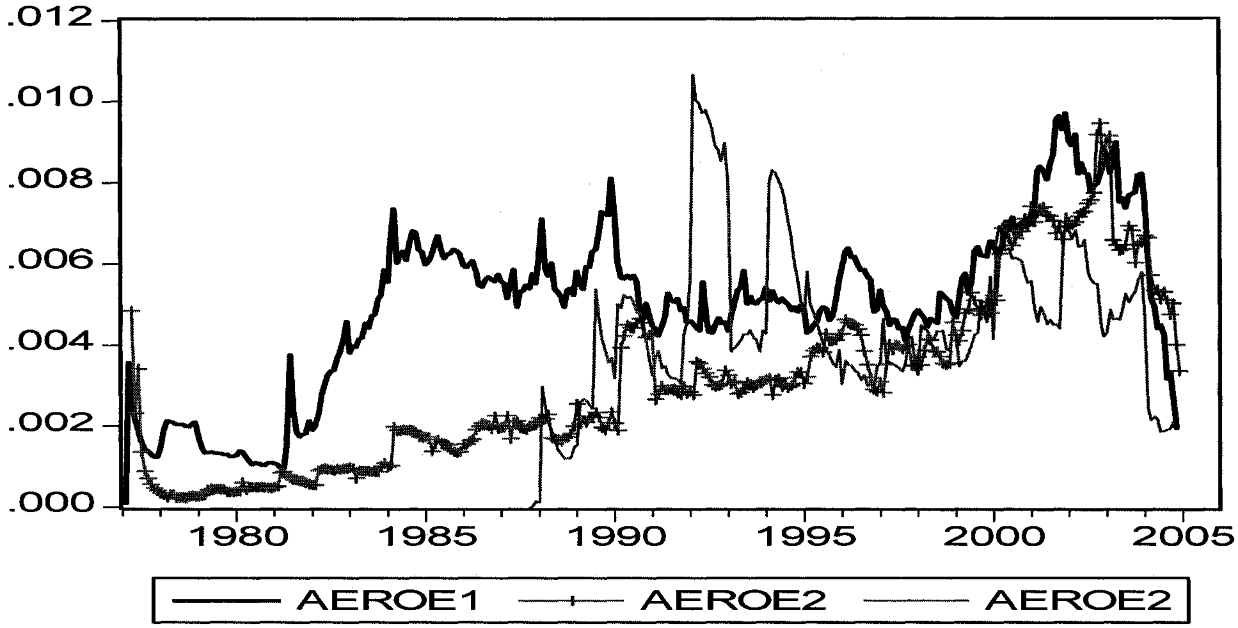


Figure 3.1. Volatility of Monthly Changes in Unadjusted forecasts of ROE

Panel A: Equal-weighted Volatilities of Monthly Changes in Bias-adjusted Forecasts of ROE



Panel B: Value-weighted Volatilities of Monthly Changes in Bias-adjusted Forecasts of ROE

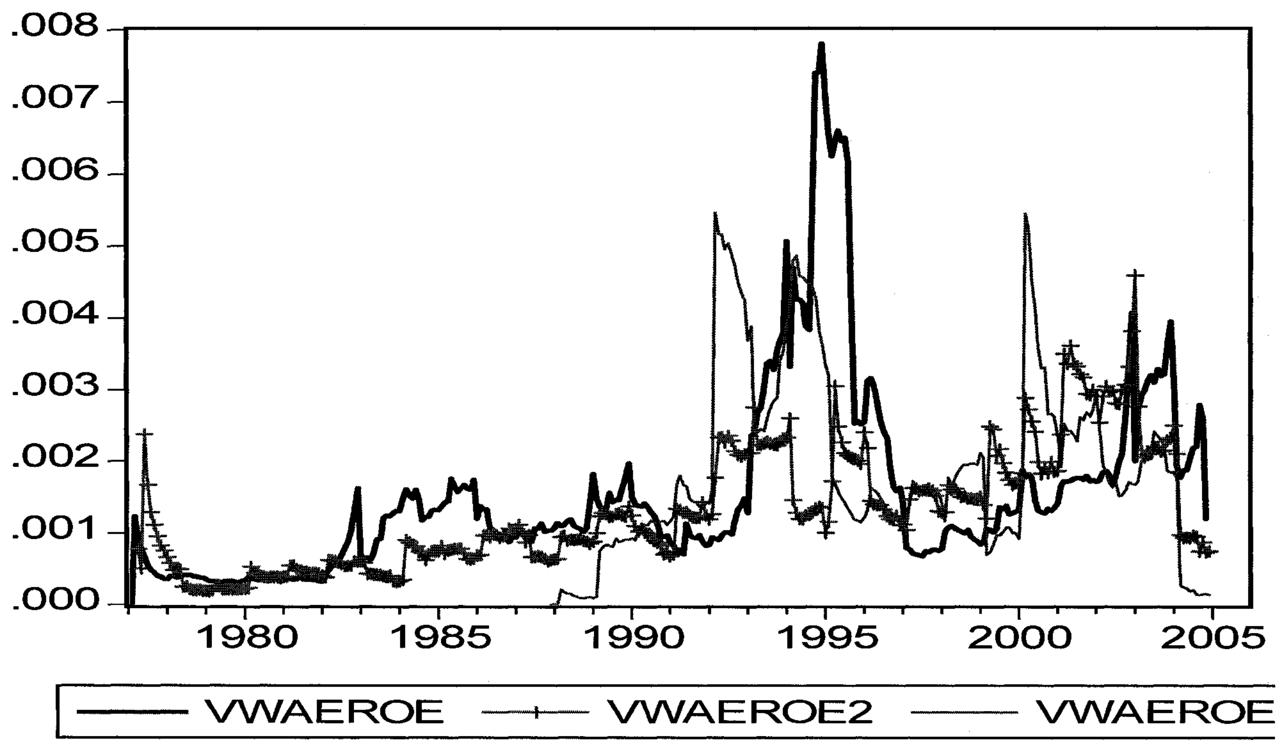
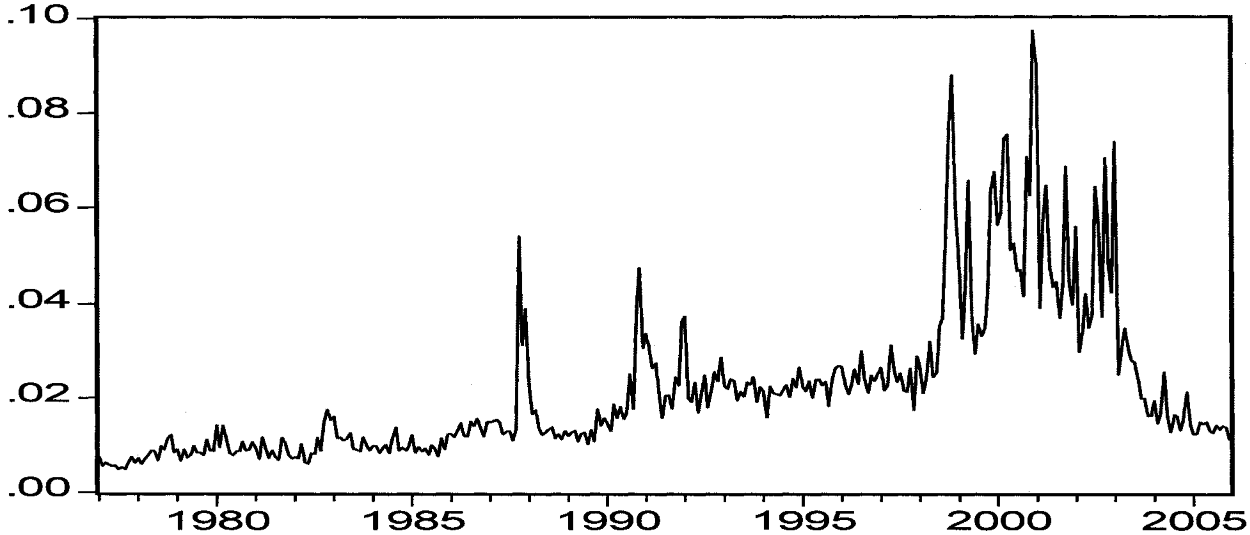


Figure 3.2. Volatility of Monthly Changes in Bias-adjusted Forecasts of ROE

Equal-weighted Monthly Idiosyncratic Volatilities, $IV^{1f}_{ew,ibes}$



Value-weighted Monthly Idiosyncratic Volatilities, $IV^{1f}_{vw,ibes}$

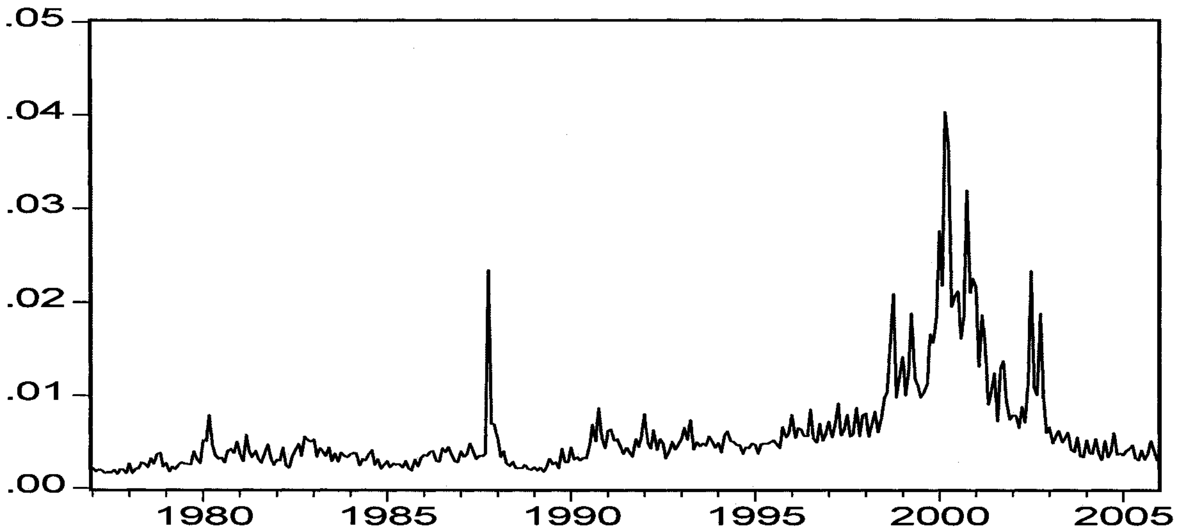


Figure 3.3. Average Monthly Return Idiosyncratic Volatilities

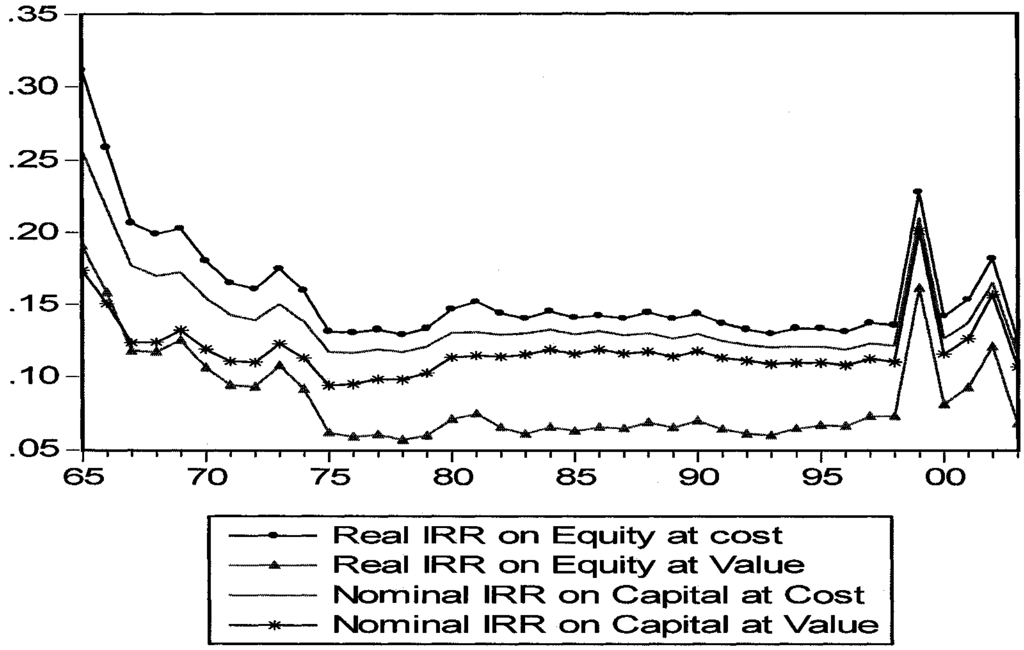


Figure 4.1. Rates of Return on Capital and Equity at Value and at Cost for the Sample Period Beginning in 1960 and Ending in 1965 to 2003

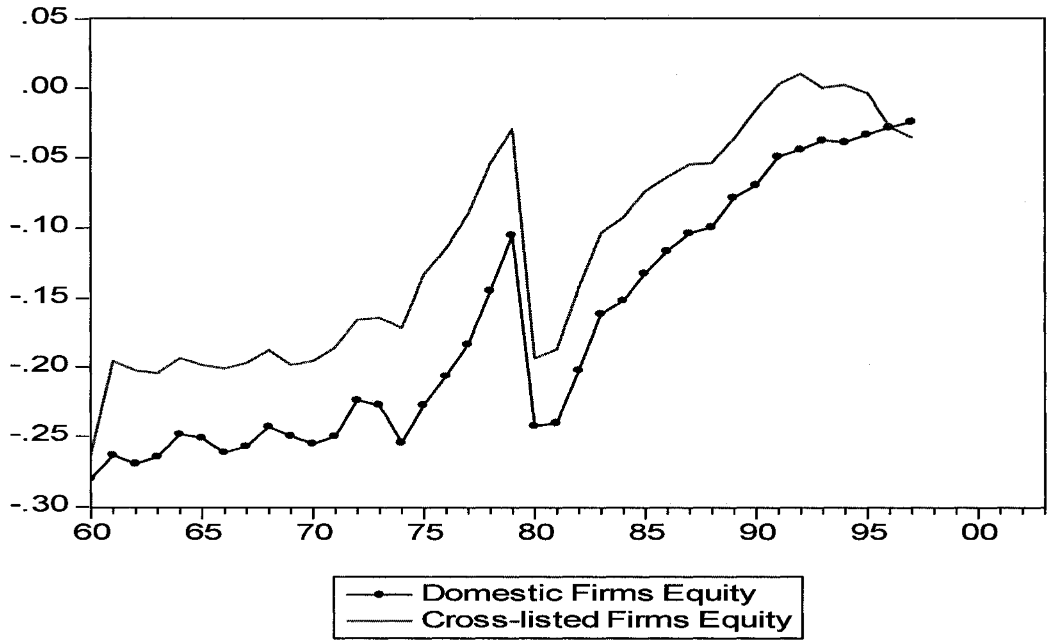


Figure 4.2. Market Misvaluations of Firm Equity Values for Domestic and Cross-listed Firms due to Inflation Illusion