SYSTEMATIC RISK FACTORS, MACROECONOMIC VARIABLES, AND MARKET VALUATION RATIOS

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Systematic Risk Factors, Macroeconomic Variables, and Market Valuation Ratios

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Chapter One: Introduction

The focus of this dissertation is to enhance the understanding of systematic risk factors and market valuation ratios. Market valuation ratios are utilized as proxies for investors’ expected or required returns. As such they should be impacted both by changes in expected economic activity and by changes in perceived risk levels. To better understand the relations between market valuation ratios, economic changes, and risk factors, this dissertation undertakes three analyses, as follows:

- In Search of a Better Market Earnings Yield (E/P) and a Better Market Dividend Yield (D/P)
- Systematic Risk Factors and Cash Flow Factors and Their Relations to Market Valuation Ratios as Proxies for Investors’ Required or Expected Returns
- SMB and HML: Risk Factors?

Each of these analyses is discussed in detail below.

1.1 In Search of a Better Market Earnings Yield (E/P) and a Better Market Dividend Yield (D/P)

This section attempts to evaluate whether an adjusted P/E ratio or its reciprocal the E/P ratio (or earnings yield) and an adjusted dividend yield (D/P) can predict excess market returns. This analysis is broken down into subsections. First, this section evaluates the relation between the S&P 500 index’s earnings yield (and alternately the dividend yield) and interest rates. Specifically, it expects to demonstrate that changes in the earnings yield (and dividend yield) are positively correlated with changes in interest
rates. Second, this dissertation evaluates if the earnings yield (and dividend yield) have predictive power relative to changes in interest rates. This is done in an attempt to further demonstrate the positive relation between the earnings yield (or alternately the dividend yield) and interest rates. Finally, this section develops an interest-rate-adjusted earnings yield and dividend yield and evaluates their abilities to forecast excess market returns. These various analyses are conducted with and without various control variables, including variables that proxy for investment costs and risk factors.

The ability of the market earnings yield and dividend yield ratios to predict future market returns has been mixed. Certain authors, such as (Basu (1977), Rozeff (1984), Shiller (1984), Fama and French (1988a, 1989), Sorenson and Arnott (1988), Cole et al. (1996), Lander et al. (1997), Campbell and Shiller (1988b, 1998, 2001), and Lewellen (2004)), have identified significant relations between these market ratios and future market returns. Other authors, such as Goetzmann and Jorion (1993), Lamont (1998), and Ang and Bekeart (2007)), have documented contrasting findings or have suggested that findings of such relations are based on problems with the analyses.

Thus, there is a significant gap in the literature as to whether these ratios have forecasting power for market returns. This dissertation attempts to address this gap by determining if “better” ratios (i.e., ratios with more predictive power) can be developed by adjusting the ratios for a demonstrated relation with interest rate components, including the risk-free rate, the term premium, and the default premium. Success in this area would provide significant contributions relative to both addressing this aforementioned gap and to practitioners’ attempts to understand and analyze equity
markets. Further, developing “better” valuation ratios could have implications for timing the market.

1.2 Systematic Risk Factors and Cash Flow Factors and Their Relations to Market Valuation Ratios as Proxies for Investors’ Required or Expected Returns

This section’s objective is to identify which macroeconomic or state variables represent systematic risk or cost factors and are thus priced in the equity market. Relative to risk factors, CRR [Chen, Roll, and Ross (1986)] (p.42) conclude that “stock prices are exposed to systematic economic news, that they are priced in accordance with their exposures, and that the news can be measured as innovations in state variables whose identification can be accomplished through simple and intuitive financial theory.”

In contrast to the approach of CRR, this dissertation focuses on the effects of state variables on market valuation ratios, specifically E/P ratio and the D/P ratios, in the evaluation process. This focus is consistent with the approach of Fama and French (2002), who utilize the E/P and D/P ratios in evaluating the equity risk premium. Market valuation ratios are interpreted as representative of investors’ expected or required returns. As such, they have three advantages over actual returns. First, they avoid the ex post/ex ante confusion in interpreting actual returns. (For instance, CRR seem to fall prey to this when they interpret the negative coefficient of unexpected inflation as indicating that investors’ require lower equity returns in inflationary times due to equities providing an inflation hedge.) Second, expected returns may be less noisy than actual returns and thus may provide better tools for evaluation. Third, they do not require the assumption that ex post realized returns represent an unbiased proxy for ex ante expected returns (i.e.,
rational expectations). Additional advantages, as noted by Brav et al. (2005), are that expected returns have smaller standard errors than realized returns per their calculations, that the issue with overlapping observations is less severe with expected versus realized returns, and that expected returns provide an independent robustness test of findings from analyses of realized returns.

Much of the finance literature is devoted to the effects of systematic (non-diversifiable) risk on asset returns. The CAPM assumes there is one systematic risk factor, whereas the APT determines that several factors systematically impact asset prices. However, little work has been done to identify what comprises systematic risk and, more specifically, which macroeconomic or state variables represent or capture systematic risk factors. Additionally, little work has been done to identify which factors, as represented by macroeconomic variables, affect investors’ expected returns, as measured by market valuation ratios. This section is designed to reduce these gaps.

Work in this area has the potential for profound impacts. These issues are of great interest not only to academicians, but also to investors, portfolio managers, and regulators. Significant findings could affect equity valuation, cost of capital determinations, asset allocations, pension forecasts (accounting expense), pension funding requirements, the expected and actual amounts of future retirement funds, needed savings rates, etc. Further, explaining risk factors also has implications for timing the market. Thus, even a small contribution to understanding systematic risk factors can have significant benefits in many areas of finance.
Market valuation ratios reflect both investors’ forecasts of future cash flows and investors’ required returns. Thus, valuation ratios reflect investor forecasts of future economic conditions in terms of both returns and risks related to such conditions. Since macroeconomic variables are proxies for economic conditions and changes in such variables proxy for economic changes, market valuation ratios implicitly reflect investors’ forecasts of future economic conditions. Thus, to the extent such forecasts are rational, we should expect that market valuation ratios have predictive ability relative to macroeconomic variables. This dissertation analyzes and evaluates this expectation.

1.3 SMB and HML: Risk Factors?

This section’s objectives relate to enhancing the understanding of the two “risk” factors identified by Fama and French (1992, 1993, 1995), SMB (Small Minus Big Market Equity) and HML (High Minus Low Book-Market Ratio). Essentially, with each of these two risk factors, the intent is to provide evidence to support that the factor is related to a systematic risk element or, in the absence of such evidence, that it may just be a spurious correlation related to data mining. Specifically, the analyses in this section are designed to determine if these factors have characteristics that would justify their classification as risk factors.

A problem with the idea that SMB and HML by themselves are “risk” factors that command premiums is that they have had varyingly positive and negative returns during recent periods. If they represent risk factors themselves, then presumably they should have generally consistent positive excess returns, as compensation for added risks. One
possible explanation for these varying positive and negative returns (although generally positive returns) is that these factors command a premium because they have different relative returns or risks in “good” times versus “bad” times. In other words, investors should generally require a return premium from investments that do relatively worse in bad times, in terms either of inferior returns or higher risk levels. Thus, a possible explanation for the varying, while generally positive, returns of SMB and HML relates to their potential asymmetric performance depending on market conditions.

This section attempts to evaluate if SMB and HML do worse in bad times and thus warrant a return premium as compensation for this “risk” factor. It evaluates both the return levels of these factors and their levels of systematic risk during “bad” times and “good” times to determine if either inferior relative returns or increased risk levels during “bad” times merit overall excess returns and classification as risk factors. This evaluation includes two definitions of “bad” times, including a definition based on market returns and a definition based on NBER-identified periods of recessions.

Fama and French (1992, 1993, 1995) provide evidence that HML (based on Book-to-Market ratios) and SMB (based on Market Equity Size) explain stock returns. They find that HML and SMB are significantly correlated with returns separately and when analyzed together for the period 1963 – 1990. Fama and French interpret these results as reflecting that risk is multidimensional. Further, they suggest that HML proxies for one dimension of risk, perhaps a measure of financial distress, and that SMB (or size) proxies for another dimension. Still, Fama and French (1996, p. 82) acknowledge that a gap exists in explaining what these two factors represent. “Finally, there is an important hole
in our work. Our tests to date do not cleanly identify the two consumption-investment state variables of special hedging concern to investors that would provide a neat interpretation of our results in terms of Merton’s (1973) ICAPM or Ross’ (1976) APT.”

Per Charoenrook and Conrad (2005), there are various explanations offered for the identified empirical relations between HML or SMB and asset returns. The risk-based explanations maintain that these factors are systematic risks not adequately captured either by beta or by the market proxy, as discussed in Roll (1977), or are related to changes in the investment opportunity set, as put forth in the Intertemporal Capital Asset Pricing Model (ICAPM), such as suggested by Liew and Vassalou (2000), Lettau and Ludvigson (2001), and Vassalou (2003). The non-risk-based explanations include non-rational investor behavior (i.e., behavioral finance explanations), spurious correlations resulting from data mining, or cost-based or market-friction-based explanations, such as relating to transactions costs.

The benefits of the analyses are potentially quite large. The HML and SMB factors are now commonly used in the financial literature related to investments, despite the lack of understanding as to what these factors represent. Also, there are contrasting views as to whether these are actually risk factors or just spurious correlations. In addition, there is little agreement as to what comprises systematic risk and whether it can be captured by a single factor or requires multiple factors. Enhancing the understanding of these factors has the potential to have profound impacts on the financial literature in these areas.
Prior to discussing the research designs for the analyses to be performed, this dissertation presents a summary of the prior literature related to the topics evaluated in this dissertation.
Chapter Two: Literature Review

This section reviews the literature related to: the relations between market valuation ratios, primarily dividend yields and P/E ratios, and overall market returns; the relations between various macroeconomic variables and overall market returns; the relations between SMB and equity returns; the relations between HML and equity returns; costs factors that may impact investors’ required returns and thus market valuation ratios. It is divided into subsections by topics.

2.1 Relation of Dividend Yields and Market Returns

Dividend yield or dividend-price ratio (D/P ratio) is defined as total annual dividends paid or to be paid divided by current market price of the related stock(s). As explained by Reichenstein and Rich (1993), if ratios are mean reverting, an above-average D/P ratio implies above-average future stock returns. This excess return would be due primarily to the capital gain which results from the movement in price to effect the mean reversion in the D/P ratio, although the excess dividend yield would also contribute to the excess future return. Based on evidence identified by Rozeff (1984) and Shiller (1984) that D/P ratios forecast short-term stock returns, Fama and French (1988a) evaluate the cross-sectional correlation of such ratios to returns of stock portfolios based on investment horizons of one month to five years. They conclude that correlations and thus predictability, on a cross-sectional basis, increase with the length of the investment period and explain 25% of the variation in returns for two-year to four-year investment horizons.
Fama and French (1989) find that variations in aggregate dividend yields also forecast variations in aggregate returns for both stocks and bonds. These authors assert that such findings can be interpreted as rational reflections by an efficient market of changing economic conditions. They further point to their findings that the explanatory power of variations in dividend yields is similar to that of the variations in default spreads (defined as the difference between the yield on a market portfolio of corporate bonds and the yield on Aaa bonds) as support of this assertion.

Campbell and Shiller (1988a) utilize, for the time period 1871-1987, annual observations of the prices, dividends, and earnings for the Standard and Poor Composite Stock Price Index. They attempt to determine if excess returns as defined by actual annual returns less the annual return on contemporary four-to-six-month prime commercial paper. Log real and excess returns are regressed against log D/P ratios, earnings/price (E/P) ratios, and lagged dividend growth ratios. These authors find that these ratios provide statistically significant explanations for one-year returns of this index. Still, they explain only a relatively small amount of the variance of such one-year returns. For example, only 3.9% of the variance of one-year returns is explained by the log dividend-price ratio. However, similar to the above noted findings relative to cross-sectional returns, Campbell and Shiller find that 26.6% of the variance of ten-year returns can be explained by the log dividend-price ratio.

In addition, these authors find that the lagged rate of dividend growth does not predict stock returns for any of the time horizons analyzed, including one year, three years, and ten years. Extending their analysis, these authors, utilizing a vector
autoregressive (VAR) framework, construct a dividend-ratio model which allows for changing interest rates and growth rates through time. They note that this model could also be classified as a dynamic Gordon growth model based on the framework originally proposed by Gordon (1962). However, this model finds little correlation between D/P ratios and theoretical value implied by constant expected real returns.

Campbell and Shiller (1998) extend their aforementioned previous work with data updated through 1997. They note that, although the D/P ratio crosses its mean of 4.73% twenty-nine times during the period from 1872 to 1997, it takes as long as twenty years (from 1955 – 1975) to revert to its mean. Also, as of 1997 (and this remains true in 2006), the ratio had not crossed its mean since 1983. They conclude that it is price (the denominator), not dividends (the numerator), which primarily explains mean reversion. These authors further note that the D/P ratio explains less than 1 percent of the annual variance of stock prices. This ratio explains approximately 15 percent of the 10-year variance of stock price growth, although this is still not that impressive. Still, Campbell and Shiller note that perhaps the dividend ratio needs to be adjusted for share repurchases, since share repurchases may be substituting for dividends during the period since 1983. Thus, repurchases, not excess stock prices, may explain the record low D/P ratio in 1997. These authors adjust the 1996 ratio for net (not gross) share repurchases and note that it increases from 2.2% to 3.0%, which is still significantly below its historical mean.

Carlson et al. (2002) dispute the findings of Campbell and Shiller (1998) and (2001) that the D/P valuation ratio indicates market overvaluation in the late 1990s. They note
that the basic premise in utilizing such a ratio to gauge misvaluation is that it will revert to their historical mean. However, Carlson et al. (2002) identify strong evidence that there has been a structural change in the mean of the D/P ratio since approximately 1992. They suggest that this break is the third such historical break, with the first occurring in the 1950s and the second in the early 1980s. They further suggest that the mean levels of this valuation ratio have changed significantly over time, from a mean of 5.2% prior to 1955 to a mean of 3.6% for the second regime until 1982, to a mean of 2.7% for the third regime until approximately 1992, and to an unknown current mean but expected to be less than 2%. In support of a structural shift in the dividend yield, Asness (2000) documents that the market’s dividend yield was consistently above the 10-year Treasury bond yield prior to the mid-1950s. Since 1958, however, the dividend yield has been consistently below (and often significantly below) the 10-year Treasury Bond Yield.

Explanations for the most recent change in mean include the substitution of share repurchase for dividends noted by several authors, including Cole et al. (1996), Grullon and Michaely (2002), and Liang and Sharpe (1999). Estimates of this substitution impact have generally been in the range of 0.5% to 1.5%, as a percent of share value for the mid to late 1990s. Campbell and Shiller (2001) find that even with structural changes the D/P ratio still implies market overvaluation as of year-end 2000. Not allowing for structural changes, these authors note that their model based on D/P ratios implies a 55% loss in real value for the stock market over the first decade of the twenty-first century.

Reichenstein and Rich (1993) regress quarterly excess returns, for the period from the first quarter of 1968 to the last quarter of 1989, of the S&P Composite Index (defined as
actual returns less returns on Treasury bills) against dividend yield ratios, E/P ratios, and a measure of market risk premium. Based on their analysis of second quarter 1968 to first quarter 1979, these authors find that dividend yields have insignificant explanatory power for one-quarter excess returns. However, for this same time period dividend yields have significant explanatory power for longer-period excess returns and that the explanatory power and the magnitude of the coefficient increase with the length of the return period. Thus, for six-month excess returns a regression on dividend yields results in $R^2$ of 0.13 and a coefficient of 5.6, and for two-year excess returns the $R^2$ is 0.47 and a coefficient of 18.4. However, for the time period 1979 to 1989, no significant correlation of dividend yield and excess returns could be identified.

Now, various authors have identified issues with the identified relation between dividend yield and market returns. These issues include: econometric issues, due to data mining, small sample bias, and errors in variables; the impact of share repurchases on dividend payments; and the lack of a comprehensive theory as to why firms pay dividends.

Ang and Bekeart (2007) and other authors argue that the predictability of long-horizon returns are spurious and result from various econometric issues. They find that neither dividend yields nor earnings yields have predictive power for equity returns that is robust to different countries and different sample periods. Rather, they attribute the conclusions of prior studies as resulting from failures to properly account for small sample properties of standard tests. Similarly, Goetzmann and Jorion (1993) use bootstrap methodologies and simulations to evaluate the distributions of test statistics.
relative to long-horizon stock returns. They also conclude that “there is no strong statistical evidence indicating that dividend yields can be used to forecast stock returns (p. 663).” In reconciling these findings with prior studies, Goetzmann and Jorion (1993) note that, since dividend payments are persistent, most of the changes in dividend yields relate to price changes. Further, since price impacts both the dependent and independent variables, these regressions suffer from biases, and GMM corrections are valid only asymptotically.

Fama and French (1988a) discuss how the errors in variable problem, that dividend yields include forecasts of earnings and dividend growth and thus bias the dividend coefficient downward. In support of this, they document that the inclusion of forward variables, such as future stock returns and future dividend growth rates increases $R^2$s and increases the magnitude of the dividend yield coefficient. Goetzmann and Jorion (1993) include variables that proxy for dividend growth and likewise find that $R^2$’s increase and the magnitude of the dividend yield coefficient increased. These authors conclude, “If analysts have some ability to forecast expected dividend growth, these forecasts should be included in the forecasting regressions, in which case dividend yields might be useful predictors of stock returns.”

Arnott and Ryan (2001) discuss how stock buybacks, higher levels of earnings reinvestment (i.e., lower payout ratios), and the “tech revolution” may increase real dividend growth. However, they argue that such increase is probably only from 1.0% to approximately 2.0%. Ilmanen (2003) indicates that gross and net buybacks would add approximately 2.0 percent and 1.5 percent, respectively, to the dividend yield, even
during their peak period in the late 1990s. Further, Liang and Sharpe (2000) maintain that, since buybacks are less consistent than dividends, 0.5 percent might be a more realistic amount. Further, per Ilmanen (2003) no adjustment may be necessary since buybacks never exceeded new share issuances in the 1990s.

Jagannathan et al. (2000) analyze narrow and broad (including share repurchases and new equity issuances) measures of dividends. They conclude that the growth rates of both are similar post World War II, as they both average 4.4 percent annual growth. However, the broad dividend yield is more volatile. Carlson et al. (2002) identifies two structural breaks in the dividend yield ratio in 1955 and 1982. They note that 1958 was the first time the dividend yield fell below the bond yield. These authors also suggest a third break in 1992, although this break cannot be empirically validated due to limited data. They relate this third break to share repurchases.

Lewellen (2004) asserts that the correction typically utilized for small-sample biases in many prior studies of market dividend yield and market returns often significantly understates the predictive power of dividend yields, due to the failure to correct for autocorrelation being approximately equal to one. Based on this assertion, he (p. 209) notes that “dividend yield predicts market returns during the period 1946-2000, as well as in various subsamples.” He finds that dividend yield is “typically significant at the 0.001 level, with many t-statistics greater than 3.0 or 4.0 (p. 229).”

Fischer Black (1976, p. 5) at the onset of his article, “The Dividend Puzzle”, asks the following two questions. “Why do corporations pay dividends? Why do investors pay attention to dividends?” His answer essentially to each of these two questions is, “We
don’t know.” That same answer largely still applies today to both questions. In fact, with developments subsequent to the publication of Black’s article in terms of the acceptability and legality of share repurchases, these questions have become even more vexing. Perhaps that is why Brealey and Myers (2002) include the “dividend controversy” in their list of the ten most significant unsolved problems in finance. One significant issue in explaining any relation between market returns and dividend yield is the lack of a comprehensive theory explaining firms’ dividend payments.

Overall, dividend yield seems to have statistical significance in forecasting returns of individual securities and the overall market. This significance increases with length of the return period. However, the forecasting utility of this ratio seems to have been significantly reduced in the last twenty years, perhaps due to firms increasing use of share repurchases as a means of returning funds to stockholders. Still, perhaps allowing for the impact of other macrovariables, such as interest rate components, may provide better consistent forecasting ability. The intent of this dissertation is to evaluate if the ability of dividend yield to forecast market returns, especially shorter-period returns such as monthly returns, is enhanced when interest rates and cost factors are controlled for.

2.2 Relation of E/P (or P/E Ratios) and Market Returns

Dividend yields have more often been evaluated by academicians in attempts to forecast market and individual equity returns. In contrast, P/E ratios are more often utilized and quoted by financial practitioners in evaluating overall market valuation and in assessing if individual equities are appropriately valued. Bierman (2002) provides a
good summary of why P/E ratios are so commonly used to evaluate the reasonableness of a firm’s stock price. He notes that, although most financial economists are in agreement that the value of common stock should be equal to the present value of its future cash flows, a valuation process based on this concept poses significant challenges for most investors and analysts. For example, they would need to estimate various future periods’ cash flows, a discount rate for each period with appropriate adjustment for risk, and some terminal value. Thus, P/E ratios represent a readily available heuristic as a substitute for this method.

Also, as discussed by Good and Meyer (1973), earnings can proxy for dividends to the extent they represent the cash flow in excess of the amount needed to continue operating the firm at its current level. In this way, earnings depict “total dividends,” which include both dividends paid out to stockholders and dividends retained by the firm to be reinvested so as to increase future earnings and dividends. Also, as noted by Haugen (1993), a firm’s P/E ratio implicitly includes a forecast of the firm’s expected rate of growth and the market’s required return for the firm’s stock. Further developing this concept, Siegel (2002, p. 95) asserts that P/E ratios are functions of expected earnings growth, interest rates, investors’ risk attitudes, taxes, liquidity, etc. Siegel (2002, p. 156) delineates five major variables which determine whether or not a P/E ratio is justified. They are: investors’ required rates of return; the rate of earnings growth; how long the excess earnings growth can be maintained; the maturity P/E (the appropriate P/E when accelerated growth has ended); and the dividend yield. Along this same line, French and
Poterba (1991) state that P/E ratios are functions of both required equity returns and expected growth rates.

Low earnings yields suggest high earnings growth prospects, low required returns, or investor non-rationality (mispricing), per Ibbotson and Chen (2003). Per Ilmanen (2003), the earnings yield is equivalent to the required rate of return, such as if the constant retention rate \(k\) equals the constant dividend growth rate \(g\).

An early empirical study of the ability of P/E ratios to forecast future investment performance was conducted by Basu (1977). He concluded that portfolios of stocks with low P/E ratios seemed to earn higher absolute and risk-adjusted rates of return than portfolios of stocks with high P/E ratios, at least during the period from April 1957 to March 1971. His work on cross-sectional returns suggested that time-series analysis of overall market P/E ratios should also be conducted to determine their ability to evaluate the misvaluation of the overall market.

Campbell and Shiller (1988a) find that 56.6% of the variance in returns of the Composite Stock Price Index Standard and Poor can be explained by the thirty-year moving average E/P ratio. Thus, they conclude that the E/P ratio is “a powerful predictor of the return on stock, particularly when the return is measured over several years (p. 675).” Reichenstein and Rich (1993) regress quarterly excess returns, for the period from the first quarter of 1968 to the last quarter of 1989, of the S&P Composite Index (defined as actual returns less returns on Treasury bills) against dividend yield ratios, E/P ratios, and a measure of market risk premium. Based on their analysis of second quarter 1968 to first quarter 1979, these authors find that E/P ratios have insignificant explanatory power.
for one-quarter and six-month excess returns. However, for this same time period E/P ratios have significant explanatory power for longer-period excess returns and that the explanatory power and the size of the coefficient increase with the length of the return period. Thus, for one-year excess returns a regression on E/P ratios results in $R^2$ of 0.11 and a coefficient of 2.2, and for two-year excess returns the $R^2$ is 0.31 and the coefficient is 4.9. However, for the time period 1979 to 1989, no significant correlation of E/P ratios and excess returns could be identified.

Campbell and Shiller (1998) extend their aforementioned previous work with data updated through 1997. They suggest that smoothed earnings may be more successful in forecasting market returns. Thus, they utilize ten-year moving-averages of real earnings as the denominator of a price/smoothed earnings (P/SE) ratio. They find that such a ratio, with an $R^2$ of 37%, is a good forecaster of ten-year growth in stock prices. Further, they note that the January 1997 ratio forecasts a ten-year real decline in the real value of the market of 40%. This use of smoothed earnings in essence attempts to capture the permanent earnings of a firm or index. Beaver and Morse (1978, p. 65) define permanent earnings as “that constant cash flow whose present value is equivalent to the present value of the cash flows generated from the current equity investment.” They note that EPS will vary from year to year due to various transitory factors that impact individual years. Thus, smoothing earnings should mitigate or eliminate the impact of transitory earnings on P/E ratios, as described by Molodovsky (1953).

Easton et al. (1992) provide support for the use of smoothed earnings based on ten-year moving averages. They note that ten-year earnings explain an impressive 63% of
ten-year market returns. They further note that the $R^2$ seems to increase in conjunction with increases in the number of years in the return interval. In fact, $R^2$ can be approximated by a factor of 6% times the number of years in the return interval up to ten. Thus, over long intervals accounting earnings seem to reflect economic earnings.

Additionally, Sorenson and Arnott (1988), Cole et al. (1996), Lander et al. (1997), and Campbell and Shiller (1998) have all found that the market E/P has the ability to forecast returns.

In contrast to the above findings, Lamont (1998) finds that the earnings yield is not a significant forecaster of returns. He argues (p. 1574) that this lack of forecasting ability results from both prices and earnings having negative relations to future returns that are negated when combined. Essentially, both may proxy for the business cycle, with both being higher in booms and lower in recessions. He discusses the mean reversion effect on price as reflecting low current risk premiums (p. 1576). He also provides several references for how earnings proxy for economic conditions.

Since ex post (actual) returns tend to be noisy estimates of expected returns and of anticipated volatility, Asness (2000) uses E/P and D/P ratios (market yields) as proxies for anticipated equity returns and bond yield as a proxy for anticipated bond returns. Prior studies, which utilize actual (ex post) equity returns as proxies, have had difficulty in demonstrating a relation between expected stock returns and ex ante volatility. By using ex ante market yields as a proxy for expected (ex ante) returns and prior volatilities as proxies for expected volatility, Asness (2000) demonstrates a clear relationship between anticipated returns and anticipated volatilities. Asness (2000) (p. 112, note 19)
indicates that long-term rolling estimates of volatility are crucial for establishing required returns (i.e., short-term averages do not work or are not significant). Also, long-term averages are not accurate in forecasting the next period’s long-term volatility and thus the change in the valuation ratios. Thus, Asness (2000) argues that it is perceived volatilities not actual that determine required returns. He explicitly begs the question on market efficiency in this regard, as he leaves it for “future work”.

Also, Arnott and Asness (2003) find that a low earnings yield (or high P/E) is related to higher future 10-year real earnings growth. Thus, the market anticipates earnings growth. Still, they find that the starting payout ratio has more explanatory power relative to future earnings growth and that the P/E ratio has little forecasting ability if the dividend payout ratio is also included. Weigand and Irons (2004) assert that, although the level of the P/E ratio has been a good forecaster of real earnings growth since the 1880s, since 1960 the change in the P/E ratio has had greater explanatory power in explaining future earnings growth.

Lewellen (2004) finds that small sample bias adjustments frequently understate the predictive power of variables, if the variables’ autocorrelation is approximately one. Based on this recognition, he concludes that “E/P appears to forecast nominal returns, but there is little evidence that it forecasts excess returns.”

In summary, earnings yields, similar to dividend yields, seem to have statistically significant forecasting ability, especially as the return period is increased. Still, there are indications that this forecasting ability has diminished in the last twenty years. One theoretical shortcoming in the use of earnings yield ratios, which may account for their
diminished forecasting ability in recent years, is their inability to reflect the impacts of changes in discount rates on the value (stock price) of a firm. This presumably is especially pertinent for the 1980s and 1990s throughout which interest rates declined on an almost steady basis. Thus, an unexplored question is, “If we adjust earnings yields for interest rates or interest-rate components, do we find increased forecasting ability, especially relative to excess returns?” Thus, one potential contribution of this dissertation is to evaluate if the ability of earnings yield to forecast market returns, especially shorter-period returns such as monthly returns, is enhanced when interest rates and cost factors are controlled for.

2.3. Fed Model

Related to the E/P ratio and a commonly used tool by investors is the Fed Model. This model compares the E/P ratio and the yield on 30-year Treasury Bonds. It derives its name from testimony by Alan Greenspan in 1997 that suggested that the Fed viewed the market as overvalued when the E/P fell below the 30-year Treasury rate and undervalued when the reverse occurred.

Implicitly the Fed Model recognizes that the bonds are the main alternative to equity investments. Thus, investors move between the two investments based on their comparable yields and thus ensure that any differential does not exist for extended periods. Still, as noted by Siegel (2002, pp. 105-107), this relation works despite the significant differences in these investments because there are offsetting advantages of each investment. Treasury bonds are guaranteed to pay a set amount of funds over time,
whereas prices of stocks, which represent real assets, should rise with inflation. Siegel maintains that the Fed Model does not work when inflation is low. Thus, prior to 1970 the model did not work. Due to wage stickiness, deflationary periods tend to increase real wage costs. Thus, nominal assets, such as bonds, should outperform equities during such periods, per Siegel (2002, p. 107).

Campbell and Vuolteenvahh (2004) estimate that the level of inflation explains nearly 80 percent of stock-market mispricing. According to these authors (p. 1), “Practitioners argue that the bond yield plus a risk premium defines a ‘normal’ yield on stocks, and that the actual stock yield tends to revert to the normal yield.” This is what motivates the Fed model for investing. Further, since nominal bond yields are highly related to expected inflation, inflation significantly impacts equity yields.

Various studies have supported the success of the Fed Model. Weigand and Irons (2004) find that the market earnings yield and the T-note yield have been cointegrated since 1960. Correlation coefficients are 0.73 for 1960-2003 but only 0.02 for 1881-1959. These authors suggest that the Fed model may stem from the Gordon growth model published in Gordon (1959). Lander et al. (1997) document a significant correlation between the E/P ratio (or earnings yield on stocks) and the 30-year Treasury rate. To calculate the earnings yield, the estimate of current operating earnings of the S&P 500 Index as reported by I/B/E/S is divided by the value of the S&P 500 Index. These authors evaluate the market timing ability of a Fed model that uses earnings forecasts to calculate equities’ earnings yield. They find that their simple trading rule provides excess returns with reduced risk relative to a buy-and-hold strategy. Assness (2003) documents that the
Fed model has significant explanatory power relative to explaining market P/Es for the period 1926-2001, as long as the return volatility of stocks and bonds is controlled for.

However, several authors suggest that the success of the Fed Model has no theoretical support and thus may reflect misunderstanding by investors. For instance, Asness (2003) asserts that this reflects non-rational behavior by the market because the P/E is a real number while the bond yield is a nominal number. He claims (p. 12) that “the P/E does not have to move with inflation since nominal corporate earnings already do so.” Such a claim assumes that earnings do so move and that investors do not seek recompense for the inflation tax (tax on capital gains due to inflation). Also, Asness (2003) maintains that, while the Fed model forecasts P/E ratios, P/E ratios forecast long-term stock returns better than the Fed model.

One argument for the Fed model is based on the derivation of the Gordon growth model that expected return equals dividend yield plus growth, which equals dividend payout times earnings yield plus growth. Asness (2003, p. 14) demonstrates that nominal earnings growth moves commensurate with inflation. Thus, real earnings should not; “real earnings growth is largely insensitive to the level of constant known inflation.” He asserts that nominal stock returns should increase with inflation and bond yields. Thus, the E/P or P/E ratio should be unaffected by inflation. Asness (2003) suggests that the negative impacts of the inflation tax may be offset its benefits in terms of reducing the real liabilities of corporations.

Likewise, Campbell and Vuolteenaho (2004) argue that the Fed model has conceptual problems in that it implicitly assumes the nominal growth rate of dividends is
constant, or at least unaffected by inflation. [According to the Gordon growth model, 
\( \frac{D_1}{P_0} = R - G \). These variables can be expressed in real or nominal terms.] G (p. 3) “is correctly interpreted as a long-term real dividend growth, not the conditional expected growth at business cycle horizons.” However, this model implicitly assumes no frictions, such as taxes and transactions costs. Campbell and Vuolteenaho (2004) find that inflation is highly significantly positively related to excess nominal dividend growth and that the risk premium appears to be largely unrelated to inflation. Overall, they find much support for the Modigliani and Cohn (1979) hypothesis of inflation illusion in that they find that inflation is highly correlated with mispricing. Similarly, Weigand and Irons (2004) attribute the Fed model’s use to behavioral factors, since the Fed Model does not represent or describe any fundamental relation among macroeconomic variables.

Now, a variation of the Fed Model is to substitute T-bill yield for Treasury-bond yield. Sorenson and Arnott (1988) using 1960-1986 data find that the estimated ERP (earnings yield less T-bill yield) explains 24% of the actual subsequent month’s excess return of the equity market (S&P 500 return less T-bill return). The dividend yield less T-bill yield is even more significant at 29% with a coefficient of 1.88, such that a ten-basis-point increase results in a nineteen-basis-point return increase. Dividend yield plus dividend growth (based on a rolling 5-year average) has little explanatory power. These authors also find that the model improves by using real earnings averaged over 8 years (or about 2 business cycles) and real current price. Cash yield (the T-bill rate) is subtracted as it represents an opportunity cost.
The Fed Model represents an interesting variation of the E/P ratio. Still, despite some empirical success, various authors dissuade its use due to the lack of theoretical support for the relation of the E/P ratio and the Treasury bond yield. Nevertheless, its prior empirical success and the surrounding controversy relative to its use by practitioners suggest that additional research is needed to further understand the relations among the components of interest rates, earnings and dividend yields, and equity market returns. This dissertation is intended to help bridge this gap by further evaluation these relations and determining if controlling for interest rates enhances the ability of earnings and dividend yields to explain and forecast market returns.

2.4 Macroeconomic Variables and Market Returns

The above sections have discussed the relations of various ratios and overall market returns. There have also been various studies that evaluate the relations between certain macroeconomic variables and market returns. As noted by Flannery and Protopapadakis (2002, p. 751), “any variable that affects the future investment opportunity set or level of consumption (given wealth) could be a priced factor in equilibrium.” One should expect that to the extent securities are impacted by these undiversifiable risk factors, they should earn risk premia, at least in a risk-adverse economy. Macroeconomic variables often reflect potentially systematic effects on either firms’ cash flows or the risk-adjusted discount rate. Likewise, changes in the economy, as measured by macroeconomic variables, may impact the real investment opportunities available. Thus, it is reasonable to expect that macroeconomic variables may be correlated with asset returns.
In an intertemporal asset pricing model, as described by Merton (1973), return premia are required by investors for exposure to uncertainties in current security returns and to changes in future investment opportunities. Movements in macroeconomic variables may cause or proxy for changes in investment opportunities. For example, changes in the balance of trade or changes in unemployment could cause changes in investment opportunities, per Flannery and Protopapadakis (2002).

For instance, Keim and Stambaugh (1986) investigate whether expected risk premiums (and thus expected returns) vary predictably with certain common factors. They develop three ex ante observable variables and find that they predict ex post risk premiums (or forecast expected returns) of common stocks of various-sized NYSE-listed firms, of long-term bonds with various levels of default risk, and of U.S. Government bonds of various maturities. However, the findings relative to stocks are much weaker than those related to debt securities and are significant only for the month of January. Further, the authors investigate only monthly risk premiums in returns. The three variables utilized are the spread between the yields on low-grade corporate bonds (annual yields divided by twelve) and one-month treasury bills (which would seem to reflect a measure of term premium and default-risk premium); the log of the ratio of the real Standard & Poor’s Composite Index to its previous historical average; and the log of average share price for the lowest quintile, based on market value, of NYSE firms. The first variable is positively correlated and the second and third variables are negatively correlated with the market risk premiums (and expected returns) of the aforementioned types of securities. These authors also find that seasonality is an important consideration.
for shorter-period risk premiums and returns. For instance, they identify that the last variable explains approximately 32% of the commonly noted January effect for small-firm stocks and low-grade bonds.

CRR find that variables that depict term premiums and default premiums help explain the cross section of average returns on NYSE stocks. They further find that the monthly growth in industrial production, inflation variables, and the default premium factor consistently have explanatory power for average stock returns, while the term premium factor sometimes exhibits explanatory power. Overall, these authors (p. 42) conclude “that stock prices are exposed to systematic economic news, that they are priced in accordance with their exposures, and that the news can be measured as innovations in state variables whose identification can be accomplished through simple and intuitive financial theory.”

In addition, Fama and French (1993) define similar term and default premium factors, with term defined as the difference between the monthly long-term government bond return (from Ibbotson Associates) and the one-month T-bill rate measured at the end of the prior month and with default defined as the difference between the return on a market portfolio of long-term corporate bonds (the composite portfolio on the corporate bond module of Ibbotson Associates) and the long-term government bond return. They do find that two debt-rate-structure factors capture strong variations in stock returns. Further, when these factors are combined with book-to-market, size, and general stock-market-return factors, the resulting five-factor model explains much of the common variation in bond and stock returns, as well as the cross-sectional variation in average
equity returns. Also, Fama and French (1989) find that dividend yields and the default premium are highly correlated (0.61 for 1927-1987 and 0.75 for 1941-1987). These authors argue that they track similar predictable components of asset returns.

Along this same line, Campbell (1987) notes that, for the periods 1959 to 1979 and 1979 to 1983, various measures constructed from interest rates on U.S. Government securities forecast excess monthly returns (or risk premiums) of the value-weighted portfolio of the New York Stock Exchange (NYSE) and of ten-year Government bonds. These measures include the one-month T-bill rate, the spread between the one-month and two-month T-bill rates, a one month lag of this spread, and the spread between the one-month and six-month T-bill rate. Reported $R^2$ for stock returns for the initial period is 11%, although autocorrelation and potential other econometric issues are noted and not corrected for. The correlation between the term structure and excess stock returns is greater for longer maturities, i.e., the longer the maturity, the more the maturity premium predicts excess stock returns.

Another area of market predictability is reflected in the work of Fama and French (1989) and Balvers et al. (1990). These authors show that economic conditions, such as production levels and proxies for stages of the business cycle, are inversely correlated with expected future returns. In other words, during expansions when business conditions are strong (and investors are presumably flush with cash) future expected returns are lower, and vice versa. Specifically, Fama and French (1989) define explanatory variables for the default spread or default premium as the difference between the yield on the market portfolio of corporate bonds and that of Aaa bonds and for the
term premium or term spread as the difference between the Aaa yield and the rate on one-month T-bills. (The Aaa yield is utilized to avoid effects from the change in tax status of Treasury bonds from non-taxable to taxable in the early 1940s.) These authors find that the expected excess returns (defined as returns net of the one-month T-bill rate) on stocks and corporate bonds move together and that their movements seem to be related to long-term business cycles. The term spread seems to trough around the peaks of business cycles and to be peak near the troughs of such cycles. Thus, these authors suggest that this spread tracks a maturity premium which may similarly impact the expected returns of various types of long-term assets, perhaps to compensate for the exposure to interest rate movements which affect the value of all long-term securities.

Fama and French (1989) also note that the default-spread coefficients are higher for stocks than bonds and for lower-grade bonds than higher-grade bonds. Such observations are consistent with the intuition that higher-risk securities are more impacted by movements in changes in business conditions. In terms of the predictability of market returns, utilizing all three variables, the $R^2$s are higher for longer return periods, as they are often less than 10% for monthly and quarterly returns and often greater than 30% for two-year to four-year aggregate stock returns. Thus, the authors interpret the variables as measures of long-term economic conditions and suggest that they may proxy for market risks which vary depending on the stage of the business cycle. They further note that consumption may offer an explanation for their findings. In other words (p.48), “when business conditions are poor, income is low and expected returns on stocks and bonds
must be high to induce substitution from consumption to investment.” Similarly, when conditions are good and income is high, lower returns are needed to induce substitution.

Reichenstein and Rich (1993) regress quarterly excess returns, for the period from the first quarter of 1968 to the last quarter of 1989, of the S&P Composite Index (defined as actual returns less returns on Treasury bills) against dividend yield ratios, E/P ratios, and a measure of the market equity risk premium. They define market risk premium as Value Line’s median year-end dividend yield plus the median annual capital gain as calculated from the forecast by Value Line of three-year to five-year price appreciation potential minus the risk-free rate (based on the three-month add-on yield T-bill rate). Based on their analysis of second quarter 1968 to first quarter 1979, these authors find that their measure of market risk premium (RP) has insignificant explanatory power for one-quarter and six-month excess returns. However, for this same time period RP has significant explanatory power for longer-period excess returns and that the explanatory power and the size of the coefficient increase with the length of the return period up to an eighteen-month return period. Thus, for one-year excess returns a regression on RP results in $R^2$ of 0.13 and a coefficient of 0.88, and for eighteen-month excess returns the $R^2$ is 0.29 and the coefficient is 1.50. Further, for the time period 1979 to 1989, in contrast to their findings in regard to dividend yields and E/P ratios, significant correlations of RP and excess returns are also identified for periods of one year or more, with the eighteen-month return period again reporting the highest correlation ($R^2$ of 0.30) and largest coefficient (1.94). Still, these authors do note that RP did not forecast the 1973-1974 market crash. However, based on their findings, these authors conclude that
the key to providing a consistent prediction of long-run stock market returns is to find a variable that closely proxies the unobservable market risk premium, although no model will be able to completely eliminate the risk inherent in the stock market.

Campbell and Shiller (1998) also note that extreme valuation ratios (low D/P and high P/E and P/SE ratios) tend to be present during periods of rapid economic expansion, such as in the late 1920s, the 1960s, and the mid-1990s. However, Campbell and Shiller (2001) note that, based on aggregate annual US data from 1871 – 2000, the D/P and E/P ratios are not useful in forecasting future dividend growth, future earnings growth, or future productivity growth. These authors do note, however, that S&P earnings and productivity (measured as the log of real output per hour for the non-farm housing private economy) have virtually the same growth rates, although productivity has historically been much less volatile and moves very closely to the trend line.

Lee et al. (1999) approach the question of the ability to forecast excess market returns from a different angle. These authors model the time-series relationship between value and price as a cointegrated system instead of a static equality. They develop a residual income model to estimate the intrinsic value of a stock and use this model to test whether stock price is a noisy measure of the stock’s intrinsic value. If stock price exceeds intrinsic value, the stock is overvalued, and vice versa. This model is related to the Economic Value Added (EVA) concept in that it recognizes economic income as based on net income minus the required return on invested equity capital. Equity value equals the sum of book value plus the present value of expected economic income. The nominal cost of equity is calculated based on a time-varying risk-free rate (the annualized
monthly T-bill rate) plus a historical market risk premium (the geometric average excess return over the one-month T-bill rate for the NYSE/AMEX value-weighted market portfolio form January 1945 to month t-1).

Although not presented, these authors also utilize constant risk premia of 4%, 5%, 6%, and 7% without significant changes to their findings. As discussed below, Fama and French (2002) take issue with the utilization of a market risk premium. Lee et al. also incorporate explanatory variables related to default spread and term spread based on the findings of Fama and French (1989), as discussed above. However, they find that neither of these variables have significant explanatory power after controlling for their value/price (V/P) ratio. They do find that their V/P ratio does outperform models based on dividend yield, E/P ratios, and book-to-market ratios in terms of both tracking ability and predictive power relative to the DJIA stocks. They also find that the use of short-term (rather than long-term) interest rates and analyst forecasts (rather than historical earnings) improves their model. They note that the predictive power of their model can be interpreted either as indicative of market inefficiency or as an indication that the V/P ratio proxies for some market risk factor.

Ritter and Warr (2002) modify the model of Lee et al. so as to incorporate adjustments for real versus nominal interest rates, inflation, and the unrecognized income related to decreasing real debt values in the presence of inflation. Their model, as did that of Lee et al., allows for a time-varying cost of capital and uses forecasts of earnings, rather than actual earnings. Forecasted earnings incorporate a forward-looking element and thus recognize the correlation of inflation and future profit levels. These authors
calculate a value/price (V/P) ratio to determine if the valuations of an index indicate overvaluation (values greater than one) or undervaluation (values less than one). They regress total annual real return of the DJIA on its aggregate V/P ratio with the prediction that these variables should be positively related. After adjusting for econometric issues and including a forecast of estimated inflation as an explanatory variable along with the V/P ratio, they estimate a model with an $R^2$ of 27%. This model suggests that the market corrects approximately one-third of its misvaluation in the subsequent year, as the estimated coefficient of the V/P ratio is 35. However, these authors also find that neither of the explanatory variables is significant without inclusion of the other. They suggest that disintermediation accounts for the reason expected real returns are so strongly related to expected inflation. They also note that the V/P ratio and expected real inflation are strongly correlated with a $\rho$ of 0.86. Thus, omission of either variable results in significant omitted variable bias in the estimated equation.

Chen (1991) demonstrates that macroeconomic variables, such as lagged production growth rate (negatively), the default premium (positively), the term premium (positively), the short-term interest rate (negatively), and the market dividend yield (positively), are correlated to market excess returns. These findings support the author’s hypothesis that recent economic growth is negatively and expected future economic growth is positively correlated with future expected market returns. Chen finds that a significant portion of the annual excess market returns can be explained by the above variables.

Flannery and Protopapadakis (2002) evaluate which of 17 macro announcement series impact the level and conditional volatility of equity returns. They evaluate
surprises (differences between actual announced amounts and expected amounts per
survey data), not levels or expected amounts. They find that only the money supply (M1
or M2) impacts both. Additionally, inflation (CPI and PPI) impact the level of equity
returns, and three real variables (Employment Report, Balance of Trade, and Housing
Starts) impact the conditional volatility of returns. All variables are measured as surprise
impacts on daily returns. Thus, they do not evaluate the impacts of expected amounts of
these variables. Thus, they conclude that these factors are “strong candidates” for risk
factors or proxies for risk factors. As a robustness check, they find that only these 6
factors are associated with increased trading volume. (Note they do not actually evaluate
if these factors are priced by capital markets.) Flannery and Protopapadakis (2002) use
3-month T-bill rate, junk bond premium, Treasury term structure, own stock returns, D/P
ratio (CRSP), and Log of market portfolio value (CRSP), and the January effect as
control variables, due to prior research indicating their significance. They omit 11 days
for crash of 1987 and October 1989 to remove outliers. These authors note (p. 774) that
their ability to detect significance of real variables may relate to prior tests’ use of a
constant coefficient model of returns that may “impose too much structure on the data.”

Flannery and Protopapadakis (2002) find that positive inflation (CPI or PPI) and M1
surprises were significantly associated with negative equity returns. (They do not
evaluate inflation or money levels). In contrast to CRR, these authors cannot identify any
industrial production variable that is significant in explaining aggregate stock returns.

Harvey (1991) argues that the term structure forecasts economic growth for many G-
7 countries and does so better than other models. Per Harvey (p. 8), Fisher (1928)
“suggests that some people would like to move income from today to tomorrow, while others wish to give up some income in the future to have additional income today. The interest rate equates the demand and supply for this income shifting.” Harvey maintains that two factors drive the desire to shift income. These are: investors’ expectations in regard to future consumption; and their willingness to hedge their income. The willingness or desire to hedge is proportional to the investor’s risk aversion. Risk aversion allows interest rates to convey information about future economic growth. Harvey says the change in GNP is linearly related to the term structure (the difference between long-term and short-term yields annualized). The coefficient of the term structure is the level of risk tolerance or the inverse of the level of risk aversion. The intercept term (a) is “the expected level of economic growth when long-term rates and short-term rates are equal.” \[ \Delta \text{GNP} = a + b(\text{Term Structure}) + \text{error term} \]. Harvey (p. 18) finds that more than half the variation in the world business cycle is predictable using the term structure of interest rates and that “the term structure of interest rates can account for over half the variation in GNP growth in many G-7 countries.” Further, he (p. 19) finds that “the shape of the term structure provides early warning of business cycle turning points.”

Chordia and Shivakumar (2006) find that future changes in GDP, industrial production, consumption, labor income, inflation, and T-bill returns are significantly related to returns earned by their zero-investment portfolio comprised of stocks with high earnings surprises financed by shorting stocks with low earnings surprises. In other words, these returns forecast future economic conditions.
Cohen et al. (2003) find that the value spread (range of high and low BE/ME ratios) is positively related to the default yield spread (the difference between the yields of Baa and Aaa long-term corporate bonds). Further, the expected return from value-versus-growth strategies is atypically high when the value spread is high. This would suggest that HML is related to a risk factor in that these findings are “consistent with time-varying expected returns being a plausible explanation for stock momentum (p. 636).” Further, the additional inclusion of the median BE/ME ratio, which measures whether the market is currently pricey, has marginal explanatory power, along with the stronger explanatory power of the value spread, relative to HML returns.

Chordia and Shivakumar (2002, p. 985) demonstrate that the excess profits related to momentum strategies are subsumed and can be explained by the inclusion of “a set of lagged macroeconomic variables” related to the business cycle. They also find that only during expansionary phases are returns to momentum strategies positive, while during recessions they are insignificantly negative.

Petkova (2006) identifies that macroeconomic variables, including the dividend yield, one-month T-bill, term premium, and default premium, have more explanatory power relative to the cross-sectional variation in average returns of portfolios than do HML and SMB. Petkova interprets this result as supportive of the ICAPM (Intertemporal Capital Asset Pricing Model) in that differences in these variables reflect changes in investment opportunities.

Much of the research in this section is compelling. Many studies have identified various macroeconomic variables whose ex ante values seem to be correlated with ex
post excess returns of the overall stock market or significant segments thereof. Certainly
the above studies suggest that investors can profit from inclusion of certain
macroeconomic variables in their forecasts of future returns and thus may improve their
average excess returns by adjusting their asset allocations based on these forecasts. Still,
much additional research is needed in this area. It is somewhat surprising that such
research has not been undertaken based on the findings of the above studies. This
dissertation is intended to help bridge this gap by evaluating the relations between
various macroeconomic variables and dividend and earnings yields, which represent
proxies for investors’ required returns.

2.5 Consumption Smoothing (Relation of Production and Returns)

Balvers et al. (1990) provide a theoretical explanation for varying equity risk
premiums. They suggest that such variations are rational and are based on the theory that
investors smooth consumption and adjust their required rate of return according to their
anticipation of scarcity or surplus. If scarcity is anticipated next period, investors will
want to save more this period and will accept lower returns this period. In this way, these
authors maintain that returns should be predictable to an extent based on predicted
aggregate output. Further, Chen (1991) seems to provide evidence for this theory. He
finds that the market excess return is positively correlated with expected future economic
growth. In other words, there is an increase in market valuation ratios and a decrease in
required return, resulting in excess actual returns, when higher output is anticipated.
Similarly, Cochrane (1997) maintains that, because investors’ utility is determined by their consumption relative to past standards, similar to the habit formation suggested by Constantinides (1990), they become more risk tolerant when the economy is strong. The findings and theories of these authors should be considered in evaluating and explaining the relations between macroeconomic variables and equity returns.

2.6 Inflation

Various authors, including Fama and Schwert (1977), Modigliani and Cohn (1979), Asness (2000, 2003), and Ritter and Warr (2002), have argued that inflation significantly impacts equity prices and required equity returns. However, such authors have been unable to explain this impact. Stulz (1986) asserts that the fact that “ex ante real returns on common stock are negatively related to ex ante expected inflation (p. 210)” is a great puzzle. Per Stulz, “one would expect information about future economic activity to be capitalized in stock prices and to have no effect on ex ante real stock returns (p. 210),” i.e., on how investors value real cash flows. Many, including Modigliani and Cohn (1979), Asness (2003), and Ritter and Warr (2002), argue that it is non-rational.

Since price levels were essentially trendless prior to 1926, fixed income investors should have required no inflation premia at that time. Only after World War II did price levels exhibit a positive trend, with the result that real yields were “decoupled” from nominal yields. Arnott and Bernstein (2002) estimate that this decoupling cost bondholders an average of 0.4 percent per year from 1926 to 2001 (or approximately 10
percent of the ex post ERP). Arnott and Bernstein (2002) posit that for periods 1950 and prior on average the expected level of inflation should have been zero.

Still, various authors posit explanations for the impacts of inflation on asset prices. These explanations, as discussed below, include a worsening investment opportunity set, the negative tax impacts on inflationary gains relative to depreciation and inventory, findings that equities are not as an effective inflation hedge as theoretically posited, and inability of investors to accurately forecast inflation. For example, per Siegel (2002, pp. 106-107), inflation has negative impacts on equity prices because it increases uncertainty, increases real tax costs for both investors and companies, and increases the risk of the central bank tightening monetary policy.

Stulz (1986) suggests that when expected inflation increases, if it results from a worsening of the investment opportunity set, “the expected real rate of return on the market portfolio of risky assets may fall by more the real rate of interest (p. 211).” This offers a potential explanation for the negative coefficient of expected inflation relative to equity returns, although it cannot explain the absolute size of the coefficient. In his model, “endogenously determined expected real rate of return of the market portfolio of risky assets and real rate of interest are negatively related to the level of expected inflation (p. 210).” Per the model, higher expected inflation “decreases the real wealth of households because it increases the opportunity cost of real balances and hence decreases the households’ holdings of real balances. To keep all the stock of capital invested in production, the households’ desired holdings of nominal assets, i.e., default-free nominal bonds and cash, must fall by the same dollar amount as their desired holdings of real
balances. This can only be achieved by a fall in the real rate of interest which makes investments in nominal assets less attractive relative to investments in production (p. 210).” Stulz models equity real returns versus inflation and monetary growth. Stulz argues that real wealth decreases if expected inflation increases. This could result in decreased real interest rates and the expected real rate on the market portfolio.

Per Cornell (1999), numerous authors, including Fama and Schwert (1977), have documented that equities are not a good hedge against short-term changes in the rate of inflation. In fact, monthly equity returns have been shown to be negatively correlated to both expected and unexpected inflation. For example, Fama and Schwert (1977, p. 144) document that “only private residential real estate is a complete hedge against both expected and unexpected inflation during the 1953-1971 period.” They find that the nominal return on real estate (as proxied by the Home Purchase Price Index) moves on average with a one-to-one correspondence with both expected and unexpected inflation. They also find (p. 144) that “government debt instruments, both bills and bonds, are complete hedges against expected inflation” and that thus “their expected real returns are unrelated to inflation.” These authors find (p. 144) that “common stock returns are negatively related to the expected inflation rate during the 1953-1971 period.” They also find weaker evidence that stock returns are negatively related to unexpected inflation and changes in expected inflation. (Still, these authors find that inflation explains little of the variation in stock returns, although this may no longer be the case.)

Similarly, Siegel (2002, pp. 195-196) documents that stocks, bonds, and Treasury bills do not provide good hedges against inflation. Short-term real returns on all of these
financial assets are negatively correlated with inflation rates. However, Siegel maintains that stock returns are immune to inflation over longer time horizons. He argues that revenues, costs, and earnings adjust to pure monetary inflation over the long term such that real values are not significantly impacted. However, there are downsides to inflation for stockholders. For instance, inflation induced by supply shocks, such as by oil price spikes, can increase real costs and reduce real earnings if selling prices do not fully compensate for expense increases.

Still, per Siegel (2002, pp. 200-201), tax policy relative to inventories and depreciation may increase the real taxes paid by corporations and thus reduce real earnings. As an at least partial offset to this, the reduction in the real value of liabilities is not taxed and not reflected in accounting statements. Also, investors pay capital gains taxes on inflation-induced price increases. This represents a reduction in investors’ real after-tax returns. Similarly, French and Poterba (1991) assert that inflation primarily causes differences between accounting and economic earnings. High inflation causes depreciation to be too low. Likewise, cost of goods sold may reflect too low an expense due to inflation profits on inventory. Also, nominal earnings reflect nominal interest costs, rather than the real interest rate. Asness (2003) discusses these effects as well as the inflation tax and inflation’s ability to reduce the real value of liabilities. Kane et al. (1996) argue that inflation impacts P/E ratios by resulting in an overstatement of earnings, due to inventory profits and insufficient depreciation expense, such that P/E multiples must be lower to compensate for such overstatements.
Sharpe (2002) identifies the strong negative relation between the market P/E ratio and inflation. He attributes this relation to two effects of inflation, that inflation is related to lower expected real earnings growth and that inflation is related to higher required real returns. He utilizes surveys of expected earnings growth and of expected inflation. He concludes that higher expected inflation increased required long-run real equity returns by approximately 0.75 percent, which he equates to a 20 percent decline in equity prices. However, since inflation similarly impacts bond yields, it does not impact ERPs. (In this way, Sharpe explains inflation’s impact using $r$ and $g$ in the dividend growth model.)

Sharpe (2002) suggests that inflation’s negative relation to forecasts of earnings growth may be explained either by investor misperceptions or by inflation’s causing misallocation of resources and reduced productivity. Several other authors have discussed the potentially negative impacts of surprise inflation on returns. Ando and Auerbach (1988) calculate that the E/P ratio drops from 0.094 to 0.085 for U.S. firms based on corrections for inflation errors for the period 1967-1983, when inflation was relatively high.

Brewer and Kaufman (1994) similarly find investors exhibit significant forecasting errors relative to inflation. They note, “Real rates are widely perceived to have been unusually low and even negative at times during the 1970s and unusually high through much of the 1980s (p. 363).” Based on ex post data, real one-year rates of interest averaged -0.9 percent in the 1970s, +5.5% for 1980-1987, and +3.2% for 1988-1990. Further, the abrupt change occurred in the 1979-1981 time period. These authors note that explanations offered for this phenomenon include a sharply increased federal deficit,
significant reductions in tax rates, a more restrictive Federal Reserve monetary policy, and a moral hazard premium included in Treasury rates after the S&L crisis.

Using University of Michigan survey data on households’ expected inflation levels, these authors find that inflation was significantly underestimated in the 1970s and overestimated in the 1980s in terms of ex ante inflation expectations versus ex post actual inflation. Based on this survey data, these authors calculate estimated ex ante real one-year rates of return. They find that their estimated ex ante real one-year rates of interest are less volatile; these ex ante rates averaged +0.2 percent in the 1970s, +4.6% for 1980-1987, and +2.9% for 1988-1990. Still, only in the 1970s are the expected ex ante real returns significantly different than the ex post real returns. They conclude that “the success of the U.S. inflation stabilization program in the 1980s appeared to have caught many economic agents by surprise and they did not downgrade their price expectations quickly (p. 370).” Blanchard (1993, p. 113) concludes relative to the ERP that “inflation contributed to the transitory increase above trend in the 1970s and the transitory decrease below trend in the 1980s.”

Various other authors have documented that inflation expectations and interest rates are biased to recent experience and thus are not sufficiently adaptive. For instance, De Bondt and Bange (1992, p. 480) find that similar inflation forecast errors are found in both survey data of inflation forecasts and in “inflation forecast errors that are implicit in ex post real rates”; also, they determine that such “inflation forecast errors are related to predictable time-variation in term premia on U.S. Government Bonds.” In other words, term premia are predictable and are positively related to the slope of the term structure,
even though they should be unforecastable according to the joint hypothesis of the expectations theory and rationality. They suggest (p. 495) that “investors need considerable time to appreciate the real and monetary shocks underlying movements in consumer price levels.” De Bondt and Bange (1992), based on their analyses of 1953-1987 data, conclude that the ERP is not explained by inflation uncertainty. These authors find that inflation forecasts from survey data are too low in periods of high inflation and too high in periods of low inflation. (Fisher (1928) made similar observations.) Thus, ex post term premia, which reflect forecast errors, are positively related to the slope of the term structure, rather than being unpredictable as they would be in unbiased situations.

Fama and Schwert (1977, pp. 124-125) provide a means of separating expected and unexpected inflation using T-bill rates. They use “the nominal return or interest rate on a treasury bill which matures at the end of period t as a proxy for the expected inflation rate for period t.” The unexpected inflation rate is “the difference between the inflation rate realized ex post and the ex ante interest rate.” They find that the expected inflation rate wanders slowly over time (i.e., is persistent) but is not mean reverting and “has little affinity for any particular value.” Still, this was prior to the Federal Reserve targeting inflation rates. Unexpected inflation is serially uncorrelated and uncorrelated with expected inflation.

Tobin (1988) posits another explanation for why unexpected inflation impacts equity returns. He maintains that financial markets anticipate that the Federal Reserve will enact tightened monetary policy to counteract unexpected inflation. Such tightening will reduce the present value of future cash flows, asset values, and thus current stock returns.
Modigliani and Cohn (1979) argue that the stock market discounts real dividends at nominal interest rates in a non-rational manner such that stocks are undervalued when inflation is high and overvalued when inflation is low. They note that, when both leverage and high expected inflation are present, investors do not properly recognize debt capital gain error.

Along this same line, Ritter and Warr (2002) find evidence to support that investors undervalue levered firms during inflationary times. In support of their “inflation illusion hypothesis” these authors find, in cross-sectional regressions, that the amount of undervaluation is positively correlated with leverage and expected inflation. Further, in times series regressions with expected inflation and value-to-price as explanatory variables for the following annual real return of the DJIA, they report an R² of 27%. This misvaluation resulted in depressed stock prices in the late 1970s and early 1980s. Thus, they conclude that the bull market which began in 1982 was partly a correction for this prior undervaluation. They assert that investors had previously undervalued levered firms in the presence of inflation and had mistakenly used nominal versus real rates to value all firms. In other words, as inflation declined, the undervaluation of firms declined and P/E ratios rose.

Ritter and Warr suggest that, when higher nominal interest rates increase nominal borrowing costs and thus decrease net income, net income provides a distorted picture of the total impact on the firm. Net income calculated according to generally accepted accounting principles fails to capture the income the firm receives from the decrease in the real value of nominal liabilities. This economic gain is realized by the firm when it
borrows additional nominal amounts to maintain a constant real level of debt. These authors indicate that any model that utilizes earnings as a proxy for cash flows without adjusting for the capital gain which accrues to stockholders related to the decrease in the value of real debt commits the inflation illusion mistake.

Ritter and Warr also note that financial disintermediation during high inflation periods contributes to the misvaluation effect or inflation illusion. In other words, when nominal interest rates are high, investors decrease their equity investments and increase their investments in fixed income securities that offer high nominal interest rates and thus high nominal returns. Further, they note that this disintermediation does not happen all at once but continues as long as the high nominal interest rates persist. Thus, a decrease in the demand for equity securities continues, and lower returns for stocks result.

Chordia and Shivakumar (2005) provide support for the inflation illusion hypothesis. They find that stocks whose earnings grow faster with inflation tend to be undervalued when inflation increases, whereas stocks whose earnings growth is negatively related to inflation tend to be overvalued when inflation decreases. Further, the correction of these misvaluations explains post-earnings-announcement-drift.

Ilmanen (2003) finds that E/P ratios are more closely related to inflation (such as the average of the prior 3 years’ inflation levels) than to any other series, including real and nominal bond yields. This author also indicates that Japan data reflects similar relations, although with the hint of a J-pattern based on Japan’s deflationary periods.

Still, since P/E and D/P ratios are supposed to be real variables, inflation conceptually should not impact P/E and D/P ratios. Ilmanen (2003) offers several
possible explanations for this relation. First, small but positive inflation levels may be optimal for real earnings growth. Second, high inflation may cause investors to undervalue equities due to irrational money illusion, as discussed by Modigliani and Cohn (1979), Ritter and Warr (2002), and Sharpe (2002). Third, inflation may lead to a rational increase in required returns for both bonds and equities due to inflation-related risk premia. In support of inflation’s impact on equities, Ilmanen (2003) notes that equities can be viewed as a consol (perpetual) bond with an increasing coupon rate. This means that equities’ modified duration equals $1/(R-G)$, which is the inverse of the dividend yield. In general, equities have a long duration and are very sensitive to permanent changes in discount rates, especially when dividend yields are low.

Sharpe (2002) demonstrates that analysts’ earnings forecasts are biased upwards. Ritter and Warr (2002) suggest that this bias may be positively correlated with inflation since increases in market undervaluation in times of high inflation should encourage Bayesian analysts to lower earnings forecasts. Fama (1981) posits a proxy hypothesis that suggests that inflation proxies for slower expected economic growth. This suggests that cash flows are reduced when inflation increases, although Ritter and Warr (2002) can find no evidence to support this hypothesis relative to the DJIA stocks. In contrast to the inflation illusion hypothesis, Feldstein (1980a, 1980b) argues that inflation leads to accounting earnings being overstated due to the inability of depreciation expense to accurately reflect the increasing replacement cost of equipment. Such impacts are adjusted for in the valuation model utilized by Ritter and Warr (2002).
Still, as noted by Thorbecke (1997), an unanswered question is why stocks, which are claims against real assets, are not better hedges against unexpected inflation? Another question, as posited by Keim and Stambaugh (1986), is, if it does not cause problems, why does the Federal Reserve care about inflation? This leads to the issue as to whether the important relation with required returns relates to inflation, the Federal Reserve, or interest rates.

This section, similar to above sections, highlights the numerous unanswered questions about the relations among inflation or interest rates, equity returns, and market valuation ratios. This dissertation is intended to help bridge this gap by evaluating the relations between various components of interest rates and investors’ expected or required returns, as proxied by earnings and dividend yields. It also is intended to determine if controlling for the impacts of interest rate factors enhances the explanatory ability of earnings and dividend yields relative to equity returns.

2.7 Monetary Policy

Some authors posit that monetary policy impacts investors’ returns and provide empirical and theoretical support for this position. In terms of empirical results, per Siegel (2002, p. 192), the results related to central bank changes in the Fed Fund rates have been dramatic. “Since 1955, the total return on stocks has been 7.4 percent in the 12 months following the 99 increases in the fed funds rate, whereas it has been 16.6 percent following the 99 decreases in the fed funds rate.” The average 12-month return over the period is 12.2 percent. Still, the ability of Fed Fund rate changes to forecast equity
returns deteriorated in the 1990s and early 2000s. In apparent contrast to this finding, according to Flannery and Protopapadakis (2002), various authors, including Bodie (1976), Fama (1981), Geske and Roll (1983), and Pearce and Roley (1983, 1985), have documented that aggregate equity returns are negatively correlated to both money growth and inflation.

Patelis (1997) explains why monetary variables may have predictive power. He discusses a “financial propagation” mechanism, which causes reactions to shocks to be state dependent. Monetary policy affects or proxies for some level of risk in the economy. Patelis finds that dividend yield dominates in explaining future expected asset returns. Thus, he finds that it is difficult to link asset pricing to the business cycle. Patelis (1997) used the Fed Funds Rate (FFR), the spread between FFR and the ten-year Treasury note, and the spread between 6-month commercial paper and the 6-mo T-bill. He finds that only FFR and dividend yield have significant explanatory power for returns.

Bernanke and Kuttner (2005) find that there is a significant negative relation between Fed Fund surprises and equity returns. They also identify an industry-based reaction to monetary policy surprises. For instance, high-tech and telecommunications sectors exhibit much larger responses than the overall market. In contrast, utilities and energy companies exhibit little or no response. They evaluate monetary surprises by looking at Fed Fund Futures relative to actual policy actions by the Fed. Their study is primarily an event study approach, although they use time series to attempt to explain why equities react to Federal Reserve actions. Their analyses provide evidence that the reactions to Fed policy changes are not related to changes in real interest rates. Rather,
they maintain that they are the result of changes in the equity premium and changes in expectations of future excess returns.

Jensen and Johnson (1995, p. 79) find that, based on data from 1962-1991, “stock returns following discount rate decreases are higher and less volatile than returns following rate increases. The stock performance patterns are not due to changes in short or long-term bond rates.” (Rate increases have opposite impacts.) Relative to these conclusions, these authors are evaluating long-term returns on stocks and bonds (returns for the periods between announcement dates), rather than event reactions. Relative to longer-term bond returns, they report three findings. First, long-term rates are higher and short-term rates are lower after discount rate decreases. Second, there is no clear interest rate pattern after discount rate changes. Third, volatility of both short-term and long-term rates is higher after increases. Their event study results show that rate decreases positively and increases negatively affect both bond and equity indices (and even more so for the financial index). Rate decreases result in some post-announcement positive drift (which the authors feel may relate to other news events), whereas increases evidence no subsequent drift in equity returns. Also, there is no drift either way in bond returns. The authors acknowledge that, since Fed policy is not completely exogenous, it cannot be conclude that Fed changes cause these impacts. Similarly, Jensen et al. (1996) identify asymmetric responses to monetary policy, with dividend yields and the default spread affecting equity returns only during periods of expansive monetary policy.

Still, Bernanke and Kuttner (2005) find weak to no support for asymmetry in the reaction of the equity market to monetary policy surprises. As explanation for their
findings, Bernanke and Kuttner (2005, p. 1253) find evidence that “tight money (for example) lowers stock prices by raising the expected equity premium. This could come about in at least two ways. First, tight money could increase the riskiness of stocks directly, for example by raising the interest costs or weakening the balance sheets of publicly owned firms. Second, tight money could reduce the willingness of stock investors to bear risk, for example by reducing expected levels of consumption, as in Campbell and Cochrane (1999), or because of its association with higher inflation, as in Brandt and Wang (2003).” These authors finding relative to industry suggests that it is related to earnings and sales impacts. Bernanke and Kuttner (2005) find a significantly negative relation between Fed Fund Rate surprises and retail sales.

To try to explain why monetary policy matters, Thorbecke (1997) evaluates 22 industry portfolios and 10 size portfolios. Size portfolios are relevant if monetary policy affects access to credit, which should affect small firms more than large firms. This effect may be asymmetric, negative on small firms in restrictive times but not necessarily as positive in expansionary times. Thorbecke (1997) uses the Boschen and Mills Index and finds that a one unit change in the index (which means more expansionary monetary policy) increases industry stock returns by 0.83 percent per month (or 10.4 percent per year). Expansionary monetary policy, which should be inflationary, is positive for stock returns.

Jones (1994, p. 95) notes that prior to 1979 the Fed targeted Fed Funds, from 1979-1982 it targeted non-borrowed reserves, and from 1982-1987 it primarily focused on a borrowing guideline. After Greenspan’s appointment in August, 1987, the prime target
again was the Fed Funds rate. Taking a similar approach, Mehra (2002) divides the evaluation periods into 1q, 1961 to 2q, 1980 (a period of upward-trending inflation) and 3q, 1980 to 3q, 2001 (a period of downward trending inflation, the outset of which coincides fairly well with a “major change in the monetary policy regime, when Paul Volcker, appointed Fed Chairman in 1979, put in place a disinflationary policy (p. 19).”

Relative to the impact of monetary policy on equity returns, again there is controversy and conflicting results. This again demonstrates that further study is needed in this area. Although this dissertation is not designed to evaluate the impact of monetary policy on equity returns, its inclusion of monetary policy and interest rate variables attempts to control for this impact in its evaluations.

2.8 Declining Equity Risk Premium

Sharpe (2002) and Fama and French (2002) argue that the equity risk premium is declining. Fama and French (2002) suggest that the average stock return over from 1951 to 2000 significantly exceeds investors’ average expected return. Thus, the equity premium, when calculated based on actual returns is deceptively high. Based on their estimates of investors’ expected returns using a dividend growth model, they suggest that the expected real equity premium for 1872 to 2000 is 3.54 percent per year, rather than the 5.57 percent per year noted above based on the actual rather than expected equity return. Further, they note that the average expected equity premium of 4.17 percent per year (as calculated with a dividend growth model) and average actual equity premium of 4.40 percent per year are similar for 1872 to 1950. However, for 1951 to 2000 the
average actual equity premium of 7.43 percent per year significantly exceeds their average estimated equity premium of 2.55 percent per year calculated from a dividend growth model and of 4.32 percent per year calculated from an earnings growth model.

These authors argue that their estimates of expected equity premiums are more accurate reflections of the estimated equity premiums than those calculated from actual returns for various reasons. These reasons include that their estimates have significantly lower standard errors and are thus more precise; that the Sharpe ratio is more constant throughout the period using their estimates, which suggests a more intuitively appealing relatively constant level of risk aversion among investors; and that their estimates are more closely aligned with fundamental valuation techniques using book-to-market ratios, return on investment, and cost of equity capital.

Fama and French assert that the differences between their estimated average equity premium and that calculated based on actual returns for 1951 to 2000 can be largely explained by unexpected capital gains due to unanticipated declines in discount rates. They find no evidence that the differences can be explained by high expected dividend or earnings growth at the end of the sample period (year 2000), as rational forecasts of long-term dividend and earnings growth rates are not high in 2000. Thus, the extremes of the year-end 2000 S&P index valuation ratios, such as the dividend yield of 1.22 percent and the E/P ratio of 3.46 percent (equivalent to a P/E ratio of 28.9), these authors suggest are explained by investors’ lower expected stock returns. In other words, Fama and French would suggest that a period of relatively low expected returns should be anticipated at the beginning of the twenty-first century. However, they (p. 658) argue that those returns are
not as different from historical average expected returns as they are from actual average returns since 1950, because the “unconditional expected equity premium of the last 50 years is probably far below the realized premium.”

As Ilmanen (2003) notes in support of Fama and French, if a rally is caused by falling discount rates, then future yields will be reduced, unless discount rates continue to fall. Per Ilmanen (2003, from 1981 to 2001, the E/P ratio fell from 12.4 percent to 4.0 percent. This repricing accounts for almost 6 percent of the S&P 500’s average annual increase of 15.5 percent. Per Ilmanen (2003, p. 13), “because stock prices are viewed as discounted values of expected future cash flows, it is an accounting identity that higher stock prices and realized returns reflect higher earnings growth expectations or lower required returns.”

Ilmanen (2003) argues that equities’ ex ante ERP fell by 3.5 percent and anticipated inflation fell by even more from 1982 to 2001. This provided the outstanding returns for equities. Similarly, Sharpe (2002) attributes half of the P/E expansion in the late 1990s to lower discount rates and the other half to increased earnings growth optimism. These factors cannot be expected to continue. Ilmanen (2003) notes that 5-year earnings growth as forecasted by analysts (based on IBES data) increased from a normal, albeit optimistic, nominal approximately 12 percent in 1984 to as high as 18 percent in 2000.

Another motivation for evaluating the relations between interest rates and market valuation ratios is to enhance the understanding of the equity risk premium. This evaluation may provide support for the conclusions of Fama and French (2002) relative to a declining equity risk premium and lower anticipated future equity returns.
2.9 Various Explanations for the Increasing Market Ratios (that suggest lower required returns)

To this point, this dissertation has reviewed various ratios and their abilities to forecast excess returns for the overall market. At this point it seems appropriate to discuss more recent values of some of these ratios, especially the high ratios in the late 1990s and early 2000s, relative to what they suggest in terms of the overall current market valuation and various explanations for these recent values. This discussion is particularly relevant, since many ratios were close to or at extreme levels relative to their historical means and even ranges during this period. By the mid-2000s, these ratios had reverted closer to their historic amounts, although still remained somewhat above historic mean and median levels.

For example, Arnott and Bernstein (2002) note that stock prices have risen from 18 times dividends in 1926 to 70 times dividends in 2001, although they acknowledge that this has occurred primarily since 1984, when dividend yields were still 5.1 percent. Arnott and Bernstein (2002) estimate that this increase in valuation multiples explains approximately 33 percent of the ex post ERP. Dimson et al. (2002, p. 178), using an admittedly simplistic Gordon growth model, demonstrate that small changes in the ERP can have profound impacts on asset prices. For example, a decrease in equities’ required return by 0.5 percent could result in a 55 percent increase in the DJIA.

Now, Ritter and Warr (2002) decompose any changes in equity valuation into three components. These components include changes in the future economic value added (future cash flows in excess of the required rate of return times the amount of invested
capital); rational changes in the risk-free rate plus the equity premium (which together comprise the required rate of return); and changes in the amount of valuation errors related to the equity valuation. Such components comprise a useful framework for analyzing explanations of the significant changes in market valuation ratios.

Merton (1980) maintains that the expected excess return on the market portfolio over the risk-free rate is a function of the level of risk present in the market times a “Reward-to-Risk Ratio”. Further, this premium must be positive and must increase as risk increases if investors are risk-adverse. Along this line, asset prices and required returns, per Ibbotson et al. (1984), reflect risk and non-risk characteristics. Non-risk characteristics include taxation, marketability, and information costs. Investors required returns include any costs related to such characteristics. These authors (p. 23) propose a New Equilibrium Theory (NET) that maintains that “the cost of capital is the sum of all capital costs at the margin.” Relevant factors impacting an individual investor’s costs include perceived uncertainty, investment horizon, taxation, and entry and exit costs. An investor’s incremental per unit costs relative to holding a particular asset usually fall at first due to economies of scale in terms of information and transactions costs. However, ultimately such costs increase, primarily due to increasing lack of diversification. Diversifiable risk is in itself a cost, which is evaluated together with the cost to diversify. According to these authors, each investor reduces the price he is willing to pay for an asset by the present value of all cost characteristics. In this way, costs increase the required gross return. Assets are bundles of pricing characteristics, and the costs of each characteristic often vary among investors.
Using this methodology, investors increase their required return to compensate for investment costs. Such costs include information costs (i.e., the costs investors incur to ascertain the value of an investment); search and transactions costs (including bid-ask spreads, paperwork and legal costs); divisibility costs (such as related to real estate, especially prior to REITs); management, maintenance, and storage costs; and non-pecuniary costs and benefits (such as the non-pecuniary benefits to owning collectible art). Further, as costs change, we should expect the gross required return to change, even though the net required return remains constant. Brennan et al. (1998, p. 371) argue that gross returns reflect costs. They find a “strong negative relation between average returns and trading volume, which is consistent with a liquidity premium in asset prices.”

To this end, Siegel (2002, p. 120) charts a theoretical P/E ratio based on changing tax rates, changing transactions costs, and changing inflation. He suggests that a P/E ratio of over 25 in a period of low equity taxes, low inflation, and low transaction costs, such as at the end of the 20th century provides investors with the same after-tax required return as much lower P/E ratios implied when taxes, inflation, and transaction costs were much higher. Further, this excludes volatility considerations, which also would increase the current P/E relative to historical averages. In general, he concludes that recent high P/E ratios are not nearly as out of line with historical averages as they would initially appear.

The explanations for the extreme values of market valuation ratios in the late 1990s and early 2000s are varied. Further, the consequences of different explanations are also significantly varied. If the reasons for these extreme values reflect persistent rational changes by investors, then expected future real returns, even though they may be reduced
relative to historical averages, may still encourage continued investment in equities. However, if the explanations are related to non-rational misvaluations or to temporary (albeit rational) changes in valuations by investors, then expected future real returns for equities based on current extreme values should be anticipated to be significantly reduced or even negative until corrective adjustments are completed. In this case, investments in equities should be sharply curtailed until anticipated corrections are realized. As pointed out by Diamond (2000), if the market is overvalued such that a correction is needed but the expected real return to equities is close to its historical 7 percent subsequent to such correction, a dollar currently invested is worth \((1-c)(1.07^t)\) \(t\) years later, with \(c\) equal to the percentage correction needed. In contrast, if the expected return for equities is now 4 percent per year but no correction is needed, a dollar currently invested is worth \((1.04^t)\) \(t\) years later.

Shiller (2000) notes that one explanation for increased extreme values of valuation ratios may be an increased demand for stock investments due to growth in 401(k) and other defined contribution plans. The first 401(k) plan was created in 1981, and the amount of funds invested through such plans grew dramatically in the 1980s and 1990s. He notes that many or most of these plans tend to have more equity investment options than other options. He further cites a study by Benartzi and Thaler (2001) that found, based on both experimental data and data on actual retirement plan asset allocations, that individuals tend to spread their investments evenly over the available options, without regard to the contents of the options. Thus, since the growth in participant-directed defined contribution plans is significantly greater than that of defined pension plans or
other types of plans, the demand for equity investments may have increased due to such asset allocation methods. Shiller (2000) also points to the growth of mutual funds as contributing to the demand for equity securities. The number of accounts in such funds increased from 6.2 million in 1982 to 119.8 million in 1998. Shiller suggests that this growth was fueled by growth in 401(k) plans and from heavy advertising by mutual funds, which encouraged even naïve investors to participate in the equity market. The decreased costs of diversification provided by such mutual funds may have also encouraged additional investments in the market by individual investors. Likewise, widespread press coverage of high market returns in the 1980s and 1990s presumably also encouraged initial and increased equity investments by many types of investors.

Along this same line, Poterba (2001) notes that 30 million individuals became stockholders in the 1990s; the result is that the percentage of households owning equities increased from 36 percent in 1989 to 52 percent in 1998. This increase results from both the rapid increase in equity mutual fund ownership and in the expansion of equity holdings in self-directed retirement accounts. He delineates that the most dramatic growth in new equity investors occurred in those owning stock only through an IRA or a retirement savings plan. This number increased by over 17 million (from 10.1 to 27.3 million) during these 10 years. Still, Poterba (2001) delineates that in 1998 only 19 percent of families with income below $25,000 owned equities, whereas 93 percent of families with income above $250,000 owned equities.

Changing demographics may have led to declining transactions costs and information costs. Cochrane (1997) notes that expanding participation in equity
investments spreads risks more evenly and leads to increased prices, lower future returns, and a lower ERP.

Campbell and Shiller (1998) also discuss certain explanations suggested as defenses for the extreme values of certain valuation ratios in the late 1990s. One explanation discussed is that changing demographics in the form of more risk-tolerant baby boomers may have increased the demand for stocks relative to other investments. However, as these authors note, even if demand has increased for equity investments, unless the shift in demographics continues, lower returns should be expected from current equity investments. In other words, stock returns will be depressed unless even stronger demand is present at the end of the investor’s holding period. Although not discussed by these authors, such increased demand may have reduced the required equity risk premium.

Siegel (1999) argues that high transaction costs (especially prior to 1975 when commissions were fixed by the NYSE) significantly reduced the return realized by investors relative to these historical averages. In addition to declining transaction costs, he further maintains that the equity premium and thus required equity returns are declining due to low-cost index funds significantly reducing the costs of holding a diversified portfolio. He notes that, prior to the widespread existence of such funds, the actual risk-return tradeoff for most investors was less desirable than that implied by stock indices, since less diversification would require an investor to accept a lower risk-return tradeoff than that implied by the market index. Thus, investors’ real equity returns may have been closer to 5% or 6% rather than the 7% approximate average return implied by
the index. To the extent that the Fed is much better about controlling inflation, the risks of both bonds and stocks have declined.

Siegel (1999) also suggests that investors in the 1990s may perceive that the business cycle has become less severe. This would suggest that the inherent risks of equity investments are less. However, Siegel also notes that investors may utilize favorable historical data to form expectations about future returns and thus increase their demands for equity investments. He maintains that the above factors, having resulted in a one-time adjustment downward in equity risk premiums, will cause future returns to be lower, rather than equal to or higher, than past returns and thus may result in significant investor disappointment. Carlson et al. (2002) note that declining transaction costs may at least in part explain a declining equity premium, and they maintain that a declining equity premium should result in a higher mean P/E ratio.

Siegel (2002, pp. 97-98) notes that spikes in P/E ratios may result from temporary earnings declines, such as occurred in the 1894, 1921, 1938, and 1990-1991 recessions. Following these spikes, five-year real returns to investors have averaged 9.7 percent annually. However, price-driven spikes in P/E ratios have resulted in subsequent 5-year returns to investors of only 1.1 percent on average, such as in September 1929, July 1933, June 1946, November 1961, and August 1987.

Thus, explanations for increased market ratios, which imply lower required or expected returns, include lower diversification costs, lower transactions costs, changing tax rates, lower risks, etc. By including various cost-related variables, this dissertation
attempts to control for certain of the explanations discussed in this section. This dissertation now proceeds to discuss several of these explanations in more detail.

2.10 Diversification Costs

In Siegel (2002, p. 118), Charles Jones documents trading costs, including both broker fees and bid-ask spreads, for equities over the last century. He delineates that transaction costs have declined tremendously since 1975, from a one-way trading cost of over 1 percent in 1975 (which is before brokerage fees were deregulated) to under 0.18 percent in 2002. Thus, the costs to construct and maintain a diversified portfolio were significant over much of the 19th and 20th century. Such costs would have necessitated a liquidity premium for equities relative to government bonds.

As noted above, reductions in diversification costs may result in reduced required gross returns and thus increased market valuation ratios. These results have at least two explanations. First, such costs reduce the gross returns investors need to maintain the same net returns. Second, reduced diversification costs may expand the demand for equities relative to other securities.

In support of the first explanation, Siegel (2002) argues that prior to the availability of low-cost mutual funds, returns from stock indexes overstated the risk-return trade-off for many investors. In other words, net returns over most of the 19th and 20th centuries were probably approximately 4% - 6% rather than the 7% historical gross returns. Siegel uses the decline in mutual fund costs as an argument for a decline in the ERP. Along this same line, Heaton and Lucas (1996) and Vissing-Jorgenson (2002) demonstrate that
greater diversification and expanded participation can explain a decline in expected returns and thus increases in the P/E ratio. Carlson et al. (2002) note that lower transactions costs and more diversification suggest permanent, not temporary or mean-reverting, behavior in the P/E and other ratios.

In support of the second explanation, McGrattan and Prescott (2001) assert that, for many households in the early post World War II period, debt was the main means for saving because transactions costs rendered holding a well-diversified equity portfolio infeasible. Also, Merton (1987) shows that incomplete diversification can cause an ERP to be much larger than it would be in an economy with perfect capital markets. Further, Heaton and Lucas (2000) review both changes in equity market participation in the 1990s and changes in diversification in the 1990s. They conclude that the relatively small changes in participation are unlikely to account for the significant change in the dividend yield ratio during the 1990s. In contrast, empirical evidence suggests that households have significantly diversified their portfolios by selling individual stocks and buying mutual funds. This significantly reduces the risk of catastrophic outcomes and causes the expected ERP to decline by more than 4 percent in their model. In other scenarios, they find that the required returns on stocks fall by 2 percent. Thus, they suggest that diversification may provide significant explanation for changes in the dividend yield.

Also, this increased demand is not just from individual investors. Per Diamond (2000), in recent years, universities, defined pension plans for public employees, and other tax-exempt institutions have higher amounts of equity investments than in the past.
This provides additional risk sharing and diversification benefits, such that the ERP may be reduced.

2.11 Mutual Fund Expenses

Now, much of the decline in the cost of diversification can be attributed to the growth in mutual funds and the decline in mutual fund expenses. It is important to note that mutual fund operating expenses do not include transaction expenses, such as commissions, bid-ask spreads, and market impact costs.

Relative to mutual funds, as discussed below, there are three critical points. First, mutual funds have grown dramatically in terms of ownership of equities. Second, mutual fund expenses have declined on average, in part as a result of this growth. Third, declining expenses and increasing mutual fund size suggest both increasing demand for equities and decreasing costs of diversification.


Further, households’ incremental equity ownership in the 1990s is almost entirely related to mutual funds. Per the ICI, U.S. household ownership of mutual funds grew
from 5.7 percent of households in 1980 to 48.1 percent of households in 2004. Per the 2002 Mutual Fund Fact Book (p. 25), net annual purchases of stocks and bonds by households outside of mutual funds were negative on average during the 1990s. Further, such purchases were negative every year from 1993 to 2001, except 1994. In contrast, net new cash flows to mutual funds were significantly positive throughout this period. For example, net new cash flows to equity mutual funds totaled $1.628 trillion from 1990-2001. Further such flows were positive every year during this period. Collins (2003) notes that only 19 percent (1009 funds) of the mutual funds that existed in 2002 were created in 1990 or earlier.

Marcis et al. (1995) reports that the annual net new cash flow was slightly negative in the 1970s and was slightly positive through most of the 1980s. However, it increased dramatically in the early 1990s. Rea and Marcis (1996) review cash flows into equity mutual funds from 1944-1995. They find that equity funds in general “experienced inflows throughout 1944-1970 and 1982-1995 when equity returns were relatively high, and they generally experienced outflows throughout the 1971-1982 period when equity returns were relatively low (p. 2).” Still, the rate of inflows as a percent of assets exhibited a fairly steady decline from 1944 to 1970. Still, they found little evidence of significant redemptions in response to sharp declines in stock prices. These authors suggest that high inflation rates in the 1970s and early 1980s encouraged investment in real estate instead of financial assets. (Probably high mortgage rates encouraged paying down mortgages versus equity investments; although this does not explain the downward trend from 1944, perhaps accelerating inflation and the inflation tax does explain it.)
As noted by Siegel and Montgomery (1995, p. 25), “stock index funds did not exist over 1926-1972. While some mutual funds were well-diversified and had low turnover, such funds were not widely held. Thus, commission rates on individual stocks are more representative of the typical investor’s experience over this period.” Per Poterba (2001), holdings of corporate equities in the U.S. by mutual funds grew from 2.0 percent in 1950 to 4.7 percent in 1970 to 6.6 percent in 1990 to 19.0 percent in 2000. During this same time, household ownership of equities outside of mutual funds declined from 90.2 percent in 1950 to 68.0 percent in 1970 to 51.0 percent in 1990 to 39.1 percent in 2000. Total equities outstanding totaled $142.7 billion in 1950, $841.4 billion in 1970, $3,542.6 billion in 1990, and $19,047.1 in 2000. Such amounts are compiled from the Federal Reserve Board’s “Flow of Funds” These amounts include private firms, as the ICI 2004 Annual Report says that in 2003 mutual funds owned $3.0 trillion of $14.0 trillion of U.S. Corporate Equities or 21.4 percent.

Rea and Reid (1998) find that the total ownership cost of equity mutual funds has declined due to investors’ increased selection of lower cost funds, economies of scale with larger funds, and lower distribution costs. LaPlante (2001) analyzes mutual fund operating expenses from 1994-1998 and finds a small decline on average per year.

Khorana et al. (2005) in a cross-sectional study of 56 nations find that, in both univariate and multivariate analyses, trading costs are negatively related to mutual fund industry size and growth rates. Trading costs are measured as the commissions paid by institutional investors and the price impact of their trades. This supports that lower costs increase demand for mutual funds.
It is important to note that, unless the demand curve for funds is vertical, a decline in costs should result in a decline in expected return that is less than the cost decline. The exact change depends on the slope of the demand curve. Mutual funds seemed to both reduce costs of and expand participation in equity ownership. As noted by Diamond (2000, p. 40), marginal investments theoretically determine the asset prices and required returns at which markets clear. “Those investments are made up of a mix of marginal portfolio allocations by all investors and by marginal investors who become participants (or non-participants) in the stock and/or bond markets.”

In summary, the explosive growth in equity mutual funds and the decline in mutual fund expenses have resulted in both increasing demand for equities and decreasing costs of diversification. This suggests that time series analyses of required returns should recognize these factors in their evaluations. This dissertation attempts to control for changing mutual fund expenses by the inclusion of a mutual fund cost factor. One contribution of this dissertation is that few prior analyses include such a control.

2.12 Transactions Costs

In addition to diversification costs, transactions costs have also declined. Two critical points in this section are that transactions costs affect investors’ required returns and that transactions costs have declined.

Relative to the first point, Amihud and Mendelson (1986) were among the earliest to show that the size of the bid-ask spread impacts the cost of capital or the required rate of return on securities. In other words, investors require a greater gross return to
compensate them for higher transactions costs such that the net return is comparable to other investments of similar risk levels. Amihud and Mendelson (1986) and Brennan et al. (1998) find that transactions costs, such as bid-ask spreads, explain part of the cross-sectional variation of expected returns. Jones (2002) asserts that bid-ask spreads may proxy for the degree of information asymmetry. Cross-sectional studies support this in that higher spreads result in higher expected returns.

Fisher (1994) finds that transactions costs can provide significant explanations for the equity premium. For instance, plausible bid-ask spreads and holding periods can generate 3-4% ERPs. He argues that the ERP includes or compensates for both higher risks and higher transactions costs. He shows the changes in turnover rates from 1900 – 1985 and provides estimates of bid-ask spreads for 1961-1981, which range from 2.79% for a value-weighted portfolio to up to 11.4% for small stocks. His model finds that “the bid-ask spread is quantitatively more important than risk in explaining the level of the ERP (p. S89)” and that “the level of transactions costs is a significant determinant of gross expected returns (p. S90).”

Schwert and Seguin (1993) discuss the impacts of transactions taxes. (Many of these impacts would seem to be similar to bid-ask spread increases.) They note that such taxes are present or have been implemented in various countries. They conclude that such taxes reduce asset prices, reduce liquidity, and increase the cost of capital. They conclude that there is no evidence to conclude that transactions costs affect volatility. Schwert and Seguin (1993) discuss the effect of May Day (in 1975) on transactions costs and volumes. They cite an article by Jarrell (1984) that concluded that commission rates
fell 30% and share turnover increased 30% in the years following the abolition of fixed commissions. These authors also discuss articles that evaluate in cross-sectional studies the impacts of trading costs. These articles show that higher costs require higher gross returns.

Per Aiyagari and Gertler (1991) transactions costs seem to matter in that equity turnover is far less than the turnover rates of savings accounts and money market accounts at 0.50 versus 3 and 7, respectively. They conclude that such costs may explain about 50 percent of the observed equity risk premium. Jagannathan et al. (2000) note that transactions costs due to illiquidity of government bonds can be high, as much as 50 basis points.

Heaton and Lucas (1996) model incomplete markets and find that transactions costs in equity and bond markets result in an ERP and a reduced risk-free rate. They suggest these effects on the ERP are both direct and indirect. As a direct effect, assets with lower associated transactions costs have lower market rates of return. Further, if such costs in bond markets take the form of a binding borrowing constraint or a significant differential between borrowing and lending rates, they may explain 50 percent of the ERP. Indirect effects relate to transactions costs causing individual consumption to more closely track individual income than aggregate consumption. This increases the systematic risk of stock. However, they note that a large supply of government securities significantly reduces the effects of transactions costs in their model.

Thus, transaction costs, per the above literature, do impact investors’ required returns. Transactions costs include direct costs (such as commissions and fees), bid-ask
spreads, market impact costs, time involved in research and record keeping, and taxes. In virtually all of these areas, the costs per transaction have declined due to market growth, technological developments, or changes in laws or regulations.

In terms of bid-ask spreads, Jones (2002) compiles annual quoted bid-ask spreads for the Dow Jones stocks from 1900-2000 and annual estimates of weighted-average explicit costs (including commissions and other fees) for 1926-2000 for NYSE stocks. He also collects turnover rates for NYSE stocks since 1900, so as to facilitate evaluation of the impact of these other frictions. Jones (2002) finds that bid-ask spreads have generally declined over time, but not in a smooth or gradual way. There are often spikes, frequently associated with turmoil in the market. However, market downturns are also often not associated with spread increases. The contemporaneous correlation coefficient between proportional spreads and annual excess stock returns is -0.236. Still, he focuses on the DJIA, which may understate the decline in bid-ask spreads. From 1900-1928 his sample includes 25-40 stocks each year. Bid-ask spreads are calculated as a proportion of the bid-ask midpoint. Bid-ask spreads in 2000 on DJIA stocks averaged 0.181 percent. In June 1997, the NYSE reduced its price increments from eights to sixteenths. Proportional spreads fell immediately, from 0.224 percent in May 1997 to 0.152 percent in July 1997. Schwert and Seguin (1993) discuss three components of the bid-ask spread, including order-processing costs, inventory or price risk, and the effects of information asymmetry.

Relative to commission costs, in 1970, the SEC began phasing in negotiated commissions. Per Siegel and Montgomery (1995), brokerage commissions on the NYSE
were fixed by agreement among the members during the period 1926-1972. They note that rates were deregulated and allowed to fall on May 1, 1975. They also note that commissions were 0.35% in 1926 on a $5000 transaction, but 1.34% in 1972 on a $5000 transaction.

Jones (2002), Appendix A, delineates commission schedules for NYSE stocks. It should be noted that prior to 1968, there were no significant economies of scale in trade size relative to commissions. Commissions were a “proportional tax on transactions, where the tax rate depended on the share price (p. 7).” Still, commission give-ups and soft dollar arrangements reduced the effective costs of trades for many institutions. Odd lot transactions increased the effective commission cost. Commission price easing began in December 1968 with small volume discounts on transactions involving over 1000 shares. This continued in 1971 with negotiated commissions on orders over $500,000. On May 1, 1975 (May Day), all commissions were deregulated. Jones estimates that commissions fell to an average rate of 0.24 percent for January 1991 – March 1993 trades and to 0.13 percent in 1997. Interestingly, one-way proportional commissions, per Jones (2002) were at 0.27 percent in 1925 and were below 0.30 percent throughout the 1920s. With falling prices, proportional commissions rose to a local maximum of 0.67 percent in 1932. Other local maximums include 0.88 percent in 1964-1965 and 0.90 percent in 1974 (in part due to low stock prices). Note that these percentages are one-way costs. Investors should require compensation for costs both ways, with annual costs depending on turnover frequency.
Jones (2002) finds that commission proportions climbed fairly steadily from 1926 to the early 1970s, to a high of almost one percent. However, shortly after the SEC broke the NYSE commission cartel, commissions plummeted. Jones and Lipson (2001) note that one-way institutional commissions on NYSE-listed stocks were only about 0.12 percent during 1997.

Per Jones (2002), on large-cap stocks bid-ask spreads plus commissions totaled more than one percent of the dollar volume of a trade for the entire period 1953-1975. Small-cap costs would have been even higher. Again such costs are one-way totals. Siegel and Montgomery (1995) note that the returns on Ibbotson and Sinquefield’s small company stocks starting in 1982 are after transaction costs, since they reflect the performance of an open-ended mutual fund.

Jones (2002) combines trading volumes with average trading costs and finds that since 1934 trading costs have (arithmetically) averaged 0.38 percent per year. Further, such costs have been significantly lower since the deregulation of commissions in 1975. Jones (2002) notes that various studies show that trading activity is very sensitive to the level of trading costs. Jones (2002) finds that turnover of NYSE stocks exceeded 200 percent in the early 1900s, was less than 10 percent during the Great Depression, and has steadily climbed since that time.

Jones models transactions costs using the Gordon growth model to show that proportional costs are directly related to the dividend yield. From \( P_0 = \frac{[E(D_1 - T_1)]/(r - g)}{D_0 / P_0 = T_0/P_0 + (r-g)/(1+g)} \), where \( T_0/P_0 \) is the proportional realized transactions cost. Further, this does not require the constant growth assumption. Jones (2002) finds
that dividend yields and bid-ask spreads are strongly correlated (0.709) since 1900; further both have fallen dramatically since the late 1970s.

Another form of transactions costs is the cost of compiling information and making decisions. Information costs help explain home bias, due to the costs of understanding cross-border investments; large investors’ and mutual funds’ economies of scale; etc. Jagannathan et al. (2000, p. 3) note that technological improvements since 1970 have made it easier for investors “to access information, communicate and transact with others, and enforce contractual obligations.”

In summary, transactions cost impact investors’ required returns. Further, such costs have declined significantly for equities. Jones (2002) concludes that the gross ERP may have fallen about one percent since the early 1900s due to changing transactions costs. He estimates aggregate trading costs at 1.05 percent in 1900 and at 0.17 percent in 2000. These observations suggest that such costs should be evaluated or controlled for in analyzing extended time series of equity returns. This dissertation attempts to control for changing expenses by the inclusion of a factor that recognizes when commissions were deregulated. One contribution of this dissertation is that few prior analyses include such a control.

2.13 Emotional or Behavioral Factors

As noted by Cornell (1999, p. 165), using the discounted dividend model or DDM, we can conclude that the level of equity prices should increase based on only three general reasons, only two of which are consistent with market rationality. First, the
discount rate, of which the ERP is a significant component, falls. Second, the stream of expected dividends (and presumably expected earnings) increases. Third, speculative or other forces, which imply non-rationality, impact asset prices.

Ritter and Warr (2002), based on their model, calculate that even with a zero percent equity premium stock market valuations in the late 1990s appear excessive. Thus, a changing equity premium may explain part of, but certainly not all of, the changes in market valuation ratios. Further, they note that the changing equity premium hypothesis predicts higher real returns in periods of higher inflation, which is the opposite of the actual real returns realized in the 1980s and 1990s relative to inflation. Their findings suggest that other, perhaps non-rational, factors may at times impact market valuations and expected returns. Thus, at times changes in equity valuations relate to changes in the amount of valuation errors related to the equity valuation.

In support of this position, French and Poterba (1991, p. 337) state, “We are unable to isolate changes in required stock returns or growth expectations that are large enough to explain recent Japanese stock price movements.” In other words, these authors are unable to explain both the run up in Japanese P/E ratios in 1986 and their rapid decline in 1990 based on changes in required returns or growth expectations. Foreign investors were net sellers of Japanese equities for each of the final five years of the 1980s. Per Cornell (1999, p. 191), this means that the difference between the high k after the collapse of the Japanese equity market and the low k before the collapse cannot be explained based on variations in interest rates or risks. Thus, the increase in the ERP must be attributed to changes in non-rational factors.
Now, one means of measuring emotional potential is the average trade size. Cornell (1999, p. 193) notes that small traders using on-line brokerage firms dominated trading of internet stocks in the second half of 1998. Further, since such stocks had relatively small float and since most institutions are unable or unwilling to take short positions, a surge in demand from small investors was able to push up prices dramatically. In this way, smaller stocks are more susceptible to behavioral factors in that it takes smaller investments to result in larger relative price movements.

Other theories which may contribute to understanding the extreme level of ratios in the late 1990s and early 2000s include the following. Barberis, Shleifer, and Vishny (1997) and Lakonishok et al. (1994) suggest that investors may excessively extrapolate recent earnings growth into the future resulting in security misvaluation. This suggests that investors may incorporate temporary earnings growth rates as more permanent growth rates in their asset valuation models. Siegel (1999) notes that per share earnings growth and output growth exhibit weak correlation due to the need by companies to issue new shares so as to finance growth. Thus, the productivity of capital must increase for per share profits to increase substantially above historical levels. This may not be properly recognized by investors.

Hall (2000) asserts that earnings in the 1990s are biased downwards due to traditional accounting methods’ failure to capture the new economy’s significant investments in intangibles, or “e-capital”. Such an assertion suggests that productivity gains, although modest in the late 1990s, should increase substantially when such investments bear fruit. McGrattan and Prescott (2001) maintain that the required
adjustment to earnings for such intangible capital creation would be a 27% increase.

Still, empirical evidence to support that intangible investments are significantly higher in the 1990s than in prior periods has yet to be presented. Further, Bond and Cummins (2000), based on a study of 459 individual firms over the period of 1982-1998, conclude that the high valuations in the market in the late 1990s are not justified based on intangible investments.

A critical question that results from this argument would be whether a higher realized premium alters investors’ expectations as to the future market premium or if investors recognize the fifty-year blip in the actual versus realized equity premium, as suggested by Fama and French (2002).

In summary, factors that may impact equity prices include those based on emotion or other non-rational elements. To the extent that such factors significantly impact equity prices, they may cause presumably temporary errors in equity valuations that represent buying or selling opportunities for investors who are able to recognize these misvaluations.

2.14 Risk Factors

Changing risk factors can also cause investors’ required returns to change. For example, Finnerty and Leistikow (1993), similar to Fama and French (2002), maintain that the equity risk premium has trended downward over time. They further note that this decline stems from the fact that the mean nominal equity rate of return has remained relatively constant, while the mean nominal T-bill return has increased over time due to
higher average inflation. In addition, these authors find that the volatilities of the equity risk premium have also trended downward.

Ilmanen (2003) indicates that the bulk of the variation in the E/P ratio over the prior fifty years can be explained by variations in inflation levels and output volatility. The trailing volatility of GDP growth rates (or earnings growth rates) explains the general downtrend in the E/P ratio, and the rise and fall of inflation from 1960 to 2000 explain the hump in the E/P ratio over this same time period.

Asness (2000) documents that the market’s earnings yield was consistently above the 10-year Treasury bond yield prior to the late 1960s. Since the late 1960s, however, the earnings yield and 10-year Treasury bond yield have been fairly comparable and have tended to move in very similar patterns, which would indicate that bonds and stocks are no longer negatively correlated. Asness (2000) posits that expected returns are a function of experienced stock and bond market volatilities. Based on assumed 20-year generations, he finds that rolling 20-year annualized monthly or annual return volatilities have significant explanatory power relative to valuation ratios (E/P and D/P). (He finds significance for periods from 5 to 30 years.) Asness evaluates data for 1891-1945, 1926-1998, and 1946-1998. Asness (2000) finds that, although apparently unrelated using univariate analysis, bond and stock (dividend and earnings) yields are significantly positively related when volatilities are controlled for.

Asness (2000) notes that there are two explanations for varying yields (E/P and D/P) having predictive power for market returns that are at least partially consistent with
efficient markets. These are varying investors’ tastes (or risk aversion) or varying levels (or perceived levels) of market risks.

The above discussion suggests that any evaluation of earnings and dividend yields should evaluate or control for varying risk levels, measured either by the volatility of economic growth or the volatility of returns. These varying risk levels help explain the changes in earnings and dividend yields over time. This dissertation includes two such risk factors in several of its analyses. To the extent these factors enhance the explanatory ability of the models, this dissertation is making a contribution to the literature in this area.

2.15 SMB (Small Minus Big) and HML (High Minus Low BM Ratio)

Penman (1996) describes the relationship of P/E ratios and BM (or book-to-market) ratios. He asserts that P/E ratios imply forecasts of future growth in earnings, which should be positively related to expected future returns on equity and negatively related to current returns on equity. In contrast, BM ratios reflect only expected future returns on equity. He further argues that, because BM ratios are affected only by future profitability, not by current profitability, they, not P/E ratios, should be the appropriate indicators of future earnings growth.

Kothari and Shanken (1997) and Pontiff and Schall (1998) provide evidence that BM ratios forecast aggregate stock market returns for the period 1926 to 1992, although the results for 1963 to 1992 are much weaker.
Fama and French (1992) provide evidence that BM ratios explain cross-sectional stock returns. They suggest that such ratios may proxy for risk, perhaps as an indicator of existing or potential financial distress. These authors evaluate the joint impacts of market beta, size (as measured by market equity or ME), E/P ratio, leverage, and the BM ratio on a cross section of stock returns. They find that the correlation of betas and returns seems to have disappeared beginning in 1970. They also find that size and BM are significantly correlated with returns separately and when analyzed together for the period 1963 - 1990, but that the inclusion of these two factors renders the relationships of both leverage and the E/P ratio with returns insignificant. Fama and French interpret these results as reflecting that risk is multidimensional. Further, they suggest that BM proxies for one dimension of risk, perhaps a measure of financial distress, and that size (or ME) proxies for another dimension. Fama and French also speculate that BM’s relationship to return might merely reflect mean reversion correcting irrational market whims and might not proxy any risk dimension. Still, they suggest that this is unlikely, due to the persistence of the relationship between BM and returns.

Other authors provide contrasting studies to those of Fama and French. Mitigating the strength of Fama and French’s evidence is a study by Jensen et al. (1997) that suggests that the success of this combination in predicting returns seems to be limited to periods of expansive monetary policy. Also, Brennan et al. (1998) find that size may proxy for a liquidity premium, as size changes sign when trading volume is included in the regression equation.
Fama and French (1995) continue their evaluation of the relationships between size and book-to-market ratios and asset returns that they identified in their 1992 article. Based on the results delineated in the 1992 article, they conclude that a three-factor model should provide better predictions of asset prices. In this 1995 article they attempt to provide explanations for the two additional factors of BM and size. Their search for explanations is based on two assumptions, that these factors reflect common risk factors and that these same risks have to exist in earnings. In this article they show that size and BM are also related to profitability. These authors thus demonstrate that BM proxies for persistent earnings performance. In other words, high BM is correlated with persistently poor prior and poor anticipated future earnings performance. Likewise, low BM reflects the opposite in terms of prior and future earnings performance. Further, they find that earnings growth rates are mean reverting.

This finding agrees with the trends identified by Lakonishok et al. (1994). However, Lakonishok et al. find that this reversion is greater than that anticipated by the market. Thus, they conclude that the market is not efficient in that it does not understand the convergence of earnings growth. Lakonishok et al. therefore conclude that higher average returns of high BM firms reflect the correction of irrational pricing due to excessive extrapolation of prior earnings trends. They also suggest that such phenomena offers evidence of investor irrationality or naivety resulting in an overpricing of growth stocks and an underpricing of distressed stocks. They further maintain that investment strategies that emphasize value stocks earned higher returns, not because they are fundamentally riskier, but because they recognize and exploit the suboptimal behavior of
many investors. To support this conclusion, these authors examine the risk characteristics of the value stocks and find no evidence to support the conclusion that value strategies are more risky than growth/glamour strategies. Rather, they find evidence that value strategies do particularly well during economic “bad” states. Lakonishok et al. (1994), similar to DeBondt and Thaler (1985), explain the value premium as irrational overreaction.

Petkova and Zhang (2005) suggest that the use by Lakonishok et al. (1994) of realized excess market returns is a noisy measure of business cycles. Instead, they utilize macrovariables (such as default premium, term premium, and T-bill rates) to define when risk premiums should be high or low. They conclude that the what Lakonishok et al. (1994) “call good states ex post tend to be bad states ex ante, and vice versa, in terms of business cycles (p. 198).” Still, it is debatable whether investors want compensated for the riskiness of returns or “bad states” as defined by macrovariables.

Petkova (2006) identifies that macroeconomic variables, including the dividend yield, one-month T-bill, term premium, and default premium, have more explanatory power relative to the cross-sectional variation in average returns of portfolios than do HML and SMB. Petkova interprets this result as supportive of the ICAPM (Intertemporal Capital Asset Pricing Model) in that differences in these variables reflect changes in investment opportunities. The author then suggests that SMB and HML actually proxy for these predictive variables in explaining cross-sectional returns.
Griffin and Lemmon (2002) support the conclusion that high BM firms exhibit higher returns than low BM firms due to market mispricing. They find that the differences are not explained by differences in economic fundamentals. They also find that this book-to-market effect is largest in small firms with low analyst coverage. In contrast, Fama and French (1995) maintain that portfolios of stocks allocated based on size and BM provide evidence of rational market pricing in that they suggest that the market’s forecasts of future earnings are unbiased and not reflective of excessive extrapolation.

Relative to firm size, Fama and French (1995) identify that, beginning with the recession in 1980 – 1981, large stocks, after adjusting for BM, outperform small stocks in terms of profitability measured as earnings to book equity. Prior to 1980, size does not seem to have been correlated with profitability in terms of this measure. Although the authors are not able to explain this size impact on earnings, they do assert that rational prices should reflect it. Perez-Quiros and Timmermann (2000) offer a possible explanation for the return premium in small firms. Their research indicates that expected returns of small firms are more sensitive to variables that measure credit market conditions.

Still, Fama and French (1995) are not able to demonstrate that returns reflect the book-to-market factor in earnings. They suggest that measurement errors and noise cloud this factor and make it difficult to identify, despite its existence. They also acknowledge that behavioralists may provide an alternate explanation. The authors conclude this article with a recognition that they have yet identified neither which economic factors
(variables) produce variations in earnings and returns based on size and BM nor which corresponding risks explain the return premiums associated with size and BM.

Fama and French (1996) maintain that many of the CAPM average return anomalies previously identified are related and disappear in a three-factor model. As discussed above, such three factors included beta (as a measure of overall market risk), the difference in return of small stocks and large stocks (or SMB for small minus big), and the difference in return of high BM stocks and low BM stocks (or HML for high minus low). They suggest that SMB compensates for the co-variation in returns in small stocks not captured in the market return and that HML compensates for the co-variation in returns related to financial distress not captured in the market return. These authors show that such a three-factor model eliminates the previously identified anomalies related to earnings/price (E/P), cash flow/price (C/P), and past sales growth, as well as the long-term reversal identified by DeBondt and Thaler (1985). Still, such a model is unable to explain positive short-term correlation (momentum) in returns. The authors also acknowledge that the three-factor model is still only a model in that the explanations and theories for the other two variables are still open to debate and various interpretations.

Kothari and Shanken (1997) find that BM ratios of the Dow Jones Industrial Average stocks, on both an economically and statistically significant basis, forecast the variations in one-year returns of an equal-weighted CRSP index and a value-weighted CRSP index stocks over the 1926 to 1991 period. They note that equal-weighted index has an adjusted $R^2$ of 26% with a coefficient of the BM variable equal to a very large 20.2%. However, deleting the 1933 value cuts this coefficient in half and reduces the adjusted $R^2$
to 11%, although it is still highly statistically significant. The results for the value-weighted index are less significant with comparable adjusted $R^2$ s of 11% and 4%, respectively. Lewellen (1999) similarly finds that BM ratios have statistically and economically significant forecasting ability relative to stock market returns.

Charoenrook and Conrad (2005) provide a good summary of this issue; there are various explanations offered for the identified empirical relations between HML or SMB and asset returns. The risk-based explanations maintain that these factors are systematic risks not adequately captured either by beta or by the market proxy, as discussed in Roll (1977), or are related to changes in the investment opportunity set, as put forth in the Intertemporal Capital Asset Pricing Model (ICAPM), such as suggested by Liew and Vassalou (2000), Lettau and Ludvigson (2001), and Vassalou (2003). The non-risk-based explanations include non-rational investor behavior (i.e., behavioral finance explanations), spurious correlations resulting from data-mining, or cost-based or market-friction-based explanations, such as relating to transactions costs. Thus, there is no agreement as to whether these factors represent systematic risks, costs, or simply spurious correlations. Thus, a significant gap in the literature exists in this area.

Petkova and Zhang (2005) find that value-minus-growth betas co-vary positively with expected market risk premiums. This contrasts with the findings of Lewellen and Nagel (2006), who find little evidence of such a covariance. However, Petkova and Zhang (2005) utilize the default spread, the term spread, and the short-term interest rate to define when expected market risk premiums are high, instead of utilizing ex post realized market excess returns, as employed by other authors. They interpret actual
returns as noisy proxies and assert that these macrovariables provide more accurate
definitions of expected market premiums. Still, these authors conclude that the
covariance is too small to explain the observed size of the value premium. Petkova and
Zhang (2005) analyze the HML for all stocks and for just small stocks because they note
that “the value anomaly is strongest in the smallest size quintile (p. 192).”

Zhang (2005) provides a rational model for the value premium. He asserts that it
is more costly for firms, especially value firms, to contract than to expand. “Assets in
place are much riskier than growth options, especially in bad times when the price of risk
is high (p. 68).” Thus, value firms are more adversely impacted by economic downturns.
He concludes that costly reversibility, along with a countercyclical price of risk, causes
the betas of value firms to vary inversely with the economy (i.e., to increase in bad
economic times and to decrease in good economic times), while the betas of growth firms
are pro-cyclical. He thus maintains that the value premium is rational because value
firms are riskier when the price of risk is high and less risky when the price of risk is low,
relative to growth firms.

Zhang (2005) maintains that use of his model facilitates rationalization of various
empirical findings of other authors, including: that value firms are riskier, especially in
bad times, as shown by Lettau and Ludvigson (2001), who find that value stocks in bad
times have higher consumption betas than growth stocks, and Petkova and Zhang (2003);
that high book-to-market is correlated with persistently low profitability and vice versa,
per Fama and French (1995); and the expected value premium is abnormally high when
the value spread (in terms of book-to-market ratios) is high and “the market is cheap,” as
noted by Cohen et al. (2003, p. 638). Asness et al. (2000) similarly conclude, based on a time series analysis, that value spreads have explanatory power for future monthly returns on value-versus-growth strategies.

In support of Zhang (2005), Xing and Zhang (2005) find that the fundamentals of value firms, including earnings, dividends, investment and sales growth rates, and profitability, are “more adversely affected by negative business cycle shocks than those of growth firms (p. 1).” Still, they find only mild support that value firms, due to higher fixed costs, are more impacted by recessions than growth firms. Cooper (2006), utilizing a real options model, provides a somewhat different assertion based on investment irreversibility. Cooper maintains that the systematic risk of high book-to-market firms is high because returns to their shareholders are sensitive to economic conditions. Due to irreversible investment, returns are much lower during periods of negative aggregate shocks but much higher when aggregate shocks are positive, due to excess capacity. Cooper concludes that “the larger the degree of investment irreversibility, the stronger the relation between book-to-market and systematic risk (p. 141).” Carlson et al. (2004) provide support for Cooper in that they find that the book-to-market effect is directly related to fixed operating costs.

Liew and Vassalou (2000) document that HML and SMB returns are positively related to future GDP growth in their analysis of 10 countries. Still, they find weak to no support for this relation in U.S. data for HML, although the support for SMB is stronger. They also find that the slope coefficients of HML and SMB are of similar size to those of the market portfolio, even though HML and SMB should be largely independent of
market returns. These authors conclude that their findings support the interpretation of HML and SMB as state variables to be included in the intertemporal asset pricing model. Cohen et al. (2003) conclude that only about 20 – 25 percent of the dispersion in cross-sectional book-to-market ratios is related to variation in expected stock returns, which could be the result of either mispricing or risk. The remaining 75 – 80 percent these authors attribute to “dispersion in expected profitability (p. 637).” In other words, the cross section of book-to-market ratios is primarily driven by “rational cash-flow expectations (p. 610),” which significantly reduces the ability to attribute the value premium to non-rational factors. In addition, utilizing an international panel covering 23 countries (excluding the U. S.), they find similar results with similar conclusions.

Cohen et al. (2003) find that the value spread (range of high and low BE/ME ratios) is positively related to the default yield spread (the difference between the yields of Baa and Aaa long-term corporate bonds). Further, the expected return from value-versus-growth strategies is atypically high when the value spread is high. This would suggest that HML is related to a risk factor in that these findings are “consistent with time-varying expected returns being a plausible explanation for stock momentum (p. 636).” Further, the additional inclusion of the median BE/ME ratio, which measures whether the market is currently pricey, has marginal explanatory power and increases the strength of the explanatory power of the value spread relative to HML returns.

Gertler and Gilchrist (1994) provide support that size is a proxy for risk. They evaluate manufacturing firms’ data and find that “small firms account for a significantly disproportionate share of the manufacturing decline that follows the tightening of
monetary policy (p. 309).” This disproportionate decline is evidenced in terms of both inventory and sales. Further, they attribute this impact to financial explanations, in part due to their finding that short-term borrowings are similarly disproportionately impacted. Additionally, they identify an asymmetric reaction for small firms, but not for large firms. In other words, small firms’ disproportionate response occurs in periods of monetary tightening and low growth states, but not in other periods, such as high growth states.

This would suggest that small firms should be more correlated to rising interest rates than large firms. Lewellen (1999, p. 9) finds that the relation of HML and returns is not explained by industry composition and thus “does not appear to be driven by industry factors in returns.”

In summary, the above discussion indicates that there are many unaddressed questions relative to the SMB and HML factors developed by Fama and French (1992, 1993, 1995). Despite their widespread use in academic studies, there is still no widespread agreement as to what these factors represent: risk factors, mispricing factors, or merely spurious correlations identified by data mining. Any research that augments the understanding of what these factors represent would make a significant contribution to financial literature. This dissertation is intended to evaluate whether SMB and HML have significantly worse returns during “bad” periods. If such relations can be identified, then empirical evidence is provided that would indicate that there is a rational explanation for the average return premiums of these factors. This then could represent a significant contribution to the literature in its corroborating evidence that SMB and HML are truly risk factors.
Chapter Three: Research Design: In Search of a Better Market Earnings Yield (E/P) and a Better Market Dividend Yield (D/P)

In this chapter, the dissertation presents the research design for the first set of three analyses, including the research hypotheses, the methodologies for testing the hypotheses, the variables, and the data. This chapter attempts to evaluate whether an adjusted P/E ratio or its reciprocal the E/P ratio (or earnings yield) and an adjusted dividend yield (D/P) can predict excess market returns. This analysis is broken down into sections. First, this chapter evaluates the relation between the S&P 500 index’s earnings yield (and alternately the dividend yield) and interest rates. Specifically, it attempts to demonstrate that the earnings yield (or dividend yield) is positively correlated with components of interest rates. Second, this dissertation evaluates if the earnings yield (and dividend yield) have predictive power relative to components of interest rates. This is done in an attempt to further demonstrate the positive relation between the earnings yield (or alternately the dividend yield) and interest rates. Finally, this chapter develops an interest-rate-adjusted earnings yield and dividend yield and evaluate their abilities to forecast excess market returns. These various analyses are conducted with and without various control variables, including variables that proxy for investment costs, the January effect, and risk factors.

This chapter initially focuses on the earnings yield, the reciprocal of the P/E ratio. This focus does not stem from this ratio’s prior superior forecasting ability. In fact, as described in the literature review, this ratio’s forecasting success has certainly been no
greater than the success of various other ratios or variables. Rather, this focus stems more from a theoretical and intuitive view that the P/E ratio should provide on average a more comprehensive evaluation of an asset’s or portfolio’s worth than the other ratios or variables utilized. Conceptually, the profitability or earnings of a company or portfolio of companies, to the extent such earnings are representative of the future earnings and cash flows, should provide an excellent gauge of the value of that company or portfolio of companies. Thus, the P/E ratio, which computes the multiple of the current price divided by earnings, should provide an excellent gauge of the proper valuation of that company or portfolio of companies.

This view is certainly evidenced by practitioners’ extensive use of P/E ratios. The P/E ratio is probably the most commonly cited statistic by practitioners as to whether or not a stock or collection of stocks is overvalued or undervalued. It is difficult to find any analyst’s recommendation as to whether to buy, sell, or hold a stock which does not mention and discuss the stock’s P/E ratio. Likewise, its widespread use is evidenced by its widespread availability. Most daily stock listings include the P/E ratio along with the stock’s dividend, dividend yield, and recent stock price activity.

Additionally, the focus on this ratio does not stem only from this theoretical view and its widespread use by practitioners. It also stems from a perception that this ratio’s heretofore lack of superior forecasting success may stem from certain shortcomings of this ratio as it is currently portrayed and that these shortcomings may be overcome by certain adjustments that perhaps have not been attempted in prior studies. Specifically, these shortcomings relate to the sensitivity of value of a financial asset or group of
financial assets to discount rates and to the extent to which prior earnings are representative of the future earnings. In other words, related to discount rates, the value of an asset is generally assumed or defined to be equal to the present value of its future net cash flows. Thus, ceteris paribus, any increase in discount rates should reduce the value of the asset, and vice versa. However, most studies of P/E ratios have failed to account for the impacts of time-varying discount rates on valuations.

Related to the representativeness of prior earnings, many studies have recognized the limitations in this area. Some studies, in compensation for these limitations, have utilized analysts’ earnings forecasts or various adjustments to earnings. These changes have at times resulted in modest improvements in the amount of return variability explained. However, in doing so, these studies have introduced additional judgmental or subjective factors which detract from the future utility and reliability of the explanatory variables in forecasting returns. Also, many of these shortcomings are more applicable to cross-sectional analysis of individual stocks, rather than time series analysis of the market portfolio or large segments of the market portfolio.

This study suggests that these shortcomings may be overcome by adjusting P/E ratios for current interest rates and by controlling for certain other factors that may change investors’ required gross returns, such as investment costs.

In contrast, the evaluation of the dividend yield is based on prior research’s success in utilizing dividend yields to predict future market returns. The contribution of this dissertation in that regard is to evaluating the relation of dividend yields and interest rates
and potentially demonstrating that recognizing this relation improves the forecasting ability of dividend yields.

3.1 Research Hypotheses

This section details the specific hypotheses to be tested in this chapter. It also provides the equations for these hypotheses. Subsequent sections define the variables and data, along with the methodologies, to be utilized in testing these hypotheses.

**Hypothesis 3.1:** The first hypothesis is that the earnings yield (EY) or alternately the dividend yield (DY) is positively related to interest rates. This hypothesis is supported by prior literature, such as Lander et al. (1997), Assness (2003), and Weigand and Irons (2004). Interest rates are divided into three components for this analysis: the short-term, risk-free rate, as proxied by the T-bill rate (TB); the maturity or term premium (TP), calculated as the difference between the T-bill rate and Aaa bond yield; and the default premium (DP), calculated as the difference between the Aaa and Baa bond yields. This analysis evaluates monthly levels of the variables both with and without the inclusion of control variables. It also evaluates the Aaa bond yield (which equals TB + TP) and the Baa bond yield separately (which equals TB + TP + DP). The specific equation to test this first hypothesis is:

\[
EY \text{ (or } DY) = a + bTB + cTP + dDP + \text{ control variables} + e \quad (1)
\]

**Hypothesis 3.2:** The second hypothesis, to further demonstrate that there is a positive relation between earnings yield (or alternately dividend yield) and interest rates, is that the earnings yield (or alternately dividend yield) forecasts interest rates. This
analysis includes monthly levels of the variables. The specific equation to test this second hypothesis is:

\[ TB \text{ (or TP or DP)} = a + bEY_{t-1} \text{ (or } bDY_{t-1}) + \text{ control variables} + e \]  

(2)

This second hypothesis is not trying to demonstrate that EY or DY cause changes in interest rates. Rather, it is designed to further confirm (as more of a robustness test) that there is a relation between EY (or DY) and interest rates. The logic is as follows (using EY as an example): the hypothesis is that interest rates are positively related to EY in that the market adjusts its required returns as interest rates change; if this is true, then interest rate levels should be positively related to EY levels; also, relying on rational expectations (that on average the market correctly anticipates interest rates), the market presumably anticipates changes in interest rates and adjusts its required return (EY level) based on anticipated changes. Thus, again the hypothesis is that interest rates impact required returns as proxied by EY and DY levels. Lags are evaluated at one month.

**Hypothesis 3.3:** The third and final hypothesis in this chapter builds on the prior two hypotheses. If the prior two hypotheses are correct, such that there is a significant relation between investors’ required returns (as proxied by the earnings yield or the dividend yield) and interest rate components, then this relation should be controlled or accounted for in evaluating whether current required returns seem too high or too low. Without such adjustment, the apparently unusual level of investors’ required returns may merely reflect differences in interest rates. Thus, this third hypothesis maintains that the predictability of market returns can be improved by adjusting the earnings and dividend yields for interest rates to calculate a “normalized” earnings yield or dividend yield. This
analysis includes monthly levels of the variables. The specific equation to test this hypothesis is:

$$RET = a + b_{NEY_{t-1}} \text{ (or } b_{NDY_{t-1}}) + \text{control variables} + e, \quad (3)$$

where NEY and DEY represent earnings yield and dividend yield ratios normalized for current interest-rate-components. For example, $NEY = EY - a_{TB} - b_{TP} - c_{DP}$, with a, b, and c based on the results of the prior analyses. One-month, three-month, and six-month returns are evaluated.

This third hypothesis is consistent with the findings of Petkova (2006) that changes in the term spread, default spread, and one-month T-bill yield reflect changing investment opportunities. If an asset’s value is based on the present value of its future cash flows, then any evaluation of such value needs to reflect both the estimated future cash flows and the components of the discount rate utilized in calculating the present value. Earnings and dividends, as components of the earnings yield and dividend yield, reflect only cash-flow components but not discount-factor components. Thus, to better gauge their relation to price, as the earnings yield and dividend yield do, we need to incorporate discount-factor components. This is the motivation for this third hypothesis.

3.2 Methodologies and Econometric Issues

This section uses time-series analysis and ordinary least squares methodologies. The t-statistics and p-values for all regression estimates are corrected for possible heteroskedasticity and small sample size among the variables by using the Newey-West procedures. The Newey-West standard errors utilized are autocorrelation-consistent,
which is important for any overlapping data. Still, the usual qualifications in utilizing macroeconomic data, including small sample size and inexact data and definitions, apply to these analyses.

3.3 Variables and Data

The variables and data discussed below are divided into key variables and control variables. The time period of the analysis focuses on 1953 to December 2006. Largely this time period is driven by data availability of many of the independent variables, which are available only back to 1950. Additionally, it has the advantages of avoiding World War II, periods of interest rate pegging prior to the Treasury-Federal Reserve Accord (March 1951), etc. that could distort the analyses.

More specific reasons to focus on post World War II time periods include:

- Since there was no consistent inflation prior to WW II, inflation’s impact may be hidden by prior periods.
- Since the SEC did not exist prior to 1933, subsequent improvements in corporate governance may have altered valuation ratios. Per Arnott and Bernstein (2002), prior to this time investors expected little real dividend growth since managers tended to usurp excess earnings.
- As Arnott and Asness (2003) point out, the quality and applicability of data to current times seems highest with post World War II data. After all, the data prior to 1946 includes “two world wars, the Great Depression, unregulated markets, and a host of other differences (p. 73).”
• Merton (1980) notes that the average annual standard deviations of return are 27.9 and 13.8 percent, respectively, for the periods July 1926 to June 1946 and July 1946 to June 1978. However, if one excludes the outset of the Great Depression (1930-1934) the standard deviation declines to 16.6 percent. Thus, there is heteroskedasticity in return data when both periods are utilized in estimating returns.

• Blanchard (1993) notes that any inflation shocks were transitory pre World War II. However, post World War II, inflation demonstrates substantial persistence.

• Campbell (1990, p. 46) notes that the “Federal Reserve Board held interest rates almost constant for much of the period up to 1951.” Thus, he finds that interest rates have little forecasting power for equity returns before 1952.

• Per Jones and Wilson (1987), T-bills were not issued until December 1929 and were issued only sparingly until World War II.

• Campbell (1991) identifies regime differences in pre-war and post-war data, in terms of the ability to forecast returns. Further, he concludes that, in comparison to the importance of news about future cash flows, “the importance of expected return variation is greater in the postwar period (p. 176).” He also suggests that using data starting in 1952 may be preferred to allow for interest rate behavior changes.

• Perhaps a main reason to focus on post WW II data is that presumably survivorship risk is not much changed during that period, where it may have significantly fluctuated in prior periods.
Fama and French (2002) focus on 1951-2000 partly because earnings data for earlier years is less reliable.

Fama and French (1989) note that during the period during and after WW II the Federal Reserve fixed Treasury bill rates. This causes the bill rate to not correlate to the business cycles during this period as it does to other periods, when it rises during expansions and falls during contractions.

A pro and con of post-war data, as Cochrane (1997, p. 7) notes, is that there were “no banking panics, no depressions, no civil wars, no constitutional crises, the cold war was not lost, and no missiles were fired over Berlin. Extreme events cause non-normality in data.”

Prior to 1950, mostly individuals owned equities, not retirement plans; also, there were few mutual funds, so diversification was expensive.

As Diamond (2000) notes, bond rates were artificially low in the 1940s as a result of policies both during and after the war.

Fama and French (1989, pp. 42-43) at times use 1953-1987 data “to show some results for a period that is free of any unusual effects of the Great Depression, World War II, the Korean War, and the pegging of Treasury-bill interest rates preceding the 1951 accord between the Treasury and the Federal Reserve.” The inflation estimates from the U.S. CPI also improved in 1953. Fama (1990) makes similar arguments for utilizing these dates.

The tax status of Treasury bonds changed from non-taxable to taxable in the early 1940s.
• As noted by Lewellen (2004, p. 218), who uses data after 1945, “the properties of stock prices were much different prior to 1945. Returns were extremely volatile in the 1930s, and this volatility reflected in both the variance and persistence of D/Y.”

Thus, based on the above, there are compelling reasons to focus on the last fifty years or so of data.

Additionally, the analyses are conducted in three ways relative to the time periods: the entire period 1953 – 2006, 1953-1979 (which is the first half of the time period), and 1980-2006 (which is the second half of the time period). 1953-1979 versus 1980-2006 represents dividing the time period exactly in half. However, it also represents an excellent break due to the changing of the guard at the Federal Reserve and the concentration on inflation in terms of monetary policy in the latter period. Also, prior to 1982 there was a de facto forewarning against share repurchases due to a fear of lawsuits over stock price manipulation. This made cash dividends prior to 1982 the preferred (or in the view of many firms the only) payout method for returning funds to shareholders. However, in 1982 the SEC provided a safe harbor for share repurchases. As documented by Grullon and Michaely (2002), a structural shift in repurchase and dividend activity was created by this provision, Rule 10b-18. Thus, a before and after is appropriate for analyzing dividend ratios.

3.3.1 Key Variables
The key variables include the following variables. Monthly observations are utilized for all variables unless otherwise noted.


- **RETMO** – S&P 500 monthly returns in excess of the risk-free rate; RETMO is calculated based on \( \left( \frac{\text{stock price}_t - \text{stock price}_{t-1}}{\text{stock price}_{t-1}} \right) - \frac{\text{TB}}{12} \) times 100 (to state the ratio in percentage terms). Data Source: Robert J. Shiller’s website (2007): [http://www.irrationalexuberance.com/index.htm](http://www.irrationalexuberance.com/index.htm).

- **RET3MO** – S&P 500 3-month returns in excess of the risk-free rate; RET3MO is calculated based on \( \left( \frac{\text{stock price}_t - \text{stock price}_{t-3}}{\text{stock price}_{t-3}} \right) - \frac{\text{TB}}{4} \) times 100 (to state the ratio in percentage terms). Data Source: Robert J. Shiller’s website (2007): [http://www.irrationalexuberance.com/index.htm](http://www.irrationalexuberance.com/index.htm).
• RET6MO – S&P 500 6-month returns in excess of the risk-free rate; RET6MO is calculated based on \[\left(\frac{\text{stock price}_{t} - \text{stock price}_{t-6}}{\text{stock price}_{t-6}}\right) \times \frac{\text{TB}}{2}\] times 100 (to state the ratio in percentage terms). Data Source: Robert J. Shiller’s website (2007): [http://www.irrationalexuberance.com/index.htm](http://www.irrationalexuberance.com/index.htm).

• DP - default risk premium (or default spread); DP is calculated as the difference between the Moody's Seasoned Aaa Corporate Bond Yield and the Moody's Seasoned Baa Corporate Bond Yield times 100 (to state the variable in percentage terms). CRR find DP to be significantly positively related to returns; default premium is also used by Keim and Stambaugh (1986), Chen (1991), Fama and French (1989, 1993), and Fama (1990). DP represents a measure of the overall risk in the economy and thus the incremental return required of bonds with relatively more default risk. Fama and French (1988a) demonstrate that default premiums are correlated with long-term business cycle conditions and that DP is higher during recessions and lower during expansions. The default risk premium has been generally defined in two different ways in the literature. One way utilizes the above definition. Another way substitutes the yield on treasury bonds for the Aaa yield. The former method provides more consistency in term, while the latter method recognizes that the Aaa yield includes a slight risk premium relative to the yield on treasury bonds. Data Source: economagic.com and research.stlouisfed.org/fred2.

• TP - term premium or maturity premium; TP is calculated as the difference between the Moody's Seasoned Aaa Corporate Bond Yield with a maturity of 10
years or more and the T-bill rate times 100 (to state the variable in percentage terms). CRR find the term premium to be marginally significantly negatively related to returns. The term premium is also used by Campbell (1987), Chen (1991), Fama and French (1989, 1993), Fama (1990), and Liew and Vassolou (2000). The term premium can represent a measure of expected inflation increases. Harvey (1991) finds that the slope of the U.S. Treasury yield curve is a strong forecaster of economic growth. The steeper (i.e., more positively sloped) the yield curve, the stronger the economy tends to grow. (Harvey finds that the term structure of interest rates explains more than 50 percent of the variation in growth in many of the G-7 countries.) Per Arnott and Asness (2003), a steeper slope also forecasts higher future earnings, especially 5-year earnings growth rates and to a lesser extent 10-year earnings growth rates. Arnott and Asness (2003) focus on post WW II because interest rates were not always free-floating prior to 1946. Fama and French (1989) find that the term premium is related to the business cycle, especially short-term business cycles. Data Source: economagic.com and research.stlouisfed.org/fred2.

- TB – 3-month T-bill yield times 100 (to state the variable in percentage terms); also used by Chen (1991); Fama (1981) and Fama and Schwert (1977) demonstrate that the three-month T-bill yield is negatively related to future stock market returns. In this way, it proxies for expectations of future economic activity. Data Source: economagic.com and research.stlouisfed.org/fred2.

3.3.2 Control Variables
• PR – dividend payout ratio; PR is calculated as total prior twelve months’ cash dividends divided by prior twelve months’ total earnings; Arnott and Asness (2003) find that the payout ratio has significantly more power for forecasting earnings growth than does the yield curve. Data Source: Robert J. Shiller’s website (2007): [http://www.irrationalexuberance.com/index.htm](http://www.irrationalexuberance.com/index.htm).

• MFC – equity mutual funds cost factor; MFC is calculated as the sales-weighted average annual costs for equity fund shareholders as reported by the ICI (Investment Company Institute). Theoretically cost factors should impact required returns; as the costs of investing and diversifying decrease, the required returns should decrease proportionately. Source: Investment Company Institute (ici.org); annual data is available from 1980 – 2006. Evaluations including MFC are run with data from 1980 and on and with a dummy variable for pre-1980.

• CD - a dummy variable for pre-May-Day 1975, when commissions became deregulated. CD takes the value of zero if date is prior to May 1, 1975 and one otherwise.

• JD - January Dummy Variable – variable to adjust for the January effect; this variable is only included in evaluations of actual returns, not of expected returns using market valuations. Cohen et al. (2003) include a January dummy (which takes on the value of 1 for January and 0 for all other months) and find that it often enhances the explanatory power of the model and is usually statistically significant.
• RF - Risk factor based on the volatility (standard deviation) of equity returns; RF is calculated as the rolling 5-year standard deviation of monthly returns (RETMO) for the prior 5 years. Asness (2000) finds that rolling 20-year annualized monthly or annual return volatilities have significant explanatory power relative to valuation ratios (E/P and D/P). (He finds significance for periods from 5 to 30 years.) Asness evaluates data for 1891-1945, 1926-1998, and 1946-1998. Asness (2000) finds that, although apparently unrelated using univariate analysis, bond and stock (dividend and earnings) yields are significantly positively related when volatilities are controlled for. Source: calculated from the RETMO data discussed above.
Chapter Four: Research Design: In Systematic Risk and Cash Flow Factors and Their Relations to Market Valuation Ratios as Proxies for Investors’ Required or Expected Returns

Expanding on Chapter 3, this chapter attempts to evaluate which systematic risks and macroeconomic variables explain investors’ required returns as proxied by market valuation ratios. Fundamentally, any asset’s price should reflect the present value of the asset’s expected future net cash flows discounted at a rate that appropriately reflects the risks of those cash flows. Thus, changes in expected net cash flows, as well as changes in systematic risk factors, should be associated with changes in investors’ required returns and thus market valuation ratios as proxies for those returns.

Along these same lines, if such factors impact investors’ required returns, innovations in required returns (as proxied by market valuation ratios) should forecast changes in systematic risks and macroeconomic variables. This section thus also attempts to evaluate whether market valuation ratios are able to forecast macroeconomic variables. Market valuation ratios should reflect both investors’ expectations as to net cash flows as well as investors’ required returns, based on systematic risk factors. Thus, different levels of market valuation ratios should be associated with different levels of various macroeconomic variables, since such variables may proxy for cash flows and risk factors in the economy. This chapter is also designed to see if market valuation ratios forecast macroeconomic variables.

4.1 Research Hypotheses
This section details the specific hypotheses to be tested in this section. It also provides the equations for these hypotheses. Subsequent sections define the variables and data, along with the methodologies, to be utilized in testing these hypotheses.

**Hypothesis 4.1:** The first hypothesis is that the earnings yield (EY) or alternately the dividend yield (DY) or growth component of earnings yield (EPG or EPG2) is related to various macroeconomic variables, which proxy for either risk factors or factors that will impact corporate cash flows on a macroeconomic level. The specific equation to test this hypothesis is:

\[
EY \ (\text{orDY or EPG or EPG2}) = a + bOPCH + cMPI + dPROD + eGIP + fGGR + gUNEM + \text{control variables} + e. \quad (4)
\]

The growth component of earnings yield (EPG or EPG2) reflects the E/P ratio based on the portion of the stock price related to retained earnings (versus dividends paid). The concept, per Bernstein (1996, p. 22), is that “an investor in equities buys two distinct assets: an asset that produces current income in the form of dividends, and an asset that is a claim on the reinvested earnings that support future growth.”

**Hypothesis 4.2:** The second hypothesis, to further demonstrate that there is relation between earnings yield (or alternately dividend yield) and certain macroeconomic variables, is that the earnings yield (or alternately dividend yield) forecasts changes in such variables. This analysis includes both monthly and quarterly levels of the variables, as only quarterly observations are available for certain variables. The specific equation to test this hypothesis is:

\[
\text{OPCH} \ (\text{or PROD, GIP, GGR or UNEM}) = a + bEY_{t-1} \ (\text{or bDY}_{t-1}) + e. \quad (5)
\]
This second hypothesis is not trying to demonstrate that EY or DY causes changes in macroeconomic variables. Rather, it is designed to further confirm (as more of a robustness test) that there is a relation between EY (or DY) and certain macroeconomic variables. The logic is as follows (using EY as an example): the hypothesis is that certain macroeconomic variables are related to EY in that the market adjusts its required returns as these variables change; if this is true, then levels of macroeconomic variables should be related to EY levels; also, relying on rational expectations (that on average the market correctly anticipates the levels of macroeconomic variables), the market presumably anticipates changes in such variables and adjusts its required return (EY level) based on anticipated changes. Thus, again the hypothesis is that macroeconomic variables are related to required returns as proxied by EY and DY levels. Lags are evaluated at one month. A one-month lag was chosen based on it being the shortest lag available with monthly data. This is based on the assumption that the shorter the lag, the more likely that the market would anticipate the macroeconomic variable.

4.2 Methodologies and Econometric Issues

This chapter uses time-series analysis and ordinary least squares methodologies. The t-statistics and p-values for all regression estimates are corrected for possible heteroskedasticity and small sample size among the variables by using the Newey-West procedures. The Newey-West standard errors utilized are autocorrelation-consistent, which is important for any overlapping data. Still, the usual qualifications in utilizing
macroeconomic data, including small sample size and inexact data and definitions, apply to these analyses.

4.3 Variables and Data

The variables and data discussed below are divided into key variables and control variables. In general, the variables found to be significant by CRR are analyzed below. However, industrial production is excluded both because later authors, such as Flannery and Protopapadakis (2002), find no significance and because the importance of industrial production in the U.S. economy has declined significantly since the time period analyzed by CRR. The time period of the analysis focuses on 1953 to 2006 (versus the focus of CRR, which was 1958-1984) and includes monthly levels and quarterly levels of the variables, as only quarterly observations are available for certain variables. Largely this time period is driven by data availability of many of the independent variables, which are available only back to 1950. Additionally, it has the advantages discussed above relative to avoiding World War II, periods of interest rate pegging prior to the Treasury-Federal Reserve Accord (March 1951), etc. that could distort the analyses.

Additionally, the analyses are conducted in three ways relative to the time periods: the entire period 1953 – 2006, 1953-1979 (which is the first half of the time period), and 1980-2006 (which is the second half of the time period). 1953-1979 versus 1980-2006 represents dividing the time period exactly in half. However, it also represents an excellent break due to the changing of the guard at the Federal Reserve and the concentration on inflation in terms of monetary policy in the latter period. Also, prior to
1982 there was a de facto forewarning against share repurchases due to a fear of lawsuits over stock price manipulation. This made cash dividends prior to 1982 the preferred (or in the view of many firms the only) payout method for returning funds to shareholders. However, in 1982 the SEC provided a safe harbor for share repurchases. As documented by Grullon and Michaely (2002), a structural shift in repurchase and dividend activity was created by this provision, Rule 10b-18. Thus, a before and after is appropriate for analyzing dividend ratios.

### 4.3.1 Key Variables

The key variables include the following variables. (Note that evaluations for the key variables involves monthly and quarterly levels of the variables, as only quarterly observations are available for certain variables, specifically GGR and PROD.) Monthly observations are utilized for all variables unless otherwise noted.

- **EY** - S&P 500 E/P ratio – Earnings Yield; see description in Section 3.3.1.
- **DY** - S&P 500 D/P ratio – Dividend Yield; see description in Section 3.3.1.
- **EPG** - S&P 500 Growth E/P ratio, which reflects the E/P ratio based on the portion of the stock price related to retained earnings (versus dividends paid) – represents $1/\left(\text{the growth P/E}\right)$ from Bernstein (1996). EPG is calculated as $\frac{\text{Earnings}}{\text{Growth Price}}$, where “Growth Price” equals stock price less (trailing twelve-month dividends)/(Baa corporate bond yield). The concept, per Bernstein (1996, p. 22), is that “an investor in equities buys two distinct assets: an asset that produces current income in the form of dividends, and an asset that is a

- EPG2 - S&P 500 Growth E/P ratio; EPG2 is calculated as (Earnings – trailing twelve-month dividends)/(“Growth Price”). Thus, the difference between EPG and EPG2 is the reduction of the numerator for dividends paid out. This seems more in keeping with the concept of Bernstein (1996, p. 22), that “an investor in equities buys two distinct assets: an asset that produces current income in the form of dividends, and an asset that is a claim on the reinvested earnings that support future growth.” Source: calculated based on data from Robert J. Shiller’s website and the Baa corporate bond yield from economagic.com.

- OPCH – calculated as the monthly percentage change in Oil Prices, OPCH is calculated based on the price of West Texas intermediate dollars per barrel. Changes in oil prices can represent a shock to the economy and thus represent a risk factor, although CRR find oil prices to be generally insignificant. Source: economagic.com

- MPI – a monetary policy variable designed to capture if the policy is expansionary or contractive, as measured by Boschen Mills Monetary Policy Index (monthly 1953-1995; Boschen and Mills (1995) and Thorbecke (1997); (-2) = strongly anti-inflationary; (-1) = anti-inflationary; (0) = neutral; (1) = pro-growth; (2) = strongly pro-growth; the intent in this dissertation is to initially evaluate this variable by stopping the time series at 1995. Because MPI was not
significant, it was excluded from further analyses. Had it been significant, I would have utilized the methodology employed by Boschen and Mills (1995) and Thorbecke (1997) to update the data. They analyze Federal Open Market Committee records to develop the index; they also find that the index is significantly correlated with innovations in the federal funds rate. Source: Boschen and Mills (1995) and Thorbecke (1997) and related websites.

- PROD – Quarterly Percentage change in Productivity, as measured by the percentage change in OPHPBS (non-farm business sector output per hour by month). Campbell and Shiller (2001) note that, based on aggregate annual US data from 1871 – 2000, the D/P and E/P ratios are not useful in forecasting future dividend growth, future earnings growth, or future productivity growth. These authors do note, however, that S&P earnings and productivity (measured as the log of real output per hour for the non-farm housing private economy) have virtually the same growth rates, although productivity has historically been much less volatile and moves very closely to the trend line. Only quarterly observations are available for this variable. Source: economagic.com.

- GIP - monthly growth rate in industrial production. CRR find GIP to be significantly positively related to returns; production growth rates are also used by Fama (1990) and Liew and Vassolou (2000). Data Source: economagic.com and research.stlouisfed.org/fred2.
• GGR – real GDP Growth Rate based on quarterly observations; Liew and Vassalou (2000) use quarterly GDP growth rates. Data source: calculated based on quarterly GDP in current dollars from economagic.com.

• UNEM – Civilian Unemployment Percentage Rate; Source: economagic.com.

4.3.2 Control Variables

This chapter utilizes the interest-rate-component variables and control variables deemed significant based on the evaluations relative to the prior chapter (Chapter 3). Thus, variables that are included here are TB, TP, DP, and RF. See Chapter 3 for a definition and discussion of these variables.
Chapter Five: Research Design: SMB and HML: Risk Factors?

This chapter’s objectives relate to enhancing the understanding of the two “risk” factors identified by Fama and French (1992, 1993, 1995), SMB (Small Minus Big Market Equity) and HML (High Minus Low Book-Market Ratio). Essentially, with each of these two factors, the intent is to provide evidence to support that the factor is related to a systematic risk element or, in the absence of such evidence, that it may just be a spurious correlation related to data mining. Specifically, the analyses in this section are designed to determine if these factors have characteristics that would justify their classification as risk factors.

A problem with the idea that SMB and HML by themselves are risk factors that command premiums is that they have had varyingly positive and negative returns during recent periods. If they represent risk factors themselves, then presumably they should have generally consistent positive excess returns, as compensation for added risks. One possible explanation for these varying positive and negative returns (although generally positive returns) is that these factors command a premium because they have different relative returns or risks in “good” times versus “bad” times. In other words, investors should generally require a return premium from investments that do relatively worse in bad times, in terms either of inferior returns or higher risk levels.

This chapter attempts to evaluate if SMB and HML do worse in bad times and thus warrant a return premium as compensation for this “risk” factor. It evaluates both the return levels of these factors and their levels of systematic risk during “bad” times and
“good” times to determine if either inferior relative returns or increased risk levels during “bad” times merit overall excess returns and classification as risk factors. This evaluation includes two definitions of “bad” times, including a definition based on market returns and a definition based on NBER-identified periods of recessions.

5.1 Research Hypotheses

This section details the specific hypotheses to be tested in this section. It also provides the equations for these hypotheses. Subsequent subsections define the variables and data, along with the methodologies, to be utilized in testing these hypotheses.

Fama and French (1992, 1993, 1995) essentially document excess returns for SMB and HML and thus conclude they must be risk factors. Providing empirical evidence that these factors perform relatively worse in bad times greatly enhances the argument that these truly represent risk factors, as investors should demand additional compensation (on average) for investments that evidenced such behavior. As discussed in Section 2.15, various authors suggest that the value premium or the size premium may be explained due to these firms’ greater susceptibility to “bad times.” For example, Zhang (2005) suggests that costly reversibility may explain the value premium. Further, if his explanation is valid, he maintains that it is a rational premium because value firms are riskier when the price of risk is high and less risky when the price of risk is low, relative to growth firms. The intent in this section is to analyze if these variables exhibit such asymmetry.
**Hypothesis 5.1:** The first hypothesis is that the returns of HML or alternately SMB are relatively worse during “bad” times. To evaluate this hypothesis, this section calculates the average, median, minimum, and maximum HML and SMB returns during different states of the economy. Additionally, this section calculates the coefficients of “good” times and “bad” times based on the following equation:

\[
\text{HML (or SMB)} = a + bG + cB + \text{control variables} + e, \quad (6)
\]

where \(G\) is a dummy variable having the value of 1 in “good” times and 0 otherwise and \(B\) is a dummy variable having the value of 1 in “bad” times and 0 otherwise. Also, the analyses are conducted both with and without control variables identified as relevant in the analyses of the earlier sections. These control variables include the interest-rate-component variables (DP, TB, and TP), as well as the risk-factor variable (RF).

“Bad” times are defined in two different ways to provide a robust analysis and to ensure that any findings are not spurious. The first definition utilizes the periods of recession identified by the NBER. The second definition is based on market returns in excess of the risk-free rate \((R_m-R_f)\), which is divided into the top 30 percent, middle 40 percent, and bottom 30 percent, with the bottom 30 percent representing “bad” times under this definition. Results that indicate that HML and SMB have relatively inferior return levels in “bad” times provides evidence that supports that HML and SMB are risk factors, while the absence of such evidence supports that they are not.

**Hypothesis 5.2:** The second hypothesis is that the systematic risks of HML or alternately SMB are relatively greater during “bad” times. To evaluate this hypothesis,
this section calculates the betas of HML and SMB during different states of the economy. Specifically, the equation for this evaluation is:

\[
\text{HML (or SMB)} = a + b(R_m - R_f) + e, \quad (7)
\]

with the evaluations conducted separately for good times, normal times, and bad times, as well as for all times combined.

“Bad” times are again defined in two different ways. These definitions are the same as those described above and are designed to provide a robust analysis so as to ensure that any findings are not spurious. Higher betas during “bad” times would indicate that these factors proxy for investments that have relatively more systematic risk in “bad” times. This would provide evidence that supports that HML and SMB represent risk factors, while the absence of such evidence would support that HML and SMB are not risk factors.

5.2 Methodologies and Econometric Issues

This chapter uses time-series analysis and ordinary least squares methodologies. The t-statistics and p-values for all regression estimates are corrected for possible heteroskedasticity and small sample size among the variables by using the Newey-West procedures. The Newey-West standard errors utilized are autocorrelation-consistent, which is important for any overlapping data. Still, the usual qualifications in utilizing macroeconomic data, including small sample size and inexact data and definitions, apply to these analyses.
5.3 Variables and Data

The variables and data discussed below are divided into key variables and control variables. The time period of the analysis focuses on January 1953 to December 2006. As discussed in prior sections, this time period avoids World War II, periods of interest rate pegging prior to the Treasury-Federal Reserve Accord (March 1951), etc. that could distort the analyses.

5.3.1 Key Variables

The key variables include the following variables. Monthly observations are utilized for all variables unless otherwise noted.

- HML - Monthly returns of HML; Source: These returns are available on the Website of Kenneth French. “HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios, HML = ½ (Small Value + Big Value) - ½ (Small Growth + Big Growth),” per French (2006). Decile portfolios are formed on BE/ME at the end of each June using NYSE breakpoints. The BE used in June of year t is the book equity for the last fiscal year end in t-1. ME is price times shares outstanding at the end of December of t-1, including all NYSE, AMEX, and NASDAQ stocks for which we have ME for December of t-1 and June of t, and BE for t-1.

- SMB - Monthly returns of SMB – Source: These returns are available on the Website of Kenneth French. “SMB (Small Minus Big) is the average
return on the three small portfolios minus the average return on the three big portfolios, \( \text{SMB} = \frac{1}{3} (\text{Small Value} + \text{Small Neutral} + \text{Small Growth}) \) \(-\frac{1}{3} (\text{Big Value} + \text{Big Neutral} + \text{Big Growth}), \)” per French (2006).

Decile portfolios are constructed at the end of each June using the June market equity and NYSE breakpoints, including all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for June of \( t \).

- \( R_m - R_f \), the excess return on the market or the market risk premium, is the value-weight return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the one-month Treasury bill rate (from Ibbotson Associates). Source: Website of Kenneth French.

- \( \text{NBER B} \) - a dummy variable having the value of 1 in “bad” times and 0 otherwise. “Bad” times are defined as the periods of recession identified by the NBER. For the 648 months of observations included in the analysis, there are 93 recessionary months and 555 expansionary months as determined by the NBER.

- \( \text{NBER G} \) - a dummy variable having the value of 1 in “good” times and 0 otherwise. “Good” times are defined as the periods of expansion identified by the NBER. For the 648 months of observations included in the analysis, there are 93 recessionary months and 555 expansionary months as determined by the NBER.

- Return B or Return G - The second definition of “bad” or “good” times is based on market returns in excess of the risk free rate. These monthly
returns are divided into: the top 30 percent (195 months with returns of at least 2.86%, when Return B = 0 and Return G = 1); the middle 40 percent (258 months between -1.39% and 2.86%, when both Return B and Return G equal zero); and the bottom 30 percent (195 months with returns of -1.39% or less, when Return B = 1 and Return G = 0).

Per French (2006), “the portfolios, which are constructed at the end of each June, are the intersections of 5 portfolios formed on size (market equity, ME) and 5 portfolios formed on the ratio of book equity to market equity (BE/ME). The size breakpoints for year t are the NYSE market equity quintiles at the end of June of t. BE/ME for June of year t is the book equity for the last fiscal year end in t-1 divided by ME for December of t-1. The BE/ME breakpoints are NYSE quintiles. The portfolios for July of year t to June of t+1 include all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for December of t-1 and June of t, and (positive) book equity data for t-1.” Petkova and Zhang (2005) analyze the HML for all stocks and for just small stocks because they note that “the value anomaly is strongest in the smallest size quintile (p. 192).”

5.3.2 Control Variables

This chapter also utilizes the interest-rate-component variables and the control variable deemed significant based on the evaluations in the prior chapters (Chapters 3 and 4). Thus, variables included here are DP, TB, TP, and RF. See Chapters 3 and 4 for definitions and discussion of these variables.
Chapter 6: Empirical Results and Analysis

In this chapter, the dissertation presents the empirical results and the analysis of such results for the research designs discussed in Chapters 3 – 5. The results and analysis for each chapter are presented separately, with Chapter 3’s results and analysis presented in Chapter 6.1, Chapter 4’s results and analysis presented in Chapter 6.2, and Chapter 5’s results and analysis presented in Chapter 6.3.

6.1 Empirical Results and Analysis Related to Chapter 3 Hypotheses

This subchapter attempts to evaluate empirically whether an adjusted P/E ratio or its reciprocal the E/P ratio (or earnings yield) and an adjusted dividend yield (D/P) can predict excess market returns. This analysis is broken down into sections. First, this subchapter evaluates the relation between the S&P 500 index’s earnings yield (and alternately the dividend yield) and components of interest rates. Second, this dissertation evaluates if the earnings yield (and dividend yield) have predictive power relative to components of interest rates. This is done in an attempt to further demonstrate the positive relation between the earnings yield (or alternately the dividend yield) and interest rates. Finally, this subchapter develops an interest-rate-adjusted earnings yield and dividend yield and evaluates their abilities to forecast excess market returns.

6.1.1 Empirical Results and Analysis Related to Chapter 3 First Hypothesis
The first hypothesis (Hypothesis 3.1) is that the earnings yield (EY) or alternately the dividend yield (DY) is positively related to interest rates. This analysis evaluates the variables both with and without the inclusion of control variables. It also evaluates the Aaa bond yield (which equals TB + TP) and the Baa bond yield separately (which equals TB + TP + DP). The specific equation to test this first hypothesis is:

\[ EY \text{ (or DY)} = a + bTB + cTP + dDP + \text{control variables} + e \]  \hspace{1cm} (1)

Table 1 presents the summary statistics for the data utilized in evaluating the Chapter 3 hypotheses. This table provides for each variable the number of observations, the minimum observation, and the maximum observation, as well as the mean, median, and standard deviation of the observations. It also reports the mean for each sub-period: 1953-1979 and 1980-2006. Relative to the variables utilized in the first hypothesis, there are a couple things that should be noted from this table. First, the interest rate variables, including Aaa, Baa, TB, TP, and to a lesser extent DP, have significantly different means for the earlier and later sub-periods. In all cases, the mean for 1953-1979 is much less than the mean for 1980-2006. Each sub-period represents one-half of the entire period. Such differences in means suggest that there may be value in analyzing the sub-periods separately, in addition to analyzing the entire period. In addition, this break point seems appropriate due to the changing of the guard at the Fed and the concentration on inflation in terms of monetary policy in the latter period. Also, prior to 1982 there was a de facto forewarning against share repurchases due to a fear of lawsuits over stock price manipulation. This made cash dividends prior to 1982 the preferred (or in the view of many firms the only) payout method for returning funds to shareholders. However, in
1982 the SEC provided a safe harbor for share repurchases. As documented by Grullon and Michaely (2002), a structural shift in repurchase activity was created by this provision, Rule 10b-18. Thus, a before and after is appropriate for analyzing dividend ratios. Second, all variables seem to have broad ranges, which can be helpful in identifying and evaluating meaningful relations between variables.

Table 2 presents analyzes of EY and DY relative to interest rates and interest-rate-components without control variables for 1953-2006; 1953-1979; and 1980-2006. There are various interesting observations from these analyses. First, virtually all the analyses in Table 2 demonstrate that the interest rate variables have significant explanatory power relative to EY and DY. In fact, some of the analyses have very high adjusted $R^2$s, especially those for 1980-2006, in which the adjusted $R^2$s are above 0.80. Second, Baa and Aaa, although highly significant, have less explanatory power than their components. Thus, it appears worthwhile to break out the interest rate variables into the interest-rate-components of TB, DP, and TP. Due to this, Baa and Aaa are not separately evaluated in later analyses. Rather, their components are evaluated. Third, DP is almost always highly significantly positively related to EY and DY. Thus, the higher the default premium, the higher is the required or expected return. This is as expected, as a higher DP equals a higher perceived risk. Fourth, the T-bill rate (TB) also is consistently positive and usually highly significantly related to EY and DY. The relationship is much stronger with EY than DY, although it is strong with DY for 1980-2006. Based on the above observations, clearly the interest-rate-component variables have significant explanatory power relative to the EY and DY variables. In other words, these variables
significantly impact expected or required returns. Thus, this table provides strong support for the first hypothesis.

Table 3 presents analyses of EY relative to interest-rate-components with control variables for 1953-2006; 1953-1979; and 1980-2006. Again, these analyses of EY have very high adjusted R²’s, especially for 1980-2006 in which the adjusted R²’s range from 0.804 to 0.840. Still, the adjusted R²’s are highly significant for each period and each analysis in this table. Also, DP is almost always highly significantly positively related to EY. The higher the default premium, the higher is the required or expected return. Again, this makes sense, as a higher DP equals a higher perceived risk. In contrast, although TB is highly significantly related to EY, it changes signs depending on the period analyzed. Its relationship is positive for the latter period but negative for the earlier period. This indicates that a higher risk-free rate is related to higher required returns post 1979 but lower required returns pre-1980. This is somewhat of a puzzling result. However, it does suggest that the periods may require separate analysis. Further, its explanation may be due to a changing of the guard at the Fed and anticipated different Fed reactions post 1979 and pre-1980. Similar to TB, TP is highly significantly related to EY; however, it too changes signs depending on the period analyzed. Similar to TB, its relationship is positive for the latter period but negative for the earlier period. This indicates that an upwardly sloping yield curve is related to higher required returns post 1979 but lower required returns pre-1980. This encourages separate analyses of the two time periods. PR (Payout Ratio) is consistently and usually highly significantly related to lower required returns. This is consistent with prior research that indicates that a higher
payout ratio is indicative of higher future earnings growth. One could also argue that a higher payout ratio equates to low current earnings. The payout ratio has issues relative to both EY and DY, since all 3 ratios share one component, E or D. Due to these concerns, it is excluded from further analyses. RF (the risk factor) is always positively related to EY; this is consistent with higher risk equating to higher required returns. However, it is not significant in the post-1980 period. CD (Commission Deregulation dummy variable), as expected, is negative when the entire period is analyzed. However, it is positive for the earlier period, perhaps because there are a limited number of non-zero observations for the earlier period. For the later period, it cannot be utilized, since all observations are post May 1975. Because it is largely redundant with the separation of periods, this variable is excluded from further analysis. Additionally, although the results are not shown, the MFC control variable was evaluated in the 1980-2006 time period. This variable was significant in the evaluations. However, when evaluated together with a simple dummy increment variable, which takes the value of 1 in period one, 2 in period 2, and so forth, the MFC variable was insignificant. Thus, it is excluded from further analysis. In summary, Table 3 provides strong additional support for the first hypothesis that interest-rate-components have significant explanatory power for expected or required returns, as proxied by EY.

Table 4 presents analyses similar to Table 3, although it utilizes DY, instead of EY, relative to interest-rate-components with control variables for 1953-2006; 1953-1979; and 1980-2006. Again, DY has very high adjusted R²’s for the latter period 1980-2006 (0.804 – 0.840), although they are highly significant for each period. Also, DP is almost
always highly significantly positively related to DY. The higher the default premium, the higher is the required or expected return. This is consistent with a higher perceived risk requiring a higher expected return. Similar to the Table 3 results, in this table TB is highly significantly related to DY; however, it changes signs depending on the period analyzed. Its relation is positive for the latter period but negative for the earlier period. This indicates that a higher risk-free rate is related to higher required returns post 1979 but lower required returns pre-1980. Again, this does suggest that the periods may require separate analysis, perhaps due to a changing of the guard at the Fed. Similarly, TP is highly significantly related to DY; however, it changes signs depending on the period analyzed. Similar to TB, its relationship is positive for the latter period but negative for the earlier period. This indicates that an upwardly sloping yield curve is related to higher required returns post 1979 but lower required returns pre-1980. PR (Payout Ratio) is consistently highly significantly related to DY. However, it changes signs depending on the period analyzed. The payout ratio has issues relative to DY, since both have D as their numerator. Due to these concerns, it is excluded from further analyses. RF (the risk factor) is always positively related to DY; this is consistent with higher risk equating to higher required return. However, it is not significant in the post-1980 period. CD (Commission Deregulation dummy variable), as expected, is negative when the entire period is analyzed. However, it is positive for the earlier period, perhaps because there are a limited number of non-zero observations for the earlier period. For the later period, it cannot be utilized, since all observations are post May 1975. Because it is largely redundant with the separation of periods, this variable is excluded from further analysis.
Overall, Tables 2-4 provide very strong support for the first hypothesis, that the components of interest rates have significant explanatory power relative to expected or required returns. Also, the results in general are very consistent whether EY or DY is being analyzed. However, most control variables contribute little, and most raise other issues. Further, since including control variables makes the interest rate variables harder to analyze, I utilize only RF in the next analyses, as the issues related to the others outweigh any minor contributions they may have.

6.1.2 Empirical Results and Analysis Related to Chapter 3 Second Hypothesis

The second hypothesis (Hypothesis 3.2), to further demonstrate that there is a positive relation between earnings yield (or alternately dividend yield) and interest-rate-components, is that the earnings yield (or alternately dividend yield) forecasts interest rates. The specific equation to test this second hypothesis is:

\[ TB (or \ TP or \ DP) = a + bEY_{t-1} (or \ bDY_{t-1}) + control \ variables + e \quad (2) \]

This second hypothesis is not trying to demonstrate that EY or DY cause changes in interest rates. Rather, it is designed to further confirm that there is a relation between EY (or DY) and interest-rate-components. Thus, again the hypothesis is that interest rates impact required returns as proxied by EY and DY levels.

Table 5 presents the results of the analyses of EY_{t-1} as the independent variable relative to interest-rate-component variables with and without RF (Risk Factor) as a control variable for 1953-2006, 1953-1979, and 1980-2006. Although Table 5 just presents results for EY_{t-1}, similar analyses were also conducted with DY_{t-1} instead of EY_{t-1}. 
In general, the DY<sub>t-1</sub> results were somewhat less significant than the results presented in Table 5. However, the conclusions were very similar. In fact, the results with DY<sub>t-1</sub> support all of the following observations and conclusions relative to EY<sub>t-1</sub>. First, the Default Premium (DP) is almost always highly significantly positively related to EY<sub>t-1</sub>. The higher the required or expected return in the prior period, the higher is the default premium in the current period. This is as expected, since a higher DP equates to a higher perceived risk. Also, the risk-free rate or T-bill rate (TB) is consistently positively and highly significantly related to EY<sub>t-1</sub>. The relation is stronger in the latter period (1980-2006), although the relation is highly significant in all periods. Further, Term Premium (TP) is almost always highly significantly negatively related to EY<sub>t-1</sub>. Thus, a lower EY (or higher P/E) is related to a higher term premium. This would suggest that lower expected returns (or higher P/E multiples) are associated with an upwardly sloping yield curve. Further, this negative relation emphasizes the need to separate interest rates into various components; otherwise, the negative and positive relations may offset and mask the true relations. In addition, the risk factor (RF) generally has significant explanatory power. However, it has little impact on the coefficient of EY<sub>t-1</sub>, especially in the latter period analyses. Finally, in summary, Table 5 presents very strong support for the second hypothesis. Consistent with the results in Tables 2-4, the results in Table 5 demonstrate that there is a significant relation between the interest-rate-component variables and EY (or DY). In other words, these interest-rate-component variables are significantly related to expected or required returns.

6.1.3 Empirical Results and Analysis Related to Chapter 3 Third Hypothesis
The third and final hypothesis in Chapter 3 (Hypothesis 3.3) builds on the prior two hypotheses. Specifically, it maintains that the predictability of market returns can be improved by adjusting the earnings and dividend yields for interest-rate-components to calculate a “normalized” earnings yield or dividend yield. The specific equation to test this hypothesis is:

\[ \text{RET} = \alpha + \beta \text{NEY}_{t-1} \text{ (or NDY}_{t-1}) + \text{control variables} + \epsilon, \quad (3) \]

where NEY and DEY represent earnings yield and dividend yield ratios normalized for current interest-rate-components. For example, \( \text{NEY} = \text{EY} - \alpha \text{TB} - \beta \text{TP} - \gamma \text{DP}, \) with \( \alpha, \beta, \) and \( \gamma \) based on the results of the prior analyses. Specifically, the coefficients for the interest-rate-component variables are taken from the results in Table 2 for the 1980-2006 time period. Specifically, \( \text{NEY} = \text{EY} - 0.699 \text{TB} - 0.240 \text{TP} - 1.443 \text{DP} \) and \( \text{NDY} = \text{DY} - 0.399 \text{TB} - 0.429 \text{TP} - 0.568 \text{DP}. \) One-month, three-month, and six-month returns are evaluated to test this hypothesis.

The concept of Hypothesis 3 is that we need to adjust the earnings yield (or dividend yield) for the interest-rate-components to determine if it exceeds the normal level. After such adjustment, it should have predictive power relative to the next period’s return. There should be a positive relation between a high NEY (earnings yield adjusted for interest-rate-component factors) and subsequent returns. This adjustment results in the average value of NEY for 1980-2006 being approximately zero. Thus, a positive NEY (or NDY) indicates, according to this hypothesis, an undervalued market, whereas a negative value represents an overvalued market, relative to current interest-rate-
component factors. A positive or negative excess future return is thus forecast by the value of NEY or NDY.

In Table 6 are the results of the analyzes of $EY_{t-1}$ or $NEY_{t-1}$ as the independent variable relative to RETMO as the dependent variable for 1953-2006, 1953-1979, and 1980-2006. JD is included as a control variable in Table 6 Panel B but not Table 6 Panel A. Although Table 6 just presents results for $EY_{t-1}$, similar analyses were also conducted with $DY_{t-1}$ instead of $EY_{t-1}$. Although, in general, results were slightly less significant for $DY_{t-1}$, the conclusions were very similar. The results with $DY_{t-1}$ support all of the below observations and conclusions relative to $EY_{t-1}$. In analyzing Table 6’s results the following observations should be noted.

First, although always positive, JD (the January dummy variable) is marginally significant in the earlier period and is insignificant in the later period. Also, it has little impact on the NEY coefficient. For this reason and since a January dummy is more problematic for returns greater than one month, JD is only utilized in the evaluation of 1-month returns.

Second, NEY (or NDY in Table 8) in Tables 6-8 consistently outperforms $EY$ (or $DY$ in Table 8) in explaining stock market returns. It is always significantly positive and usually highly significantly positive. Also, the magnitude and significance of its coefficient increases as the return period increases and in the later period versus the earlier period. This is consistent with prior findings in this paper that interest rates are more related to $EY$ and $DY$ in the later period (1980-2006). $EY$ is always either not
significant or marginally significant in explaining returns. However, NEY is always significantly positive and usually highly significantly positive.

Third, adjusted $R^2$ values increase when the periods are separated. Also, the later period, as expected has higher adjusted $R^2$ values.

Table 7 Panel A presents results for analyzes $EY_{t-3}$ or $NEY_{t-3}$ as the independent variable relative to $RET3MO$ as the dependent variable for 1953-2006, 1953-1979, and 1980-2006. Table 7 Panel B presents results for analyzes $EY_{t-6}$ or $NEY_{t-6}$ as the independent variable relative to $RET6MO$ as the dependent variable for 1953-2006, 1953-1979, and 1980-2006. Also, although Table 7 just presents results for EY, similar analyses were also conducted with DY instead of EY as the independent variable, and these are presented in Table 8. Again, Table 7 Panel A presents results for $RET3MO$ (3-month excess returns), while Table 7 Panel B presents results for $RET6MO$ (6-month excess returns). Observations for Table 7 are similar to those for Table 6, as follows.

First, NEY in Table 7 consistently outperforms EY in explaining stock market returns, as measured by the adjusted $R^2$ values. It is always highly significantly positive. Also, the magnitude and significance of its coefficient increases as the return period increases and in the later period versus the earlier period. This is consistent with prior findings in this paper that interest rates are more related to EY and DY in the later period (1980-2006). EY is always either not significant or marginally significant in explaining returns. However, NEY is always highly significantly positive in evaluating 3-month and 6-month returns, regardless of the period evaluated.
Second, Adjusted R\(^2\) values increase when the periods are separated. Also, the later period, as expected, has higher adjusted R\(^2\) values.

Table 8 Panel A presents results for analyzes DY\(_{t-3}\) or NDY\(_{t-3}\) as the independent variable relative to RET3MO as the dependent variable for 1953-2006, 1953-1979, and 1980-2006. Table 8 Panel B presents results for analyzes DY\(_{t-6}\) or NDY\(_{t-6}\) as the independent variable relative to RET6MO as the dependent variable for 1953-2006, 1953-1979, and 1980-2006. Observations for Table 8 are similar to those for Tables 6 and 7, as follows.

First, NDY in Table 8 consistently outperforms DY in explaining stock market returns, as the adjusted R\(^2\) always increases. Also, NDY is always highly significantly positive. In addition, the magnitude and significance of its coefficient increases as the return period increases and in the later period versus the earlier period. This is consistent with prior findings in this paper that interest rates are more related to EY and DY in the later period (1980-2006). DY is generally more significant in explaining returns than EY, a finding that is consistent with prior studies. However, again DY always has less explanatory power than NDY, as measured by the adjusted R\(^2\) values. NDY is always highly significantly positive in evaluating 3-month and 6-month returns, regardless of the period evaluated.

Second, adjusted R\(^2\) values increase significantly when the periods are separated. Also, the later period, as expected, has similar or higher adjusted R\(^2\) values.

The results presented in Tables 6-8 provide good support for hypothesis 3. Clearly, adjusting the EY and DY values for interest-rate-components improves their explanatory
power relative to future returns. The explanatory power of NEY and NDY relative to 3-month and 6-month returns, as evidenced by adjusted $R^2$ values of 10% - 12% in the latter period, is fairly impressive. Thus, the premise of Chapter 3, that there is a significant relation between the interest-rate-component variables and EY (or DY) and that this relation should be adjusted for in evaluating future returns, is clearly supported by the analyses presented in this chapter. In other words, when evaluating expected or required returns (as measured by EY or DY), one should adjust these factors for current interest-rate components. This helps determine whether excess returns can be expected in future periods, and thus whether or not the market is currently overvalued or undervalued.

Again, the rationale for this third hypothesis is that if an asset’s value is based on the present value of its future cash flows, then any evaluation of such value needs to reflect both the estimated future cash flows and the components of the discount rate utilized in calculating the present value. Earnings and dividends, as components of the earnings yield and dividend yield, reflect only cash-flow components but not discount-factor components. Thus, to better gauge their relation to price, as the earnings yield and dividend yield do, we need to incorporate discount-factor components. Thus, it is not surprising that incorporating discount rate components enhances the utility of the earnings yield and dividend yield.

However, the fact that NEY and NDY have significant predictive power relative to future returns seems to imply market inefficiencies. As noted by Cornell (1999, p. 165), the level of equity prices should increase based on only three general reasons, only two of
which are consistent with market rationality. First, the discount rate falls. Second, the stream of expected dividends (and presumably expected earnings) increases. Third, speculative or other forces, which imply non-rationality, impact asset prices. Since NEY and NDY adjust for changes in the discount rate and earnings or dividends, we are left with the third explanation. The predictability of future returns thus implies non-rational factors. This findings supports the prior research of: Ritter and Warr (2002), whose results suggest that non-rational factors and thus valuation errors may at times impact market valuations and expected returns; French and Poterba (1991, p. 337) and Cornell (1999, p. 191), who conclude that the difference between the high k after the collapse of the Japanese equity market and the low k before the collapse, since they cannot be explained based on variations in interest rates or risks, must be attributed to changes in non-rational factors; and Barberis, Shleifer, and Vishny (1997) and Lakonishok et al. (1994), who suggest that investors may excessively extrapolate recent earnings growth into the future resulting in security misvaluation.

In summary and in reference back to the title of Chapter 3, the results of these analyses indicated that the Search for a Better Market Earnings Yield (E/P) and a Better Market Dividend Yield (D/P) has been successful.
Table 1
Summary Statistics

This table reports summary statistics of the variables utilized in Chapter 3. For each variable, I report the number of observations, the minimum observation, the maximum observation, as well as the mean, median, and standard deviation of the observations. In the final two columns, I also report the mean for each sub-period: 1953-1979 and 1980-2006. Definitions for each variable, along with the sources of the data, can be found in Section 3.3. The amounts in all but the final two columns are for the entire period. Variables are listed in alphabetical order.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev.</th>
<th>1953-1979 Mean</th>
<th>1980-2006 Mean</th>
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</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>648</td>
<td>2.850</td>
<td>15.490</td>
<td>7.238</td>
<td>7.230</td>
<td>2.729</td>
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<td>CD</td>
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<td>1.000</td>
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<td>1.000</td>
<td>0.493</td>
<td>0.173</td>
<td>1.000</td>
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<td>DP</td>
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<td>0.810</td>
<td>0.412</td>
<td>0.805</td>
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<td>JD</td>
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<td>1.000</td>
<td>0.083</td>
<td>0.000</td>
<td>0.277</td>
<td>0.083</td>
<td>0.083</td>
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<td>MFC</td>
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<td>110.000</td>
<td>249.000</td>
<td>167.111</td>
<td>160.000</td>
<td>38.235</td>
<td>N/A</td>
<td>167.111</td>
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<td>NDY</td>
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<td>-2.592</td>
<td>4.409</td>
<td>-0.182</td>
<td>-0.658</td>
<td>1.418</td>
<td>0.922</td>
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<td>NEY</td>
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<td>-2.251</td>
<td>8.496</td>
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<td>0.951</td>
<td>2.293</td>
<td>2.874</td>
<td>-0.103</td>
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<tr>
<td>PR</td>
<td>648</td>
<td>0.304</td>
<td>0.764</td>
<td>0.493</td>
<td>0.510</td>
<td>0.093</td>
<td>0.519</td>
<td>0.467</td>
</tr>
<tr>
<td>RET3MO</td>
<td>645</td>
<td>-27.132</td>
<td>23.719</td>
<td>0.820</td>
<td>1.174</td>
<td>6.877</td>
<td>0.457</td>
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<tr>
<td>RET6MO</td>
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<td>-34.070</td>
<td>34.192</td>
<td>1.752</td>
<td>2.241</td>
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<td>2.337</td>
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<tr>
<td>RETMO</td>
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<td>0.033</td>
<td>0.006</td>
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<td>0.035</td>
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<tr>
<td>TB</td>
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<td>0.640</td>
<td>16.300</td>
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<td>4.383</td>
<td>5.844</td>
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<tr>
<td>TP</td>
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<td>5.130</td>
<td>2.124</td>
<td>1.980</td>
<td>1.452</td>
<td>1.430</td>
<td>2.819</td>
</tr>
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</table>
Table 2

Analysis of EY (or DY) and Interest Rate Variables without Control Variables

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) TB; (2) DP; (3) TP; (4) Baa Yield; and (5) Aaa Yield. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.278 (0.000)</td>
<td>0.449 (0.000)</td>
<td>0.699 (0.000)</td>
<td>0.027 (0.203)</td>
<td>0.006 (0.843)</td>
<td>0.399 (0.000)</td>
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</tr>
<tr>
<td>DP (Default Premium)</td>
<td>2.325 (0.000)</td>
<td>1.087 (0.055)</td>
<td>1.443 (0.000)</td>
<td>1.287 (0.000)</td>
<td>0.621 (0.005)</td>
<td>0.568 (0.000)</td>
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<td>1.431 (0.000)</td>
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<tr>
<td>TP (Term Premium)</td>
<td>-0.606 (0.000)</td>
<td>0.034 (0.839)</td>
<td>0.240 (0.001)</td>
<td>-0.287 (0.000)</td>
<td>-0.086 (0.191)</td>
<td>0.429 (0.000)</td>
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<td>Baa Yield</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>0.406 (0.000)</td>
<td>0.130 (0.000)</td>
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<tr>
<td>Aaa Yield</td>
<td></td>
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<td></td>
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<td></td>
<td>0.282 (0.000)</td>
<td>0.028 (0.220)</td>
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<tr>
<td>Intercept</td>
<td>+4.507 (0.000)</td>
<td>4.551 (0.000)</td>
<td>-0.103 (0.737)</td>
<td>2.565 (0.000)</td>
<td>3.339 (0.000)</td>
<td>-1.285 (0.000)</td>
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<td>2.240 (0.000)</td>
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<td>Observations</td>
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<td>324</td>
<td>648</td>
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<td>324</td>
<td>648</td>
<td>648</td>
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<td>648</td>
<td>648</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.444</td>
<td>0.233</td>
<td>0.805</td>
<td>0.291</td>
<td>0.039</td>
<td>0.866</td>
<td>0.217</td>
<td>0.228</td>
<td>0.113</td>
<td>0.152</td>
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</table>
Table 3

Analysis of EY and Interest Rate Variables with Control Variables

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) TB; (2) DP; (3) TP; (4) PR; (5) CD; and (6) Risk Factor. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.429 (0.000)</td>
<td>0.258 (0.000)</td>
<td>0.270 (0.000)</td>
<td>0.348 (0.000)</td>
<td>0.308 (0.000)</td>
<td>0.128 (0.000)</td>
<td>0.197 (0.000)</td>
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<tr>
<td>DP (Default Premium)</td>
<td>1.499 (0.000)</td>
<td>1.898 (0.000)</td>
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<td>1.439 (0.000)</td>
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<td>1.433 (0.000)</td>
<td>1.294 (0.000)</td>
<td>1.409 (0.000)</td>
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<tr>
<td>TP (Term Premium)</td>
<td>-0.283 (0.004)</td>
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<td>-0.721 (0.000)</td>
<td>-0.749 (0.000)</td>
<td>-0.670 (0.000)</td>
<td>-0.954 (0.000)</td>
<td>-0.295 (0.021)</td>
<td>0.600 (0.000)</td>
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<td>PR (Payout Ratio)</td>
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<td>-21.316 (0.000)</td>
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<td>-6.184 (0.000)</td>
<td>0.000 (0.000)</td>
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</tr>
<tr>
<td>CD¹ (Comm. Deregulation)</td>
<td>-1.681 (0.000)</td>
<td>2.377 (0.000)</td>
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<td></td>
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<tr>
<td>Risk Factor (Std. Dev.)</td>
<td>102.645 (0.000)</td>
<td>91.025 (0.000)</td>
<td>93.975 (0.000)</td>
<td>46.090 (0.000)</td>
<td>154.700 (0.000)</td>
<td>337.900 (0.000)</td>
<td>12.259 (0.303)</td>
<td>4.326 (0.741)</td>
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<tr>
<td>Intercept</td>
<td>3.527 (0.000)</td>
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<td>2.074 (0.000)</td>
<td>16.773 (0.000)</td>
<td>14.836 (0.000)</td>
<td>-2.173 (0.000)</td>
<td>22.039 (0.000)</td>
<td>0.974 (0.038)</td>
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</tr>
<tr>
<td>Adjusted R²</td>
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<td>0.475</td>
<td>0.647</td>
<td>0.602</td>
<td>0.477</td>
<td>0.570</td>
<td>0.840</td>
<td>0.804</td>
</tr>
</tbody>
</table>

¹CD variable is not relevant for the period 1980-2006, as it is entirely after the May 1, 1975 Commission Deregulation.
### Table 4

**Analysis of DY and Interest Rate Variables with Control Variables**

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) TB; (2) DP; (3) TP; (4) PR; (5) CD; and (6) Risk Factor. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.177</td>
<td>0.191</td>
<td>0.026</td>
<td>-0.211</td>
<td>-0.194</td>
<td>-0.161</td>
<td>0.379</td>
<td>0.403</td>
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<td>(0.223)</td>
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<tr>
<td>DP (Default Premium)</td>
<td>0.770</td>
<td>0.777</td>
<td>1.214</td>
<td>0.708</td>
<td>0.572</td>
<td>0.473</td>
<td>0.703</td>
<td>0.553</td>
<td>0.524</td>
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<td>(0.020)</td>
<td>(0.001)</td>
<td>(0.000)</td>
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<tr>
<td>TP (Term Premium)</td>
<td>-0.107</td>
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<td>-0.305</td>
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<td>-0.372</td>
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<td>(0.000)</td>
<td>(0.008)</td>
<td>(0.000)</td>
<td>(0.000)</td>
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<tr>
<td>PR² (Payout Ratio)</td>
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<td>-2.865</td>
<td>-3.881</td>
<td>-6.624</td>
<td>1.601</td>
<td>1.618</td>
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<tr>
<td></td>
<td>(0.000)</td>
<td>(0.004)</td>
<td>(0.000)</td>
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<td>(0.000)</td>
<td>(0.000)</td>
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<td></td>
<td></td>
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<tr>
<td>CD¹ (Comm. Deregulation)</td>
<td>-0.881</td>
<td>-1.291</td>
<td>1.010</td>
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<td></td>
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<td></td>
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<td>(0.000)</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Risk Factor (Std. Dev.)</td>
<td>35.448</td>
<td>31.694</td>
<td>14.476</td>
<td>18.333</td>
<td>64.503</td>
<td>97.857</td>
<td>3.407</td>
<td>5.441</td>
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<td>(0.000)</td>
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<td>-0.228</td>
<td>1.262</td>
<td>2.190</td>
<td>5.311</td>
<td>4.488</td>
<td>1.391</td>
<td>7.491</td>
<td>-1.753</td>
<td>-1.445</td>
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<td>(0.476)</td>
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<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
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<tr>
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<td>324</td>
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<tr>
<td>Adjusted R²</td>
<td>0.457</td>
<td>0.425</td>
<td>0.294</td>
<td>0.302</td>
<td>0.236</td>
<td>0.204</td>
<td>0.192</td>
<td>0.877</td>
<td>0.866</td>
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</table>

¹CD variable is not relevant for the period 1980-2006, as it is entirely after the May 1, 1975 Commission Deregulation.

²PR is excluded from the DY analyses since both DY and PR utilize D as the numerator of the variable.
Table 5  

Interest Rate Variables as Dependent Variable and EY$_{t-1}$ as Independent Variable

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) EY$_{t-1}$; and (2) Risk Factor (in the second table only). P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EY$_{t-1}$</td>
<td>0.641 (0.000)</td>
<td>0.415 (0.000)</td>
<td>0.965 (0.000)</td>
<td>0.072 (0.000)</td>
<td>0.048 (0.000)</td>
<td>0.116 (0.000)</td>
<td>-0.170 (0.000)</td>
<td>-0.008 (0.761)</td>
<td>-0.193 (0.000)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.739 (0.003)</td>
<td>1.307 (0.000)</td>
<td>-0.176 (0.000)</td>
<td>0.449 (0.000)</td>
<td>0.449 (0.000)</td>
<td>0.355 (0.000)</td>
<td>3.286 (0.000)</td>
<td>1.489 (0.000)</td>
<td>4.021 (0.000)</td>
</tr>
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<td>Observations</td>
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<td>323</td>
<td>324</td>
<td>647</td>
<td>323</td>
<td>324</td>
<td>647</td>
<td>323</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R$^2$</td>
<td>0.363</td>
<td>0.195</td>
<td>0.730</td>
<td>0.214</td>
<td>0.118</td>
<td>0.530</td>
<td>0.095</td>
<td>-0.003</td>
<td>0.136</td>
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<tbody>
<tr>
<td>EY$_{t-1}$</td>
<td>0.640 (0.000)</td>
<td>0.186 (0.001)</td>
<td>0.967 (0.000)</td>
<td>0.059 (0.000)</td>
<td>-0.010 (0.199)</td>
<td>0.115 (0.000)</td>
<td>-0.231 (0.000)</td>
<td>-0.191 (0.000)</td>
<td>-0.194 (0.000)</td>
</tr>
<tr>
<td>Risk Factor (Std. Dev.)</td>
<td>1.811 (0.906)</td>
<td>154.166 (0.000)</td>
<td>-77.572 (0.000)</td>
<td>25.470 (0.000)</td>
<td>39.042 (0.000)</td>
<td>22.099 (0.000)</td>
<td>117.768 (0.000)</td>
<td>123.383 (0.000)</td>
<td>83.856 (0.000)</td>
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<tr>
<td>Intercept</td>
<td>0.684 (0.190)</td>
<td>-2.048 (0.001)</td>
<td>2.491 (0.000)</td>
<td>-0.319 (0.000)</td>
<td>-0.400 (0.000)</td>
<td>-0.405 (0.000)</td>
<td>-0.262 (0.348)</td>
<td>-1.196 (0.000)</td>
<td>1.138 (0.008)</td>
</tr>
<tr>
<td>Observations</td>
<td>647</td>
<td>323</td>
<td>324</td>
<td>647</td>
<td>323</td>
<td>324</td>
<td>647</td>
<td>323</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R$^2$</td>
<td>0.362</td>
<td>0.288</td>
<td>0.752</td>
<td>0.341</td>
<td>0.396</td>
<td>0.622</td>
<td>0.314</td>
<td>0.250</td>
<td>0.261</td>
</tr>
</tbody>
</table>
Table 6

RETMO (Monthly Returns) as Dependent Variable and EY\(_{t-1}\) or NEY\(_{t-1}\) as Independent Variable

Ordinary least squares regressions. The dependent variable is RETMO. The independent variable is either (1) EY\(_{t-1}\); or (2) NEY\(_{t-1}\); the independent variable and the time period are provided in the column heading. An additional independent variable, JD, is included in Table 6 Panel B. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

Table 6 Panel A: Without JD as independent variable

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</thead>
<tbody>
<tr>
<td>EY(<em>{t-1}) or NEY(</em>{t-1})</td>
<td>0.001</td>
<td>0.124</td>
<td>-0.002</td>
<td>0.183</td>
<td>0.021</td>
<td>0.534</td>
</tr>
<tr>
<td></td>
<td>(0.984)</td>
<td>(0.033)</td>
<td>(0.984)</td>
<td>(0.035)</td>
<td>(0.762)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.243</td>
<td>0.078</td>
<td>0.143</td>
<td>-0.395</td>
<td>0.239</td>
<td>0.419</td>
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<tr>
<td></td>
<td>(0.512)</td>
<td>(0.618)</td>
<td>(0.818)</td>
<td>(0.203)</td>
<td>(0.612)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Observations</td>
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<td>323</td>
<td>323</td>
<td>324</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R(^2)</td>
<td>-0.002</td>
<td>0.005</td>
<td>-0.003</td>
<td>0.011</td>
<td>-0.003</td>
<td>0.033</td>
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</tbody>
</table>

Table 6 Panel B: with JD as independent variable

<table>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EY(<em>{t-1}) or NEY(</em>{t-1})</td>
<td>0.001</td>
<td>0.126</td>
<td>0.039</td>
<td>0.187</td>
<td>0.020</td>
<td>0.533</td>
</tr>
<tr>
<td></td>
<td>(0.988)</td>
<td>(0.031)</td>
<td>(0.950)</td>
<td>(0.031)</td>
<td>(0.772)</td>
<td>(0.001)</td>
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<tr>
<td>JD (January Dummy Var.)</td>
<td>0.920</td>
<td>0.933</td>
<td>1.187</td>
<td>1.220</td>
<td>0.655</td>
<td>0.643</td>
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<td>(0.060)</td>
<td>(0.055)</td>
<td>(0.084)</td>
<td>(0.074)</td>
<td>(0.348)</td>
<td>(0.348)</td>
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<tr>
<td>Intercept</td>
<td>0.170</td>
<td>0.000</td>
<td>0.039</td>
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<td>0.190</td>
<td>0.366</td>
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<td>(0.649)</td>
<td>(0.999)</td>
<td>(0.950)</td>
<td>(0.111)</td>
<td>(0.688)</td>
<td>(0.066)</td>
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<td>Observations</td>
<td>647</td>
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</tr>
<tr>
<td>Adjusted R(^2)</td>
<td>0.002</td>
<td>0.010</td>
<td>0.003</td>
<td>0.018</td>
<td>-0.003</td>
<td>0.033</td>
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Table 7

RET3MO or RET6MO as Dependent Variable and EY or NEY as Independent Variable

Ordinary least squares regressions. The dependent variable is RET3MO in Table 7 Panel A and RET6MO in Table 7 Panel B. The independent variable is either (1) EY; or (2) NEY with the appropriate lag; the independent variable and the time period lag are provided in the column heading. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

Table 7 Panel A: Dependent Variable = RET3MO

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>EY_{t-3}</th>
<th>NEY_{t-3}</th>
<th>EY_{t-3}</th>
<th>NEY_{t-3}</th>
<th>EY_{t-3}</th>
<th>NEY_{t-3}</th>
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<tbody>
<tr>
<td>EY_{t-3} or NEY_{t-3}</td>
<td>0.076 (0.457)</td>
<td>0.409 (0.001)</td>
<td>0.082 (0.620)</td>
<td>0.612 (0.000)</td>
<td>0.125 (0.354)</td>
<td>1.547 (0.000)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.301 (0.688)</td>
<td>0.253 (0.419)</td>
<td>-0.150 (0.907)</td>
<td>-1.293 (0.037)</td>
<td>0.392 (0.675)</td>
<td>1.293 (0.001)</td>
</tr>
<tr>
<td>Observations</td>
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<td>645</td>
<td>321</td>
<td>321</td>
<td>324</td>
<td>324</td>
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<tr>
<td>Adjusted R^2</td>
<td>-0.001</td>
<td>0.017</td>
<td>-0.002</td>
<td>0.035</td>
<td>0.000</td>
<td>0.079</td>
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</table>

Table 7 Panel B: Dependent Variable = RET6MO

<table>
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<tr>
<th>Independent Variables</th>
<th>EY_{t-6}</th>
<th>NEY_{t-6}</th>
<th>EY_{t-6}</th>
<th>NEY_{t-6}</th>
<th>EY_{t-6}</th>
<th>NEY_{t-6}</th>
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<tr>
<td>EY_{t-6} or NEY_{t-6}</td>
<td>0.282 (0.073)</td>
<td>0.926 (0.000)</td>
<td>0.509 (0.065)</td>
<td>1.520 (0.000)</td>
<td>0.236 (0.222)</td>
<td>2.385 (0.000)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.174 (0.880)</td>
<td>0.466 (0.329)</td>
<td>-2.572 (0.222)</td>
<td>-3.158 (0.001)</td>
<td>0.836 (0.537)</td>
<td>2.417 (0.000)</td>
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<td>318</td>
<td>318</td>
<td>324</td>
<td>324</td>
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<tr>
<td>Adjusted R^2</td>
<td>0.003</td>
<td>0.039</td>
<td>0.008</td>
<td>0.087</td>
<td>0.002</td>
<td>0.101</td>
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Table 8

RET3MO or RET6MO as Dependent Variable and DY or NDY as Independent Variable

Ordinary least squares regressions. The dependent variable is RET3MO in Table 8 Panel A and RET6MO in Table 8 Panel B. The independent variable is either (1) DY; or (2) NDY with the appropriate time lag; the independent variable and the time period are provided in the column heading. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 3.3.

Table 8 Panel A: Dependent Variable = RET3MO

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>DY_{t,3} (1953 - 2006)</th>
<th>NDY_{t,3} (1953 - 2006)</th>
<th>DY_{t,3} (1953 - 1979)</th>
<th>NDY_{t,3} (1953 - 1979)</th>
<th>DY_{t,3} (1980 - 2006)</th>
<th>NDY_{t,3} (1980 - 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DY_{t-1} or NDY_{t-1}</td>
<td>0.422 (0.069)</td>
<td>0.549 (0.004)</td>
<td>1.491 (0.001)</td>
<td>1.386 (0.000)</td>
<td>0.268 (0.367)</td>
<td>4.519 (0.000)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.578 (0.478)</td>
<td>0.918 (0.001)</td>
<td>-5.099 (0.004)</td>
<td>-0.828 (0.078)</td>
<td>0.404 (0.669)</td>
<td>6.935 (0.000)</td>
</tr>
<tr>
<td>Observations</td>
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<td>645</td>
<td>321</td>
<td>321</td>
<td>324</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.004</td>
<td>0.011</td>
<td>0.029</td>
<td>0.055</td>
<td>-0.001</td>
<td>0.101</td>
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Table 8 Panel B: Dependent Variable = RET6MO

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>DY_{t,6} (1953 - 2006)</th>
<th>NDY_{t,6} (1953 - 2006)</th>
<th>DY_{t,6} (1953 - 1979)</th>
<th>NDY_{t,6} (1953 - 1979)</th>
<th>DY_{t,6} (1980 - 2006)</th>
<th>NDY_{t,6} (1980 - 2006)</th>
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<tr>
<td>DY_{t+1} or NDY_{t-1}</td>
<td>1.173 (0.001)</td>
<td>1.260 (0.000)</td>
<td>4.176 (0.000)</td>
<td>3.257 (0.000)</td>
<td>0.537 (0.214)</td>
<td>6.671 (0.000)</td>
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<tr>
<td>Intercept</td>
<td>-2.140 (0.087)</td>
<td>1.972 (0.000)</td>
<td>-14.351 (0.000)</td>
<td>-1.867 (0.011)</td>
<td>0.765 (0.581)</td>
<td>10.723 (0.000)</td>
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<td>642</td>
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<td>318</td>
<td>324</td>
<td>324</td>
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<tr>
<td>Adjusted R²</td>
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<td>0.094</td>
<td>0.122</td>
<td>0.002</td>
<td>0.119</td>
</tr>
</tbody>
</table>
6.2 Empirical Results and Analysis Related to Chapter 4 Hypotheses

This subchapter attempts to evaluate empirically which systematic risks and macroeconomic variables explain investors’ required returns as proxied by market valuation ratios. This analysis is broken down into sections. First, this subchapter evaluates the relation between the S&P 500 index’s earnings yield (and alternately the dividend yield and growth E/P ratio) and various macroeconomic variables, with controls for the components of interest rates and the risk factor analyzed in subchapter 6.1. Second, this dissertation evaluates if the earnings yield (and dividend yield and growth E/P ratio) have predictive power relative to these macroeconomic variables. This is done in an attempt to further demonstrate the relation between the earnings yield (or alternately the dividend yield or growth E/P ratio) and these macroeconomic variables.

6.2.1 Empirical Results and Analysis Related to Chapter 4 First Hypothesis

The first hypothesis (Hypothesis 4.1) is that the earnings yield (EY) or alternately the dividend yield (DY) or the growth E/P ratio (EPG or EPG2) is significantly related to certain macroeconomic variables. This analysis evaluates the variables with the inclusion of the interest-rate-component variables (TB, DP, and TP) and the risk factor variable (RF) as control variables. The specific equation to test this first hypothesis is:

\[
EY \text{ (or } DY \text{ or } EPG \text{ or } EPG2) = a + bOPCH + cMPI + dPROD + eGIP + fGGR + gUNEM + \text{control variables} + e. \quad (4)
\]

Table 9 presents the summary statistics for the data utilized in evaluating the Chapter 4 hypotheses. This table provides for each variable the number of observations, the
minimum observation, and the maximum observation, as well as the mean, median, and standard deviation of the observations. It also reports the mean for each sub-period: 1953-1979 and 1980-2006. Each sub-period represents one-half of the entire period. Relative to the variables utilized in the first hypothesis, there are a few things that should be noted from this table. First, as previously noted, the interest rate variables, including TB, TP, and to a lesser extent DP, have significantly different means for the earlier and later sub-periods. In all cases, the mean for 1953-1979 is much less than the mean for 1980-2006. Such differences in means suggest that there may be value in analyzing the sub-periods separately, in addition to analyzing the entire period. Second, there are significantly different means for the earlier and later sub-periods for the EPG and EPG2 variables. This causes issues with the EPG and EPG2 analyses for all but the latter period, as is discussed below. Third, all variables seem to have broad ranges, which can be helpful in identifying and evaluating meaningful relations between variables.

Table 10 presents analyzes of EY, DY, EPG, and EPG2 relative to UNEM, GIP, OPCH, and interest-rate-components with RF as a control variable for 1953-2006; 1953-1979; and 1980-2006; essentially, this table adds UNEM, GIP, OPCH to the analyses of Chapter 3. It also includes EPG and EPG2, although analyses of these variables are only relevant for the post 1980 period. Prior to 1980, there are observations in which the values of EPG and EPG2 are negative, as the value of the dividend stream exceeds the stock price. In such situations the value and the measure of magnitude of EPG and EPG2 are nonsensical, and as a result the adjusted $R^2$'s for such analyses are close to zero or
even negative. Observations in Table 10 are monthly, which eliminates the ability to include GGR and PROD.

Before discussing Table 10, it should be noted that analyses were performed utilizing MPI, the Boschen Mills Monetary Policy Index variable, in conjunction with the interest-rate-component variables for periods 1953-1980, 1980-1995, and 1953-1995. The time period is limited by data availability for the variable, as noted above. The results of these analyses are not shown, although they can be summarized as follows. The MPI variable has mixed results. As expected, it is more significant post 1980. For 1980-1995, it is significantly negatively related to EY, EPG, and EPG2, but has no significant explanatory power relative to DY. Also, pre-1980 it is significant only when positively signed, which is contrary to expectations. For EY, EPG, and EPG2, even for 1980-1995, it adds little to the explanatory power of the models when the interest-rate-components are also included, as at best the adjusted $R^2$ increases by 0.04. Based on this and due to data availability limitations and the desire to have as parsimonious a model as possible, MPI was not included in subsequent analyses and is not discussed further in this paper.

Now, there are various interesting observations from the analyses in Table 10. First, virtually all the analyses in Table 10 demonstrate that there are significant relations between the dependent and independent variables, as the independent variables have significant explanatory power relative to EY, DY, EPG, and EPG2. In fact, most of the analyses have very high adjusted $R^2$'s, especially those for 1980-2006, in which the lowest adjusted $R^2$ is 0.67. Second, the interest-rate-component variables (TB, TP, and MP) also are highly related to EPG and EPG2 for the 1980-2006 period. This provides additional
support for the first hypothesis of Section 3, that these variables have significant
explanatory power relative to investors’ expected or required returns, for which EPG and
EPG2 proxy. Second, DP (the default premium interest rate factor) and UNEM (the
unemployment rate) are highly correlated, 0.73 for the later period, 0.65 for the earlier
period, and 0.72 for overall. This is not surprising, as one would expect that when
unemployment is higher, there is more perceived risk and thus a higher default premium.
However, this correlation does result in DP having less significance when both DP and
UNEM are included in an analysis. Third, UNEM is almost always highly significant in
explaining required returns. However, it is usually negatively signed in the earlier period
and positively signed for the whole period and later period. One would expect a positive
sign, i.e., a higher required return when the unemployment rate and thus risk levels are
higher. The negative relation for the earlier period is enigmatic. Fourth, GIP (industrial
production growth rates) is, as expected, negatively correlated with required returns.
Higher growth rates are thus associated with higher valuations and lower required
returns. This relation is always highly significant. Fifth, consistent with the prior research
of CRR, changes in oil prices (OPCH) are not significant in explaining investors’
required returns. Sixth, DP is often significantly positively related to EY, DY, EPG, and
EPG2. Thus, the higher is the default premium, the higher is the required or expected
return. Again, this is consistent with a higher DP equaling a higher perceived risk.
Whenever significant, DP is positively signed. Still, as noted above, the inclusion of
UNEM reduces the significance of DP. Seventh, TB is often highly significant; however,
it changes signs depending on the period analyzed. Its relationship is positive for the
latter period but negative for the earlier period. This indicates that a higher risk-free rate is related to higher required returns post 1979 but lower required returns pre-1980. This pre-1980 relation is enigmatic, although it may be due to a changing of the guard at the Fed and different anticipated Fed reactions for the two different periods. However, it does support that the time periods require separate analysis. Eighth, TP is usually highly significant; however, it changes signs depending both on the dependent variable and the time period being analyzed. Finally, inclusion of the three added variables (UNEM, GIP, and OPCH) provides some marginal improvement in the adjusted $R^2$ values. The improvement ranges anywhere from 0.01 to 0.11, such as from 0.204 to 0.277 for DY% 1953-1979. The improvement is smaller in the latter period, 1980-2006.

Tables 11 and 12 utilize quarterly observations in the analyses. This permits the inclusion of GGR (GDP Growth Rate) and PROD (Percentage Change in Productivity) in Table 11 in addition to the independent variables utilized in Table 10. Table 12, utilizing quarterly observations, analyses only the interest-rate-component variables (DP, TB, and TP), while Table 11 analyses these variables plus GGR, PROD, UNEM, GIP, OPCH, and RF. Again, the adjusted $R^2$s are high, especially for 1980-2006. This is true for both Table 11 and Table 12.

There are numerous interesting observations from the analyses in these tables. First, as shown in Table 12, the interest-rate-component variables (TB, TP, MP) are generally highly related to EY, DY, EPG, and EPG2 for all the analyzes but especially the 1980-2006 period. The lowest adjusted $R^2$ for the post-1980 analyses that include only the interest-rate-component variables is 0.664. Second, in Table 11, as in Table 10, due to DP
and UNEM being highly correlated, DP generally has less significance when both DP and UNEM are included in an analysis. Third, UNEM is almost always highly significant in explaining required returns. However, it is negatively signed in the earlier period and positively signed for the whole period and later period. The negative relation for the earlier period is contrary to expectations. Fourth, GIP (industrial production growth rates) is, as expected, negatively correlated with required returns. Higher growth rates are thus associated with higher valuations. This relation is usually significant. Fifth, consistent with the prior research of CRR and the results in Table 10, changes in oil prices (OPCH) are never highly significant in explaining investors’ required returns. Sixth, TB is often highly significant; however, it changes signs depending on the period analyzed. Its relationship is positive for the latter period but negative for the earlier period. This indicates that a higher risk-free rate is related to higher required returns post 1979 but lower required returns pre-1980. Again, as noted above, this may be due to a changing of the guard at the Fed. Seventh, TP is often highly significant; however, it changes signs depending both on the dependent variable and the time period being analyzed. This is a bit of an enigma. Eighth, GGR (real GDP growth rate) has some significant explanatory power relative to investors’ expected or required returns. However, it is generally positively related to the valuation ratios. In other words, when growth rates are higher, investors’ expected or required returns are higher, which means that valuation ratios are lower. This is counter-intuitive; one would generally expect higher valuation ratios in periods of higher GDP growth. Still, the explanatory power of this variable is not that high in terms of contribution to the adjusted $R^2$ values. Ninth, PROD (quarterly change in
productivity) is perhaps the most interesting independent variable in these analyses, excluding the interest-rate-component variables. It is always negatively signed and usually highly significant in explaining investors’ required returns. Thus, as expected, when productivity is increasing, investors’ required returns are lower and valuation ratios are higher. Finally, inclusion of the five added variables (GGR, PROD, UNEM, GIP, and OPCH) increases the adjusted $R^2$ values, in comparing Tables 11 and 12. The increase ranges anywhere from 3% to 30%, such as from 0.439 to 0.568 for EY for 1953-1980. However, the improvement is relatively small in the latter period, 1980-2006, as it ranges from 3% to 5%.

Overall, the analyses in this section corroborate the conclusions relative to Section 3 with the addition of quarterly analyses and analyses of EPG and EPG2. Again, there is very strong support for hypothesis 1 of Chapter 3. Also, the results in general are very consistent whether EY, DY, EPG, or EPG2 is being analyzed.

Relative to the other macroeconomic variables, there are various conclusions. Oil price changes, consistent with CRR, have little relation to investors’ expected or required returns. Unemployment rates have some explanatory power relative to investors’ required returns. However, this explanatory power is largely superceded by the explanatory power of the Default Premium (DP), especially since UNEM is not consistently signed. Further, the magnitude, significance, and sign of the coefficient of UNEM are similar in all analyses even if DP is excluded. Thus, multicollinearity does not explain the results relative to UNEM. Industrial Production Growth Rates (GIP) are consistently negatively related to investors’ required returns. Thus, as expected, the
higher the growth rates, the higher the valuations and lower the expected or required returns. Still, especially for the latter period, 1980-2006, this variable contributes little to the overall explanatory power of the model relative to just including interest-rate-component variables. GDP Growth Rates (GGR) are generally positively related to investors’ required returns and often significantly related. Thus, contrary to expectations, the higher the growth rates, the lower the valuations and higher the expected or required returns. Still, this variable contribution is minor to the overall explanatory power of the model relative to just including interest-rate-component variables. Finally, PROD (quarterly change in productivity) is usually highly negatively related to investors’ required returns. Thus, as expected, when productivity is increasing, investors’ required returns are lower and valuation ratios are higher.

PROD is the most significant and consistent of the additional variables analyzed in this section. Based on this, Table 13 provides an analysis of the interest-rate-component variables and PROD as independent variables and of the valuation ratio variables as dependent variables for the latter time period, 1980-2006. The results are compelling. All four variables have significant explanatory power and are signed correctly when significant in explaining the valuation ratio variables. The adjusted $R^2$'s are quite high, ranging from 0.70 to 0.87. Thus, interest-rate-component variables and productivity changes are significantly related to investors’ expected or required returns.

6.2.2 Empirical Results and Analysis Related to Chapter 4 Second Hypothesis
The second hypothesis (Hypothesis 4.2), to further demonstrate that there is a significant relation between the valuation ratios, such as earnings yield (or alternately dividend yield), and various macroeconomic variables, is that the earnings yield (or alternately dividend yield) forecasts such macroeconomic variables. The specific equation to test this second hypothesis is:

\[ \text{OPCH (or PROD, GIP, GGR, or UNEM)} = a + b\text{EY}_{t-1} \text{ (or bDY}_{t-1}) + e. \quad (5) \]

This second hypothesis is not trying to demonstrate that EY or DY cause changes in macroeconomic variables. Rather, it is designed to further confirm that there is a relation between EY (or DY) and macroeconomic variables, as proxies for risk factors. Thus, again the hypothesis is that macroeconomic variables impact required returns as proxied by EY and DY levels.

Table 14 presents the results of the analyses of EY\(_{t-1}\) as the independent variable relative to macroeconomic variables for 1953-2006, 1953-1979, and 1980-2006. Although Table 14 just presents complete results for EY\(_{t-1}\), similar analyses were also conducted with DY\(_{t-1}\) instead of EY\(_{t-1}\), and the adjusted R\(^2\)'s for these analyses are presented in Table 14. In general, the conclusions were very similar for both sets of analyses. In fact, the results with DY\(_{t-1}\) support all of the following observations and conclusions relative to EY\(_{t-1}\). First, UNEM (the unemployment rate), similar to the Default Premium (DP) with which it is highly correlated, is almost always highly significantly positively related to EY\(_{t-1}\). The higher the required or expected return in the prior period, the higher is the unemployment rate in the current period. This is as expected, since a higher UNEM equates to a higher perceived risk. Also, GIP (the
Industrial Production Growth Rate) is consistently negatively and highly significantly related to EY$_{t-1}$. OPCH (Oil Price Changes) shows little relation to EY$_{t-1}$. Further, GDP growth rate (GGR) is highly significantly positively related to EY$_{t-1}$ for the whole period and the latter period but not significantly related for the earlier period. Thus, a higher EY (or lower P/E) is related to a higher growth rate. This would suggest that higher required returns (or lower P/E multiples) are related to higher GDP growth rates, which is counter-intuitive. In addition, changes in productivity rates (PROD) generally are significantly negatively related to EY$_{t-1}$, especially in the latter period analyses.

Finally, in summary of the analyses in Table 14, this table provides some support for the second hypothesis. Consistent with the results in Tables 10-13, the results in Table 14 demonstrate that there are significant relations between various macroeconomic variables and EY (or DY), although the adjusted R$^2$ values are not that high. In other words, these macroeconomic variables have some relation to expected or required returns.

Based on the analyses presented in Tables 10-14, investors’ expected or required returns, as proxied by the earnings yield (EY) or alternately the dividend yield (DY) or growth component of earnings yield (EPG or EPG2), are related to various macroeconomic variables, which proxy for either risk factors or factors that will impact corporate cash flows on a macroeconomic level. However, not all variables evaluated evidence such a relation. Specifically, oil price changes, surprisingly but consistent with prior research, evidence no relation to investors’ expected or required returns. There is some evidence of a relation between GDP growth rates and investors’ required returns. However, this evidence is not that strong and what evidence there is indicates that the
relation is counter-intuitive, in that higher growth rates are associated with higher required returns and lower valuation ratios. Industrial production growth rates are, as expected, negatively associated with investors’ required returns. Thus, when growth rates are higher, required returns are lower and valuation ratios are higher. Further, this relation is somewhat stronger in the earlier period, perhaps due to production being a smaller part of the total economy in more recent years. Still, although statistically significant, this relation does not contribute that much to the explanatory power of the models.

Unemployment rates also evidence a significant relation to investors’ required returns. However, this relation is not consistent in that in the earlier period it is significantly negative, such that higher unemployment rates are associated with lower required returns; this is certainly contrary to what is expected. To determine if this relation is due to UNEM’s correlation with the default premium (DP), separate analyses were conducted on the earlier period and the total period with and without DP and RF (to which UNEM is also highly correlated) included in the model. These analyses revealed that when just DP and UNEM are included, DP tends to dominate UNEM in explaining EY or DY; the magnitude and significance of the coefficient of UNEM are greatly reduced, although the coefficient remains positive. In contrast, when RF is added to the model, the coefficient of UNEM becomes significantly negative, whether or not DP is included in the model. Thus, the explanatory power of UNEM relative to investors’ required returns is neither robust nor consistent. Finally, productivity growth rates (PROD) are shown to be consistently negatively related to investors’ required returns. This relation is usually significant and is almost always highly significant in the latter period. As productivity
increases, investors’ required returns decrease. PROD thus offers the most promise of the additional variables analyzed in this section relative to its ability to explain investors’ required returns in a manner that is consistent with expectations.
### Table 9
#### Summary Statistics

This table reports summary statistics of the variables utilized in Chapter 4. For each variable, I report the number of observations, the minimum observation, the maximum observation, as well as the mean, median, and standard deviation of the observations. In the final two columns, I also report the Mean for each sub-period: 1953-1979 and 1980-2006. Definitions for each variable, along with the sources of the data, can be found in Section 4.3. The amounts in all but the final two columns are for the entire period. Variables are listed in alphabetical order. Only quarterly observations are available for GGR and PROD; for the other variables, the observations are available monthly.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev.</th>
<th>1953-1979 Mean</th>
<th>1980-2006 Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>648</td>
<td>0.320</td>
<td>2.690</td>
<td>0.941</td>
<td>0.810</td>
<td>0.412</td>
<td>0.805</td>
<td>1.076</td>
</tr>
<tr>
<td>EPG</td>
<td>648</td>
<td>-6.525</td>
<td>54.739</td>
<td>0.180</td>
<td>0.105</td>
<td>2.228</td>
<td>0.271</td>
<td>0.090</td>
</tr>
<tr>
<td>EPG2</td>
<td>648</td>
<td>-3.466</td>
<td>29.940</td>
<td>0.094</td>
<td>0.052</td>
<td>1.215</td>
<td>0.141</td>
<td>0.048</td>
</tr>
<tr>
<td>GIP</td>
<td>648</td>
<td>-0.035</td>
<td>0.062</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.003</td>
<td>0.002</td>
</tr>
<tr>
<td>GGR</td>
<td>216</td>
<td>-0.016</td>
<td>0.058</td>
<td>0.017</td>
<td>0.016</td>
<td>0.010</td>
<td>0.018</td>
<td>0.015</td>
</tr>
<tr>
<td>OPCH</td>
<td>648</td>
<td>-0.327</td>
<td>1.346</td>
<td>0.007</td>
<td>0.000</td>
<td>0.078</td>
<td>0.010</td>
<td>0.005</td>
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<tr>
<td>PROD</td>
<td>216</td>
<td>-0.015</td>
<td>0.030</td>
<td>0.005</td>
<td>0.005</td>
<td>0.008</td>
<td>0.006</td>
<td>0.005</td>
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<tr>
<td>RF</td>
<td>648</td>
<td>0.019</td>
<td>0.046</td>
<td>0.034</td>
<td>0.033</td>
<td>0.006</td>
<td>0.033</td>
<td>0.035</td>
</tr>
<tr>
<td>TB</td>
<td>648</td>
<td>0.640</td>
<td>16.300</td>
<td>5.114</td>
<td>4.915</td>
<td>2.818</td>
<td>4.383</td>
<td>5.844</td>
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<tr>
<td>TP</td>
<td>648</td>
<td>-2.280</td>
<td>5.130</td>
<td>2.124</td>
<td>1.980</td>
<td>1.452</td>
<td>1.430</td>
<td>2.819</td>
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<td>UNEM</td>
<td>648</td>
<td>2.500</td>
<td>10.800</td>
<td>5.734</td>
<td>5.600</td>
<td>1.465</td>
<td>5.317</td>
<td>6.151</td>
</tr>
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</table>
Table 10
Analysis of EY (or DY or EPG) and Macroeconomic Variables (Monthly Observations)

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) UNEM; (2) GIP; (3) OPCH; (4) TB; (5) DP; (6) TP; and (7) RF. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 4.3.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>UNEM (Unempl. Rate)</td>
<td>0.678 (0.000)</td>
<td>-0.388 (0.000)</td>
<td>0.349 (0.000)</td>
<td>0.435 (0.000)</td>
<td>-0.224 (0.000)</td>
<td>0.373 (0.000)</td>
<td>0.008 (0.000)</td>
<td>0.001 (0.000)</td>
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</tr>
<tr>
<td>GIP (Ind. Prod. Growth Rate)</td>
<td>-32.131 (0.000)</td>
<td>-27.496 (0.000)</td>
<td>-35.900 (0.000)</td>
<td>-14.209 (0.001)</td>
<td>-12.686 (0.001)</td>
<td>-13.950 (0.000)</td>
<td>-0.771 (0.000)</td>
<td>-0.457 (0.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPCH (Change in Oil Prices)</td>
<td>0.213 (0.817)</td>
<td>0.792 (0.509)</td>
<td>0.541 (0.528)</td>
<td>-0.321 (0.483)</td>
<td>-0.141 (0.782)</td>
<td>0.043 (0.876)</td>
<td>0.011 (0.480)</td>
<td>0.009 (0.421)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.215 (0.000)</td>
<td>-0.170 (0.035)</td>
<td>0.621 (0.000)</td>
<td>-0.012 (0.549)</td>
<td>-0.188 (0.000)</td>
<td>0.305 (0.000)</td>
<td>0.009 (0.000)</td>
<td>0.005 (0.000)</td>
<td>0.011 (0.000)</td>
<td>0.005 (0.000)</td>
</tr>
<tr>
<td>DP (Default Premium)</td>
<td>0.491 (0.120)</td>
<td>0.681 (0.182)</td>
<td>0.758 (0.008)</td>
<td>0.377 (0.017)</td>
<td>0.581 (0.008)</td>
<td>-0.046 (0.609)</td>
<td>0.011 (0.024)</td>
<td>0.012 (0.001)</td>
<td>0.026 (0.000)</td>
<td>0.016 (0.000)</td>
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<tr>
<td>TP (Term Premium)</td>
<td>-0.948 (0.000)</td>
<td>-0.765 (0.000)</td>
<td>0.034 (0.711)</td>
<td>-0.458 (0.000)</td>
<td>-0.278 (0.000)</td>
<td>0.188 (0.000)</td>
<td>0.000 (0.000)</td>
<td>-0.003 (0.029)</td>
<td>0.004 (0.000)</td>
<td>-0.002 (0.016)</td>
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<tr>
<td>RF (Risk Factor)</td>
<td>80.893 (0.000)</td>
<td>389.893 (0.000)</td>
<td>5.506 (0.000)</td>
<td>7.062 (0.666)</td>
<td>7.062 (0.322)</td>
<td>128.522 (0.000)</td>
<td>8.518 (0.037)</td>
<td>0.994 (0.673)</td>
<td>-0.034 (0.835)</td>
<td></td>
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<tr>
<td>Intercept</td>
<td>0.755 (0.103)</td>
<td>-1.902 (0.002)</td>
<td>-0.590 (0.236)</td>
<td>1.292 (0.000)</td>
<td>1.515 (0.000)</td>
<td>-1.951 (0.000)</td>
<td>-0.026 (0.003)</td>
<td>0.010 (0.129)</td>
<td>-0.015 (0.005)</td>
<td>0.009 (0.023)</td>
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<tr>
<td>Observations</td>
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<td>648</td>
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<tr>
<td>Adjusted R²</td>
<td>0.528</td>
<td>0.509</td>
<td>0.815</td>
<td>0.402</td>
<td>0.277</td>
<td>0.914</td>
<td>0.792</td>
<td>0.675</td>
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<td>Adjusted R²</td>
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</table>
### Analysis of EY (or DY or EPG) and Macroeconomic Variables (Quarterly Observations)

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) GGR; (2) PROD; (3) UNEM; (4) GIP; (5) OPCH; (6) TB; (7) DP; (8) TP; and (9) RF. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are quarterly. Definitions for each dependent and independent variable can be found in Section 4.3. An intercept was included in each analysis, but due to space considerations its values are not shown.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>GGR (GDP Growth Rate)</td>
<td>68.348 (0.000)</td>
<td>15.105 (0.013)</td>
<td>52.714 (0.063)</td>
<td>-10.092 (0.319)</td>
<td>0.161 (0.981)</td>
<td>0.626 (0.088)</td>
<td>0.113 (0.011)</td>
<td>0.689 (0.011)</td>
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<tr>
<td>PROD (% Ch. in Productivity)</td>
<td>-89.130 (0.000)</td>
<td>-38.239 (0.124)</td>
<td>-86.199 (0.000)</td>
<td>-23.571 (0.016)</td>
<td>-0.708 (0.947)</td>
<td>-20.922 (0.002)</td>
<td>-1.378 (0.000)</td>
<td>-1.019 (0.000)</td>
</tr>
<tr>
<td>UNEM (Unempl. Rate)</td>
<td>0.712 (0.000)</td>
<td>-0.281 (0.027)</td>
<td>0.319 (0.000)</td>
<td>-0.197 (0.042)</td>
<td>0.368 (0.000)</td>
<td>0.007 (0.004)</td>
<td>0.001 (0.706)</td>
<td>0.001 (0.706)</td>
</tr>
<tr>
<td>GIP (Ind. Prod. Growth Rate)</td>
<td>-52.611 (0.000)</td>
<td>-41.885 (0.009)</td>
<td>-44.680 (0.040)</td>
<td>-19.032 (0.014)</td>
<td>-15.458 (0.023)</td>
<td>-4.205 (0.554)</td>
<td>-0.742 (0.052)</td>
<td>-0.637 (0.024)</td>
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<tr>
<td>OPCH (Change in Oil Prices)</td>
<td>0.765 (0.713)</td>
<td>15.930 (0.044)</td>
<td>0.258 (0.854)</td>
<td>-0.301 (0.780)</td>
<td>0.609 (0.071)</td>
<td>0.013 (0.768)</td>
<td>0.007 (0.788)</td>
<td>0.008 (0.663)</td>
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<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.079 (0.294)</td>
<td>-0.224 (0.172)</td>
<td>0.534 (0.085)</td>
<td>-0.042 (0.032)</td>
<td>-0.151 (0.000)</td>
<td>0.306 (0.000)</td>
<td>0.008 (0.001)</td>
<td>0.004 (0.001)</td>
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<td>DP (Default Premium)</td>
<td>0.831 (0.120)</td>
<td>0.589 (0.516)</td>
<td>0.945 (0.043)</td>
<td>0.417 (0.132)</td>
<td>0.360 (0.354)</td>
<td>-0.063 (0.678)</td>
<td>0.013 (0.108)</td>
<td>0.015 (0.015)</td>
</tr>
<tr>
<td>TP (Term Premium)</td>
<td>-0.913 (0.000)</td>
<td>-0.806 (0.006)</td>
<td>-0.444 (0.762)</td>
<td>-0.241 (0.000)</td>
<td>0.190 (0.052)</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.927)</td>
<td>0.002 (0.233)</td>
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<tr>
<td>RF (Risk Factor)</td>
<td>52.981 (0.033)</td>
<td>369.841 (0.000)</td>
<td>6.244 (0.769)</td>
<td>-0.213 (0.987)</td>
<td>127.545 (0.000)</td>
<td>13.790 (0.051)</td>
<td>0.161 (0.666)</td>
<td>-0.072 (0.792)</td>
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<td>Adjusted $R^2$</td>
<td>0.568</td>
<td>0.531</td>
<td>0.836</td>
<td>0.404</td>
<td>0.290</td>
<td>0.918</td>
<td>0.811</td>
<td>0.709</td>
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Table 12
Analysis of EY (or DY or EPG) and Macroeconomic Interest-Rate Variables (Quarterly Observations)

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) TB; (2) DP; and (3) TP. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are quarterly. Definitions for each dependent and independent variable can be found in Section 4.3.

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<tbody>
<tr>
<td>TB (3-mo. T-bill rate)</td>
<td>0.285</td>
<td>0.469</td>
<td>0.692</td>
<td>0.034</td>
<td>0.015</td>
<td>0.401</td>
<td>0.011</td>
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<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.360)</td>
<td>(0.772)</td>
<td>(0.000)</td>
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<tr>
<td>DP (Default Premium)</td>
<td>2.274</td>
<td>1.005</td>
<td>1.468</td>
<td>1.231</td>
<td>0.565</td>
<td>0.541</td>
<td>0.262</td>
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<td>(0.316)</td>
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<td>(0.152)</td>
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<tr>
<td>TP (Term Premium)</td>
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<td>0.044</td>
<td>0.239</td>
<td>-0.277</td>
<td>-0.072</td>
<td>0.431</td>
<td>0.005</td>
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<td>(0.883)</td>
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<td>(0.535)</td>
<td>(0.000)</td>
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<td>Intercept</td>
<td>4.489</td>
<td>4.518</td>
<td>-0.102</td>
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<td>(0.000)</td>
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<td>(0.847)</td>
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<td>(0.000)</td>
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<td>Adjusted R²</td>
<td>0.439</td>
<td>0.229</td>
<td>0.802</td>
<td>0.281</td>
<td>0.021</td>
<td>0.865</td>
<td>0.772</td>
<td>0.664</td>
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Table 13

Analysis of EY (or DY or EPG) and Productivity and Interest-Rate Variables (Quarterly Observations)

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) PROD; (2) TB; (3) DP; and (4) TP. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are quarterly. Definitions for each dependent and independent variable can be found in Section 4.3.

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<tr>
<td>PROD (% Ch. in Productivity)</td>
<td>-57.598 (0.001)</td>
<td>-15.054 (0.024)</td>
<td>-1.011 (0.001)</td>
<td>-0.714 (0.001)</td>
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<td>TB (3-mo. T-bill rate)</td>
<td>0.682 (0.000)</td>
<td>0.398 (0.000)</td>
<td>0.011 (0.000)</td>
<td>0.005 (0.000)</td>
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<td>DP (Default Premium)</td>
<td>1.418 (0.000)</td>
<td>0.528 (0.001)</td>
<td>0.025 (0.000)</td>
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<td>TP (Term Premium)</td>
<td>0.258 (0.029)</td>
<td>0.436 (0.000)</td>
<td>0.005 (0.016)</td>
<td>-0.002 (0.207)</td>
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<td>Intercept</td>
<td>0.241 (0.637)</td>
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<td>-0.010 (0.272)</td>
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<td>Adjusted R²</td>
<td>0.822</td>
<td>0.871</td>
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Table 14

Macroeconomic Variables as Dependent Variable and EY_{t-1} as Independent Variable

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variable is EY_{t-1}. Regressions were also performed with DY_{t-1} as the independent variable; however, due to space considerations, only the Adjusted R^2 values are shown for these regressions. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 4.3. Observations are monthly in the first tables and quarterly in the second table.

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<td>EY_{t-1}</td>
<td>0.205</td>
<td>0.153</td>
<td>0.322</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.000</td>
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<td>(0.000)</td>
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<td>(0.344)</td>
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<td>4.144</td>
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<td>0.011</td>
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<td>Adjusted R^2</td>
<td>0.137</td>
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<td>0.000</td>
<td>0.014</td>
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<td>Adjusted R^2: for DY_{t-1}</td>
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<td>0.018</td>
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<td>0.021</td>
<td>0.058</td>
<td>0.024</td>
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<tbody>
<tr>
<td>EY_{t-1}</td>
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<td>(0.007)</td>
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<td>(0.005)</td>
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</tr>
<tr>
<td>Observations</td>
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<td>215</td>
<td>107</td>
<td>108</td>
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<tr>
<td>Adjusted R^2</td>
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<td>-0.005</td>
<td>0.065</td>
<td>0.043</td>
<td>0.038</td>
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</tr>
<tr>
<td>Adjusted R^2: for DY_{t-1}</td>
<td>0.016</td>
<td>0.224</td>
<td>0.062</td>
<td>0.054</td>
<td>0.007</td>
<td>0.028</td>
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</table>
6.3 Empirical Results and Analysis Related to Chapter 5 Hypotheses

This subchapter attempts to evaluate whether or not there is empirical support for classifying HML or SMB as a systematic risk factor. Specifically, this subchapter seeks to determine if HML or SMB perform significantly worse during “bad” economic times such that rational investors would demand return premiums for the inherent risks associated with such factors. As Zhang (2005) maintains, if performance is worse during bad times and better in good times, it is rational for investors to demand a premium for such investments because such firms are riskier when the price of risk is high and less risky when the price of risk is low.

This analysis is broken down into sections. First, this subchapter evaluates the relation between alternately HML and SMB and dummy variables that denote “bad” and “good” economic times, with and without controls for the components of interest rates and the risk factor analyzed in subchapter 6.1. This analysis thus determines by the size and magnitude of the coefficients of the dummy variables whether HML and SMB augment or mitigate returns in “bad” and “good” economic times. Second, this dissertation calculates the betas of alternately HML and SMB for “good” economic times, “bad” economic times, and all times combined. This is done in an attempt to further determine whether HML and SMB possess characteristics that merit their classification as risk factors.

6.3.1 Empirical Results and Analysis Related to Chapter 5 First Hypothesis
The first hypothesis (Hypothesis 5.1) is that the returns of HML or alternately SMB are relatively worse during “bad” times. To evaluate this hypothesis, this subsection calculates the average and median HML and SMB returns during different states of the economy. Additionally, this subsection calculates the coefficients of “good” times and “bad” times based on the following equation:

\[ \text{HML (or SMB)} = a + bG + cB + \text{control variables} + e, \quad (6) \]

where \( G \) is a dummy variable having the value of 1 in “good” times and 0 otherwise and \( B \) is a dummy variable having the value of 1 in “bad” times and 0 otherwise. Also, the analyses are conducted both with and without control variables identified as relevant in the analyses of the earlier sections. These control variables include the interest-rate-component variables (DP, TB, and TP), as well as the risk-factor variable (RF).

As explained in Section 5.3.1, “bad” times are defined in two different ways to provide a robust analysis and to ensure that any findings are not spurious. The first definition utilizes the periods of recession identified by the NBER. The second definition is based on market returns in excess of the risk-free rate \((R_m - R_f)\), which are divided into the top 30 percent (Return \( G = 1 \) and Return \( B = 0 \)), middle 40 percent (Return \( G = 0 \) and Return \( B = 0 \)), and bottom 30 percent (Return \( G = 0 \) and Return \( B = 1 \)).

Table 15 presents the summary statistics for the data utilized in evaluating the Chapter 5 hypotheses. This table provides for each variable the number of observations, the minimum observation, and the maximum observation, as well as the mean, median, and standard deviation of the observations. It also reports the mean for each sub-period: 1953-1979 and 1980-2006. Each sub-period represents one-half of the entire period.
Relative to the variables utilized in the first hypothesis, there are a few things that should be noted from Table 15. First, SMB, when evaluated in whole and separately for “good” and “bad” economic times, exhibits characteristics that are expected for a risk factor. Its values are significantly worse in “bad” versus “good” economic times. Its mean and median values increase noticeably between “bad” and “good” times. This is true for the entire time period (1953-2006), as well as for both the sub-periods (1953-1979 and 1980-2006). In contrast, HML exhibits characteristics that are not consistent with it being a risk factor. HML’s values are significantly better in “bad” versus “good” economic times. Its mean and median values decrease noticeably between “bad” and “good” times. This is true for the entire time period (1953-2006), as well as for both the sub-periods (1953-1979 and 1980-2006). Finally, a comparison of the HML and SMB values between different NBER states and Return states indicates that the NBER B and NBER G states are clearly different from the Return B and Return G states, respectively. This enhances the robustness of the analysis.

Table 16 Panel A presents analyzes with HML as the dependent variable and either NBER B as the dependent variable or Return B and Return G as the dependent variables. These analyses were performed both without control variables and with the inclusion of DP, TB, TP, and RF as control variables. Inclusion of the control variables has little impact on the analyses as none of the control variables are ever highly significant in the analyses of HML. Thus, although the control variables were included in the analyses, their results are not presented in Table 16 but in Table 17. Consistent with the prior sections, analyses are performed for three time periods: the entire time period 1953-2006;
the first half 1953-1979; and the second half 1980-2006. Observations in all of Table 16’s and Table 17’s analyses are monthly.

Analyzing the results presented in Table 16 Panel A, one first notes that there seems to be little or no relation between NBER B and HML. The adjusted $R^2$s for the NBER B and HML analyses approximate zero consistently and the NBER B variable is never statistically significant relative to HML. In contrast, Return B and Return G are highly significant relative to HML for both the periods 1953-2006 and 1980-2006. Further, the adjusted $R^2$s for these periods are 0.078 and 0.186, respectively, which are rather high for analyses of monthly returns. However, the coefficients of Return B and Return G are consistent throughout with HML being not a risk factor, but a contra-risk factor. The coefficients of Return B and Return G are approximately +1.0 and -1.0, respectively, for the whole period, with their magnitudes being even significantly greater in the latter period. This means that when the market goes down a lot (i.e., in the worst 30 percent of the months), the HML factor mitigates that by increasing the monthly return by an average of 1.0% return for that month. Also, when the market goes up a lot (i.e., in the best 30 percent of the months), the HML factor mitigates that by decreasing the monthly return by an average of 1.0% return for that month. Thus, the HML factor tends to reduce the magnitude of the market returns in both directions and thus the variability of returns. This is the essence of a contra-risk factor, not a risk factor.

Table 16 Panel B presents analyzes with SMB as the dependent variable and either NBER B as the dependent variable or Return B and Return G as the dependent variables. These analyses were performed both without control variables and with the inclusion of
DP, TB, TP, and RF as control variables. Inclusion of the control variables has little impact on the analyses, as only DP of the control variables is ever highly significant in the analyses of SMB and DP is only highly significant in one analysis. Thus, although the four control variables were included in the analyses, only the results for DP are presented in Table 16 Panel B with the results for the other variables presented in Table 17 Panel B.

Consistent with the prior sections, analyses are performed for three time periods: the entire time period 1953-2006; the first half 1953-1979; and the second half 1980-2006. Observations in all of Table 16’s and Table 17’s analyses are monthly.

Analyzing the results presented in Table 16 Panel B, one first notes that there seems to be some relation between NBER B and SMB. Although the adjusted $R^2$s for the NBER B and SMB analyses are approximately 0.02 consistently, which is not that high, the NBER B variable is significant for both the entire period 1953-2006 and the earlier period 1980-2006. NBER B is consistently negative, with coefficients ranging from -0.74 to -1.00 in 1953-2006 and 1953-1979; in both of these periods the coefficient is significantly negative. In 1980-2006 the coefficient ranges from -0.20 to -0.42, although it is not statistically significant. Thus, in “bad” times, as defined by the NBER, SMB tends to decrease returns (i.e., make them even more negative). This suggests that SMB is a risk factor in that investors would presumably require additional compensation for an investment that does even worse in bad times. DP in these analyses is consistently significant, and the magnitude of its coefficient ranges from 1.21 to 1.45. This also suggests that SMB is a risk factor, as SMB is impacted when the default risk premium is higher.
The analyses in Table 16 Panel B that incorporate Return B and Return G further corroborate that SMB is a risk factor. Return B is consistently highly significantly negative, with coefficients ranging from -1.25 to -1.40. The magnitude and significance of the coefficients of Return B tend to increase with the inclusion of the other variables, although Return B is highly significantly negative with or without the inclusion of the control variables. The coefficients of Return G are always statistically insignificant; they are positive for the early and whole period and negative for the latter period. Thus, analyzing “bad” times versus “good” times facilitates the identification that SMB does significantly worse in bad times; thus, it would seem to represent a risk factor that investors would demand additional compensation for.

As a summary of Table 16, SMB clearly does exhibit returns in “bad” times that would be consistent with it being a risk factor. In contrast, there is no evidence from Table 16 to support that HML is a risk factor. Rather, there is evidence to support that HML is a contra-risk factor, in that its returns tend to mitigate the extremes of market returns on both the upside and downside. To further evaluate these issues, this dissertation now proceeds to calculate the betas of SMB and HML during various economic times.

6.3.2 Empirical Results and Analysis Related to Chapter 5 Second Hypothesis

The second hypothesis (Hypothesis 5.2) is that the systematic risks of HML or alternately SMB are relatively greater during “bad” times. In other words, the second hypothesis is that SMB and HML should have positive betas, especially in bad times to
merit being classified as risk factors. Higher betas during “bad” times would indicate that these factors proxy for investments that have relatively more systematic risk in “bad” times. This would provide evidence that supports that HML and SMB represent risk factors, while the absence of such evidence would support that HML and SMB are not risk factors. To evaluate this hypothesis, this section calculates the betas of HML and SMB during different states of the economy. Specifically, the equation for this evaluation is:

\[ \text{HML (or SMB)} = a + b(R_m - R_f) + e, \]  (7)

with the evaluations conducted separately for good times, normal times, and bad times, as well as for all times combined.

“Bad” times are again defined in two different ways. These definitions, based on the NBER and market returns, are the same as those described above and are designed to provide a robust analysis so as to ensure that any findings are not spurious.

Table 18 presents analyzes with HML as the dependent variable and the market risk premium \((R_m - R_f)\) as the independent variable. Thus, this table calculates the betas of HML under different scenarios. In Table 18 Panel A the betas of HML are calculated alternately for all months, for “good” months per the NBER, and for “bad” months per the NBER. Additionally, the betas of HML for each of these scenarios are calculated for the entire period (1953-2006), for the first half (1953-1979), and for the second half (1980-2006). In Table 18 Panel B the betas of HML are calculated alternately for neutral months, for “good” months, and for “bad” months with months being sorted according to the monthly market risk premium \((R_m - R_f)\) based on the middle 40 percent, the top 30
percent, and the bottom 30 percent, respectively. Additionally, the betas of HML for each of these scenarios are calculated for the entire period (1953-2006), for the first half (1953-1979), and for the second half (1980-2006). These analyses were performed with the assumption that the market risk premium should be positive at least in “bad” months if HML is a risk factor. After all, it is reasonable for investors to expect a risk premium for an investment that does worse in “bad” months and thus increases the variability of returns.

In analyzing Table 18 Panel A, one immediately notes that the coefficients of the market risk premium ($R_m-R_f$) are always negative and usually highly significantly negative. This is the opposite of what is expected for a risk factor. HML’s betas being negative indicate that in “bad” times the HML factor improves returns, while in “good” times the HML factor reduces returns. Thus, overall HML reduces the variability of returns and thus reduces risk. Further, several of the adjusted $R^2$s in Table 18 Panel A are quite high. In fact, for all three analyses (all times, “good” times, and “bad” times) of the latter period (1980-2006), the adjusted $R^2$s are approximately 0.26, which is very high for explaining monthly returns. Likewise for all three time-period analyses of “bad” times, the negative coefficient of the market risk premium is significant, and the adjusted $R^2$s range from 0.08 to 0.27. Thus, there appears to be significant empirical evidence that HML is a contra-risk factor, especially in “bad” times as defined by the NBER.

An analysis of Table 18 Panel B provides corroborating evidence to that noted in Table 18 Panel A, especially in regard to both “bad” times for all time periods and in regard to all types of times for the latter half period (1980-2006). The coefficients of the
market risk premium ($R_m-R_f$) are always significantly negative and often highly significantly negative both during “bad” times for all time periods and during all types of times for the latter half period (1980-2006). Again, HML’s betas being negative indicate that in “bad” times the HML factor improves returns, while in “good” times the HML factor reduces returns. Thus, overall HML reduces the variability of returns and thus reduces risk. Further, the adjusted $R^2$’s in Table 18 Panel B range from 0.09 to 0.19, which are relatively high for explaining monthly returns. Thus, the betas based on various scenarios sorted according to market premium returns ($R_m-R_f$) provide significant empirical evidence that HML is a contra-risk factor, especially in “bad” times and in the latter time period (1980-2006).

Table 19 presents analyzes with SMB as the dependent variable and the market risk premium ($R_m-R_f$) as the independent variable. Thus, this table calculates the betas of SMB under different scenarios. In Table 19 Panel A the betas of SMB are calculated alternately for all months, for “good” months per the NBER, and for “bad” months per the NBER. Additionally, the betas of SMB for each of these scenarios are calculated for the entire period (1953-2006), for the first half (1953-1979), and for the second half (1980-2006). In Table 19 Panel B, the betas of SMB are calculated alternately for neutral months, for “good” months, and for “bad” months with months being sorted according to the monthly $R_m-R_f$ based on the middle 40 percent, the top 30 percent, and the bottom 30 percent, respectively. Additionally, the betas of SMB for each of these scenarios are calculated for the entire period (1953-2006), for the first half (1953-1979), and for the second half (1980-2006). These analyses were performed with the assumption that the
market risk premium should be positive at least in “bad” months if SMB is a risk factor. After all, it is reasonable for investors to expect a risk premium for an investment that does worse in “bad” months.

In analyzing Table 19 Panel A, one immediately notes that the coefficients of the market risk premium \((R_m-R_f)\) are always highly significantly positive. This is consistent with what is expected for a risk factor. SMB’s betas being positive indicate that in “bad” times the SMB factor reduces returns even further (i.e., makes returns even more negative), while in “good” times the SMB factor increases returns even more. Thus, overall SMB increases the variability of returns and thus increases risk. Further, several of the adjusted \(R^2\)s in Table 19 Panel A are relatively high for monthly return data. In fact, for all three analyses (all times, “good” times, and “bad” times) of the earlier period (1953-1979) and for all three time-period analyses of “bad” times, the adjusted \(R^2\)s exceed 0.10, with the highest being 0.20. Thus, these betas provide significant empirical evidence that SMB is a risk factor, especially in “bad” times as defined by the NBER.

An analysis of Table 19 Panel B provides corroborating evidence to that noted in Table 19 Panel A, especially in regard to both “bad” times and “neutral” times for all time periods. The coefficients of the market risk premium \((R_m-R_f)\) are always significantly positive and usually highly significantly positive both during “bad” times and “neutral” times for all time periods. Again, SMB’s betas being positive indicate that in “bad” times the SMB factor makes returns even worse, while in “neutral” times the SMB factor reduces returns when the market premium is negative and increases returns when the market premium is positive. Thus, overall SMB increases the variability of
returns and thus increases risk in both “bad” and “neutral” times. SMB’s betas are not significant in “good” times in Table 19 Panel B, such that SMB does not consistently increase or decrease returns in “good” times. Further, the adjusted $R^2$’s in Table 19 Panel B for “bad” times range from 0.10 to 0.17, which are relatively high for explaining monthly returns. Thus, the betas based on various scenarios sorted according to market premium returns ($R_m-R_f$) provide significant empirical evidence that SMB is a risk factor, especially in “bad” times and in “neutral” times.

Based on the analyses presented in Tables 15-19, the conclusions relative to HML and SMB being risk factors are diametric. HML’s negative betas and tendency to increase returns during “bad” periods provide strong evidence that it is not a risk factor, but is instead a contra-risk factor that reduces the variability of returns. This is consistent with Lakonishok et al. (1994), who find evidence that value strategies do particularly well during economic “bad” states. Lakonishok et al. (1994), similar to DeBondt and Thaler (1985), explain the value premium as irrational overreaction.

In contrast, SMB’s positive betas and tendency to reduce returns even further during bad times provide strong evidence that it is a risk factor. It is rational for investors to demand excess return or a risk premium for investments that increase the variability of returns and for investments that perform even worse in down markets.
Table 15
Summary Statistics

This table reports summary statistics of the variables utilized in Chapter 5. For each variable, I report the number of observations, the minimum observation, the maximum observation, as well as the mean, median, and standard deviation of the observations. In the final two columns, I also report the Mean for each sub-period: 1953-1979 and 1980-2006. Definitions for each variable, along with the sources of the data, can be found in Section 5.3. The amounts in all but the final two columns are for the entire period, 1953-2006. Variables are listed in alphabetical order. Observations are available monthly for all variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev.</th>
<th>1953-1979 Mean</th>
<th>1980-2006 Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>648</td>
<td>0.320</td>
<td>2.690</td>
<td>0.941</td>
<td>0.810</td>
<td>0.412</td>
<td>0.805</td>
<td>1.076</td>
</tr>
<tr>
<td>HML</td>
<td>648</td>
<td>-12.800</td>
<td>13.800</td>
<td>0.421</td>
<td>0.108</td>
<td>2.740</td>
<td>0.403</td>
<td>0.438</td>
</tr>
<tr>
<td>HML: NBER B</td>
<td>93</td>
<td>-9.800</td>
<td>8.240</td>
<td>0.546</td>
<td>0.340</td>
<td>3.162</td>
<td>0.503</td>
<td>0.608</td>
</tr>
<tr>
<td>HML: NBER G</td>
<td>555</td>
<td>-12.800</td>
<td>13.800</td>
<td>0.400</td>
<td>0.410</td>
<td>2.666</td>
<td>0.383</td>
<td>0.415</td>
</tr>
<tr>
<td>HML: Return B</td>
<td>195</td>
<td>-3.620</td>
<td>13.800</td>
<td>1.431</td>
<td>0.950</td>
<td>2.734</td>
<td>0.664</td>
<td>2.190</td>
</tr>
<tr>
<td>HML: Mid Returns</td>
<td>258</td>
<td>-12.800</td>
<td>6.520</td>
<td>0.448</td>
<td>0.470</td>
<td>2.237</td>
<td>0.354</td>
<td>0.545</td>
</tr>
<tr>
<td>HML: Return G</td>
<td>195</td>
<td>-10.050</td>
<td>8.570</td>
<td>-0.626</td>
<td>-0.520</td>
<td>2.969</td>
<td>0.207</td>
<td>-1.433</td>
</tr>
<tr>
<td>NBER B</td>
<td>648</td>
<td>0.000</td>
<td>1.000</td>
<td>0.144</td>
<td>0.000</td>
<td>0.351</td>
<td>0.170</td>
<td>0.117</td>
</tr>
<tr>
<td>NBER G</td>
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<td>0.000</td>
<td>1.000</td>
<td>0.856</td>
<td>1.000</td>
<td>0.351</td>
<td>0.830</td>
<td>0.883</td>
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<tr>
<td>Return B</td>
<td>648</td>
<td>0.000</td>
<td>1.000</td>
<td>0.301</td>
<td>0.000</td>
<td>0.459</td>
<td>0.299</td>
<td>0.302</td>
</tr>
<tr>
<td>Return G</td>
<td>648</td>
<td>0.000</td>
<td>1.000</td>
<td>0.301</td>
<td>0.000</td>
<td>0.459</td>
<td>0.296</td>
<td>0.306</td>
</tr>
<tr>
<td>RF</td>
<td>648</td>
<td>0.019</td>
<td>0.046</td>
<td>0.034</td>
<td>0.033</td>
<td>0.006</td>
<td>0.033</td>
<td>0.035</td>
</tr>
<tr>
<td>Rm-Rf</td>
<td>648</td>
<td>-23.130</td>
<td>39.180</td>
<td>0.570</td>
<td>0.920</td>
<td>4.244</td>
<td>0.502</td>
<td>0.637</td>
</tr>
<tr>
<td>SMB</td>
<td>648</td>
<td>-16.700</td>
<td>22.180</td>
<td>0.197</td>
<td>0.060</td>
<td>3.007</td>
<td>0.268</td>
<td>0.125</td>
</tr>
<tr>
<td>SMB: NBER B</td>
<td>93</td>
<td>-7.750</td>
<td>10.960</td>
<td>-0.285</td>
<td>-0.160</td>
<td>3.278</td>
<td>-0.445</td>
<td>-0.055</td>
</tr>
<tr>
<td>SMB: NBER G</td>
<td>555</td>
<td>-16.700</td>
<td>22.180</td>
<td>0.277</td>
<td>0.090</td>
<td>2.954</td>
<td>0.413</td>
<td>0.149</td>
</tr>
<tr>
<td>SMB: Return B</td>
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<td>-9.950</td>
<td>7.490</td>
<td>-0.766</td>
<td>-0.530</td>
<td>2.865</td>
<td>-0.708</td>
<td>-0.823</td>
</tr>
<tr>
<td>SMB: Mid Returns</td>
<td>258</td>
<td>-6.110</td>
<td>22.180</td>
<td>0.518</td>
<td>0.260</td>
<td>2.709</td>
<td>0.439</td>
<td>0.599</td>
</tr>
<tr>
<td>SMB: Return G</td>
<td>195</td>
<td>-16.700</td>
<td>13.730</td>
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<td>0.430</td>
<td>3.296</td>
<td>1.020</td>
<td>0.456</td>
</tr>
<tr>
<td>TB</td>
<td>648</td>
<td>0.640</td>
<td>16.300</td>
<td>5.114</td>
<td>4.915</td>
<td>2.818</td>
<td>4.383</td>
<td>5.844</td>
</tr>
<tr>
<td>TP</td>
<td>648</td>
<td>-2.280</td>
<td>5.130</td>
<td>2.124</td>
<td>1.980</td>
<td>1.452</td>
<td>1.430</td>
<td>2.819</td>
</tr>
</tbody>
</table>
Table 16

HML or SMB as Dependent Variable and Dummy “Bad” or “Good” Economic States as Independent Variables

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. The independent variables are (1) NBER G; (2) Return B; and (3) Return G. Also, control variables include DP; TB; TP; and RF, although only the results for DP for the SMB analyses are shown below; the remaining results are shown in Table 17. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 5.3.

<table>
<thead>
<tr>
<th>Table 16 Panel A: HML as Dependent Variable</th>
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</thead>
<tbody>
<tr>
<td>Independent Variables</td>
</tr>
<tr>
<td>HML (1953-2006)</td>
</tr>
<tr>
<td>HML (1953-1979)</td>
</tr>
<tr>
<td>HML (1980-2006)</td>
</tr>
<tr>
<td>HML (1953-2006)</td>
</tr>
<tr>
<td>HML (1953-1979)</td>
</tr>
<tr>
<td>HML (1980-2006)</td>
</tr>
<tr>
<td>NBER B</td>
</tr>
<tr>
<td>0.255</td>
</tr>
<tr>
<td>(0.433)</td>
</tr>
<tr>
<td>Return B</td>
</tr>
<tr>
<td>0.989</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Return G</td>
</tr>
<tr>
<td>-1.074</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>-0.271</td>
</tr>
<tr>
<td>(0.674)</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>648</td>
</tr>
<tr>
<td>Adjusted R^2</td>
</tr>
<tr>
<td>-0.002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 16 Panel B: SMB as Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
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<td>SMB (1953-2006)</td>
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<td>SMB (1953-1979)</td>
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<tr>
<td>SMB (1980-2006)</td>
</tr>
<tr>
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</tr>
<tr>
<td>SMB (1953-1979)</td>
</tr>
<tr>
<td>SMB (1980-2006)</td>
</tr>
<tr>
<td>NBER B</td>
</tr>
<tr>
<td>-0.742</td>
</tr>
<tr>
<td>(0.035)</td>
</tr>
<tr>
<td>Return B</td>
</tr>
<tr>
<td>-1.297</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Return G</td>
</tr>
<tr>
<td>0.138</td>
</tr>
<tr>
<td>(0.626)</td>
</tr>
<tr>
<td>DP</td>
</tr>
<tr>
<td>1.211</td>
</tr>
<tr>
<td>(0.009)</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>-1.097</td>
</tr>
<tr>
<td>(0.117)</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>648</td>
</tr>
<tr>
<td>Adjusted R^2</td>
</tr>
<tr>
<td>0.020</td>
</tr>
</tbody>
</table>
Table 17

HML or SMB as Dependent Variable and Dummy “Bad” or “Good” Economic States as Independent Variables: Results for Control Variables

Ordinary least squares regressions. The dependent variable and time period are provided in the column heading. Results for the main independent variables are shown in Table 16: (1) NBER G; (2) Return B; and (3) Return G. Results for the control variables are shown below: DP; TB; TP; and RF. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 5.3.

### Table 17 Panel A: HML as Dependent Variable

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RF</td>
<td>15.603 (0.467)</td>
<td>-3.481 (0.924)</td>
<td>32.123 (0.343)</td>
<td>2.562 (0.901)</td>
<td>-5.213 (0.886)</td>
<td>4.174 (0.892)</td>
</tr>
<tr>
<td>TB</td>
<td>0.084 (0.153)</td>
<td>0.119 (0.249)</td>
<td>0.155 (0.162)</td>
<td>0.015 (0.797)</td>
<td>0.097 (0.351)</td>
<td>0.011 (0.912)</td>
</tr>
<tr>
<td>TP</td>
<td>0.134 (0.192)</td>
<td>0.397 (0.388)</td>
<td>0.159 (0.340)</td>
<td>0.093 (0.071)</td>
<td>0.380 (0.071)</td>
<td>0.020 (0.906)</td>
</tr>
<tr>
<td>DP</td>
<td>-0.623 (0.144)</td>
<td>-0.978 (0.122)</td>
<td>-0.888 (0.187)</td>
<td>-0.063 (0.877)</td>
<td>-0.821 (0.192)</td>
<td>0.033 (0.957)</td>
</tr>
<tr>
<td>Observations</td>
<td>648</td>
<td>324</td>
<td>324</td>
<td>648</td>
<td>324</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.008</td>
<td>0.078</td>
<td>0.001</td>
<td>0.186</td>
</tr>
</tbody>
</table>

### Table 17 Panel B: SMB as Dependent Variable

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RF</td>
<td>43.173 (0.064)</td>
<td>69.227 (0.113)</td>
<td>16.341 (0.637)</td>
<td>51.914 (0.024)</td>
<td>77.224 (0.070)</td>
<td>20.204 (0.556)</td>
</tr>
<tr>
<td>TB</td>
<td>-0.160 (0.013)</td>
<td>-0.177 (0.154)</td>
<td>-0.186 (0.100)</td>
<td>-0.108 (0.089)</td>
<td>-0.093 (0.447)</td>
<td>-0.152 (0.175)</td>
</tr>
<tr>
<td>TP</td>
<td>-0.177 (0.113)</td>
<td>-0.442 (0.082)</td>
<td>-0.035 (0.851)</td>
<td>-0.130 (0.228)</td>
<td>-0.370 (0.135)</td>
<td>-0.007 (0.968)</td>
</tr>
<tr>
<td>DP</td>
<td>1.211 (0.009)</td>
<td>1.427 (0.060)</td>
<td>1.455 (0.034)</td>
<td>0.782 (0.081)</td>
<td>0.768 (0.299)</td>
<td>1.247 (0.064)</td>
</tr>
<tr>
<td>Observations</td>
<td>648</td>
<td>324</td>
<td>324</td>
<td>648</td>
<td>324</td>
<td>324</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.020</td>
<td>0.023</td>
<td>0.016</td>
<td>0.054</td>
<td>0.068</td>
<td>0.045</td>
</tr>
</tbody>
</table>
**Table 18**

**HML as Dependent Variable and \( R_m - R_f \) as Independent Variable: Betas for HML**

Ordinary least squares regressions. HML is the dependent variable. The time period and months included (such as “good” or “bad” economic times) are provided in the column heading. The independent variable is \( R_m - R_f \), such that the coefficient is the beta of HML. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 5.3.

### Table 18 Panel A: “Good” Times and “Bad” Times are defined per NBER

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_m - R_f )</td>
<td>-0.235 (0.000)</td>
<td>-0.080 (0.009)</td>
<td>-0.368 (0.000)</td>
<td>-0.243 (0.000)</td>
<td>-0.030 (0.372)</td>
<td>-0.394 (0.000)</td>
<td>-0.217 (0.000)</td>
<td>-0.175 (0.022)</td>
<td>-0.276 (0.001)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.555 (0.000)</td>
<td>0.443 (0.000)</td>
<td>0.673 (0.000)</td>
<td>0.580 (0.000)</td>
<td>0.404 (0.001)</td>
<td>0.725 (0.000)</td>
<td>0.445 (0.146)</td>
<td>0.422 (0.327)</td>
<td>0.478 (0.263)</td>
</tr>
<tr>
<td>Observations</td>
<td>648</td>
<td>324</td>
<td>324</td>
<td>555</td>
<td>269</td>
<td>286</td>
<td>93</td>
<td>55</td>
<td>38</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.131</td>
<td>0.018</td>
<td>0.261</td>
<td>0.125</td>
<td>-0.001</td>
<td>0.263</td>
<td>0.148</td>
<td>0.078</td>
<td>0.268</td>
</tr>
</tbody>
</table>

### Table 18 Panel B: “Good” Times, “Bad” Times, and Neutral Times are defined per Market Returns; “All Times” results would be the same as in Table 18 Panel A.

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>( R_m - R_f )</td>
<td>-0.476 (0.000)</td>
<td>-0.200 (0.131)</td>
<td>-0.820 (0.000)</td>
<td>-0.141 (0.157)</td>
<td>0.097 (0.453)</td>
<td>-0.361 (0.012)</td>
<td>-0.325 (0.000)</td>
<td>-0.370 (0.000)</td>
<td>-0.287 (0.002)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.851 (0.000)</td>
<td>0.506 (0.008)</td>
<td>1.313 (0.000)</td>
<td>0.094 (0.864)</td>
<td>-0.273 (0.697)</td>
<td>0.465 (0.558)</td>
<td>0.022 (0.947)</td>
<td>-0.903 (0.018)</td>
<td>0.920 (0.065)</td>
</tr>
<tr>
<td>Observations</td>
<td>258</td>
<td>131</td>
<td>127</td>
<td>195</td>
<td>96</td>
<td>99</td>
<td>195</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.059</td>
<td>0.010</td>
<td>0.123</td>
<td>0.005</td>
<td>-0.005</td>
<td>0.054</td>
<td>0.119</td>
<td>0.190</td>
<td>0.088</td>
</tr>
</tbody>
</table>
Table 19

SMB as Dependent Variable and \( R_m - R_f \) as Independent Variable: Betas for SMB

Ordinary least squares regressions. SMB is the dependent variable. The time period and months included (such as “good” or “bad” economic times) are provided in the column heading. The independent variable is \( R_m - R_f \) such that the coefficient is the beta of SMB. P-values are shown in parentheses and are corrected for variables being heteroskedastic. Observations are monthly. Definitions for each dependent and independent variable can be found in Section 5.3.

### Table 19 Panel A: “Good” Times and “Bad” Times are defined per NBER

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</tr>
</thead>
<tbody>
<tr>
<td>( R_m - R_f )</td>
<td>0.191 (0.000)</td>
<td>0.228 (0.000)</td>
<td>0.159 (0.000)</td>
<td>0.174 (0.000)</td>
<td>0.231 (0.000)</td>
<td>0.134 (0.000)</td>
<td>0.227 (0.000)</td>
<td>0.205 (0.008)</td>
<td>0.257 (0.003)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.088 (0.444)</td>
<td>0.153 (0.287)</td>
<td>0.024 (0.894)</td>
<td>0.148 (0.234)</td>
<td>0.252 (0.096)</td>
<td>0.044 (0.820)</td>
<td>-0.179 (0.570)</td>
<td>-0.349 (0.419)</td>
<td>0.066 (0.888)</td>
</tr>
<tr>
<td>Observations</td>
<td>648</td>
<td>324</td>
<td>324</td>
<td>555</td>
<td>269</td>
<td>286</td>
<td>93</td>
<td>55</td>
<td>38</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.071</td>
<td>0.114</td>
<td>0.043</td>
<td>0.051</td>
<td>0.103</td>
<td>0.025</td>
<td>0.151</td>
<td>0.109</td>
<td>0.201</td>
</tr>
</tbody>
</table>

### Table 19 Panel B: “Good” Times, “Bad” Times, and Neutral Times are defined per Market Returns;

“All Times” results would be the same as in Table 19 Panel A.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>( R_m - R_f )</td>
<td>0.539 (0.000)</td>
<td>0.360 (0.032)</td>
<td>0.745 (0.002)</td>
<td>0.004 (0.974)</td>
<td>0.222 (0.109)</td>
<td>-0.233 (0.185)</td>
<td>0.358 (0.000)</td>
<td>0.441 (0.000)</td>
<td>0.310 (0.001)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.062 (0.760)</td>
<td>0.166 (0.484)</td>
<td>-0.098 (0.772)</td>
<td>0.715 (0.245)</td>
<td>-0.078 (0.916)</td>
<td>1.680 (0.090)</td>
<td>0.786 (0.022)</td>
<td>1.160 (0.017)</td>
<td>0.547 (0.270)</td>
</tr>
<tr>
<td>Observations</td>
<td>258</td>
<td>131</td>
<td>127</td>
<td>195</td>
<td>96</td>
<td>99</td>
<td>195</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.051</td>
<td>0.028</td>
<td>0.070</td>
<td>-0.005</td>
<td>0.017</td>
<td>0.008</td>
<td>0.132</td>
<td>0.172</td>
<td>0.102</td>
</tr>
</tbody>
</table>
Chapter 7: Summary, Conclusions, and Prospects for Future Research

This dissertation utilizes three related analyses to empirically evaluate the relations among macroeconomic variables, systematic risk factors, and market valuation ratios. Market valuation ratios are utilized as proxies for investors’ expected or required returns.

The first essay, “In Search of a Better Market Earnings Yield (E/P) and a Better Market Dividend Yield (D/P),” evaluates the relations between market valuation ratios and the components of interest rates, with controls for various factors. This essay demonstrates that interest rates are significantly related to valuation ratios and that adjusting for this identified relation improves the utility of valuation ratios in forecasting market returns. In other words, when evaluating expected or required returns (as measured by EY or DY), one should adjust these factors for current interest-rate components. This helps determine whether excess returns can be expected in future periods, and thus whether or not the market is currently overvalued or undervalued. The rationale for such an adjustment is that if an asset’s value is based on the present value of its future cash flows, then any evaluation of such value needs to reflect both the estimated future cash flows and the components of the discount rate utilized in calculating the present value. Earnings and dividends, as components of the earnings yield and dividend yield, reflect only cash-flow components but not discount-factor components. Thus, to better gauge their relation to price, as the earnings yield and dividend yield do, we need to incorporate discount-factor components. Thus, it is not surprising that incorporating discount rate components enhances the utility of the earnings yield and dividend yield.
The second essay, “Systematic Risk Factors and Cash Flow Factors and Their Relations to Market Valuation Ratios as Proxies for Investors’ Required or Expected Returns,” evaluates the effects of state variables on market valuation ratios. This essay identifies which macroeconomic or state variables represent or capture systematic risk factors and which macroeconomic variables affect investors’ expected returns, as measured by market valuation ratios. Investors’ expected or required returns, as proxied by the earnings yield (EY) or alternately the dividend yield (DY) or growth component of earnings yield (EPG or EPG2), are related to various macroeconomic variables, which proxy for either risk factors or factors that will impact corporate cash flows on a macroeconomic level. However, not all variables evaluated evidence such a relation.

Specifically, oil price changes, surprisingly but consistent with prior research, evidence no relation to investors’ expected or required returns. There is some evidence of a relation between GDP growth rates and investors’ required returns. However, this evidence is not that strong and what evidence there is indicates that the relation is counter-intuitive, in that higher growth rates are associated with higher required returns and lower valuation ratios. Industrial production growth rates are, as expected, negatively associated with investors’ required returns. Thus, when growth rates are higher, required returns are lower and valuation ratios are higher. Further, this relation is somewhat stronger in the earlier period, perhaps due to production being a smaller part of the total economy in more recent years. Still, although statistically significant, this relation does not contribute that much to the explanatory power of the models. Unemployment rates also evidence a significant relation to investors’ required returns. However, this relation is not consistent in that in the earlier period it is significantly negative, such that higher
unemployment rates are associated with lower required returns; this is certainly contrary to what is expected. Also, additional analyses demonstrate that the explanatory power of UNEM relative to investors’ required returns is neither robust nor consistent. Finally, productivity growth rates (PROD) are shown to be consistently negatively related to investors’ required returns. This relation is usually significant and is almost always highly significant in the latter period. As productivity increases, investors’ required returns decrease. In summary, PROD thus offers the most promise of the additional variables analyzed in this section relative to its ability to explain investors’ required returns in a manner that is consistent with expectations.

The third essay, “SMB and HML: Risk Factors?”, evaluates if SMB (Small Minus Big return differentials based on the total size of market equity) and HML (High Minus Low return differentials based on book-to-market ratios) do worse relative to other equity investments in “bad” times and thus warrant a return premium as compensation for this “risk” factor. The conclusions relative to HML and SMB being risk factors are diametric. HML’s negative betas and tendency to increase returns during “bad” periods provide strong evidence that it is not a risk factor, but is instead a contra-risk factor that reduces the variability of returns. This is consistent with Lakonishok et al. (1994), who find evidence that value strategies do particularly well during economic “bad” states. Lakonishok et al. (1994), similar to DeBondt and Thaler (1985), explain the value premium as irrational overreaction. In contrast, SMB’s positive betas and tendency to reduce returns even further during bad times provide strong evidence that it is a risk factor. It is rational for investors to demand excess return or a risk premium for investments that increase the variability of returns and for investments that perform even
worse in down markets. In summary, this essay corroborates that SMB is a risk factor but
provides evidence that HML is actually a contra-risk factor.

Based on the results of this dissertation, there are various avenues for further research, including:

- Analyzing the growth components of earnings yield (EPG and EPG2) as alternate market valuation ratios relative to their abilities to predict future market returns, with and without adjustments for components of interest rates. Perhaps these ratios by themselves or in conjunction with NEY and NDY can further enhance the predictability of future market returns;

- Incorporating productivity growth rate (PROD) as an adjustment factor to market valuation ratios and evaluating whether adjusting for levels of PROD further enhances the predictability of future market returns;

- Repeating the analyses of SMB and HML for different size firms (such as sorted into deciles by size) to determine if conclusions are similar for all firm sizes. This might enhance the understanding of SMB and HML. This line of research is suggested by the findings of Griffin and Lemmon (2002) that the effects of the HML factor may be most pronounced in small firms; and

- Evaluating further why the term premium (TP) is significantly negatively related to investors’ expected or required returns in the earlier period (1953-1979) and yet significantly positively related in the later period (1980-2006), as identified in Chapter 4.
In summary, this dissertation studies the relations among risk factors, macroeconomic variables, and market valuation ratios so as to enhance the understanding of how risk factors and macroeconomic variables impact equity market valuations and equity market returns.
Bibliography and References


Chordia, Tarun, and Lakshmanan Shivakumar, (2005), "Inflation Illusion and the Post-Earnings Announcement Drift" *Journal of Accounting Research* 43 (No. 4), pp., 521-556.


