CROSS-SECTIONAL DETERMINANTS OF TURKISH STOCK MARKET RETURNS

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ABSTRACT

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This thesis analyzes the relationship between stock returns and firm-specific characteristics including market beta, size, book-to-market ratio, leverage, earnings yield, net sales-to-price ratio and prior return performance in Istanbul Stock Exchange during the period 1993-2003. Moreover, the predictability of some macroeconomic variables based on the stock market return behavior is investigated.

Keywords: Istanbul Stock Exchange, size effect, book-to-market ratio

ÖZ

İMKB'DE HİSSE SENEDİ GETİRİLERİ İLE FİRMALARIN FİNANSAL ORANLARI ARASINDAKİ İLİŞKİLER

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Bu çalışma, İstanbul Menkul Kıymetler Borsası'nda hisse senedi getirileri ile firmalara özgü finansal oranlar arasındaki ilişkinin varlığını incelemektedir. Firma büyüklüğü, defter-piyasa değeri oranı, kazanç-fiyat oranı, net satışlar-fiyat oranı, finansal kaldıraç oranları, beta katsayısı ve önceki dönem getiri performansı çalışmada kullanılan değişkenlerdir. Ayrıca, bu değişkenlerin hisse senedi getirileri üzerindeki etkileri ile makroekonomik göstergeler arasındaki ilişkinin varlığı da test edilmektedir.

Anahtar Kelimeler: İMKB, Firma Büyüklüğü, Defter-Piyasa Değeri Oranı

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CHAPTER 1

INTRODUCTION

This thesis is mainly concerned with testing the predictability of stock returns using data from the Istanbul Stock Exchange (ISE) data. This "predictability" is commonly referred to as a security market imperfection, or a fundamental and seasonal regularity, or an anomaly. Hundreds of papers have documented persistent cross-sectional and time series patterns in returns that are not predicted by the existing prevalent asset pricing theory Capital Asset Pricing Model (CAPM).

CAPM has occupied a central position in the financial economics literature for more than 35 years since its original appearance. According to CAPM, the expected rate of return on any security is linearly related to that security's systematic risk (beta) which is measured relative to the market portfolio of all securities. If this model is correct and security markets are informationally efficient, then security returns will, on average, conform to this linear relationship. Persistent departures documented in the literature represent violations of the joint hypothesis that both the CAPM and the efficient markets hypothesis are correct.

The early empirical tests of the model in the 1960s and 1970s did not support the CAPM[1]. After these findings, many empirical studies were conducted to arrive at the common conclusion that betas of common stocks do not adequately explain the cross-sectional differences in stock returns. Instead, a number of

[1] The results are discussed in detail in the literature survey chapter.

other variables seem to have significant predictive ability. These other variables include firm size (measured by the market capitalization of a firm's stock), the ratio of the book value to market value (the accounting value of a firm's book value of equity divided by its market capitalization), earnings yield (the firm's reported accounting net profits divided by market value of equity), the level of leverage of a firm and the firm's prior return performance in stock market both on short-term and long-term basis. The interesting point to note is that, in spite of the overwhelming empirical evidence, there is still no supporting theory or proof that has been developed to justify the choice of variables to be included in asset pricing models in addition to beta.

The significant predictive ability of these ad hoc variables can be interpreted in three different ways. First of all, it is important to mention that if the joint hypothesis mentioned above is rejected, this rejection can not be specifically attributed to one or the other branch of the hypothesis. In the first explanation, one can interpret the findings as evidence of market inefficiency, and also argue that if stock returns can be predicted on the basis of historical factors such as market capitalization or earnings yield of a firm, then it is difficult to characterize such stock markets as informationally efficient and such stock markets can not be said to be semi-strong efficient. For the second explanation, one can argue that the rejection may be due to a test design based on an incorrect equilibrium model, and, therefore, the CAPM is an incomplete description of equilibrium price formation and these variables are proxies for additional risk factors.

Finally, from a different perspective, the results that do not support the CAPM are not necessarily the proof of the model's invalidity or the stock market's inefficiency; instead, it may be the manifestation of the researchers' inability to measure beta risk accurately. For example, the negative relationship between market capitalization and beta-adjusted returns found empirically in many stock markets in the literature may disappear if the beta risk can be measured with less error.

In addition to these issues, CAPM is an ex-ante model; that is, all variables in the model are in the form of expected values. However, in the empirical tests of CAPM, realized values of the variables are used since it is empirically impossible to work with expected values. Also, CAPM requires the use of the true market portfolio including all assets. However, the empirical tests use market indexes as proxies for the true and unobservable market portfolio. As a result, from a statistical perspective, it is not possible to draw an exact conclusion regarding the validity of CAPM whatever the degree of the statistical significance of the test results.

The primary purpose of this study is to examine whether the firm-specific characteristics also affect returns of stocks traded on the ISE. The major contribution of this study is to offer comparable results to previous studies about the anomalies by using an independent data set from an emerging and rapidly growing stock market. It also provides a comprehensive study of the characteristics of the ISE stocks. To the extent that emerging markets are not integrated with the U.S. and other developed markets, they provide independent out-of-sample tests to study such anomalous return patterns.

Moreover, in this study, the validity of the anomalies is measured in different states of the Turkish economy. That is, the return behavior of the portfolios constructed on the basis of firm-characteristics is analyzed in conjunction with the different states of the macroeconomic environment.

Although most studies on emerging market returns are conducted by using multi-country samples such as Chui and Wei's (1998) study of five Pacific – Basin emerging markets, this study is only concentrated on the ISE. The largescale studies have the advantage of using larger sample sizes, and their disadvantage is that they have mixed results as a result of the differences in the sample countries' size, liberalization and political and economic risk exposure, average market capitalization, investor characteristics and accounting environments. Therefore, by using data only from the ISE, it is possible to hold country-specific characteristics constant that are expected to affect the behavior of the effect of firm-specific characteristics on stock returns.

As a last point, the Turkish stock market has frequent upturns and downturns resulting from country-specific economic and political instabilities that are usually not generated by the common events affecting major world markets. So, it is plausible to expect positive risk premium loadings on size, book-to-market ratio and other variables if these risks exist not only during economic upturns but also during economic downturns.

In this study, there exists no empirical evidence for the explanatory power of beta. Instead, a number of other variables including firm size, book-to-market equity ratio, earnings yield, net sales-to-price ratio, leverage and prior return performance are able to explain the variation in stock returns. The explanatory powers of these variables are at different levels of statistical significance. Among these, the most powerful explanatory variable is found to be the market leverage. Also, the reversal of past 12 months' return performance is another subject that seems to have a strong effect in explaining the average returns which is independent of the effect of the other factors.

In addition, size and book-to-market factors have some power in predicting the future economic growth or stagnation. Also, after the periods of the major political and financial crises that occurred in Turkey, a more risk averse investor behavior is observed by analyzing the risk premiums of size and book-to-market equity ratio characteristics.

The rest of the study is organized as follows. Chapter 2 reviews the literature regarding the testing of CAPM and also anomalous return patterns, starting from initial tests of the CAPM to the latest studies related with the explanations of anomalous return patterns observed. Chapter 3 describes the details of the methodology used in this study. Chapter 4 documents the results in a detailed manner and, finally, Chapter 5 makes a summary and concludes the study.

CHAPTER 2

LITERATURE SURVEY

The Capital Asset Pricing Model (CAPM), developed independently by Sharpe (1964), Lintner (1965), Mossin (1966) and Black (1972) is a theoretical model which argues that the only explanatory factor in the pricing of risky assets is the systematic risk or “beta”. Beta is measured relative to the mean-variance efficient market portfolio which contains all possible assets held in proportion to their market values.

CAPM is a theoretical construct that predicts expected rates of return on assets using a value-weighted market portfolio of all risky assets and there are several studies in the literature that test the model empirically. However, it is difficult to test the predictions of CAPM empirically because all the variables in the CAPM equation are on an ex-ante basis and both the expected returns and the exact market portfolio are unobservable (Roll, 1977).

Initial tests for CAPM are performed by Lintner (1965). These tests use annual data on 631 NYSE stocks for a 10-year period between 1954 and 1963. These initial tests use a very simple test methodology: they first estimate betas for individual securities using a time series regression model and then use these betas to test the Security Market Line (SML) equation. In the second-pass regressions, an arithmetic average of returns during the test period is used as a proxy for the expected values of returns of both individual securities and the market portfolio. More specifically, the first and second stage regressions are formed in the following manner:

$$1^{st}\text{ stage regression: } r_{i,t} - r_{f,t} = \alpha_i + \beta_i \times (r_{M,t} - r_{f,t}) + e_{i,t} \tag{1}$$

The β's of individual securities are calculated from time-series regressions shown in Equation (1) and are used as explanatory variables in the second-stage regressions as shown in Equation (2) :

$$2^{nd}\text{ stage regression: } \overline{r_i - r_f} = \gamma_0 + \gamma_1 \times \beta_i + \gamma_2 \times \sigma^2(e_i) \tag{2}$$

The results of these initial tests do not support the theoretical CAPM. γ_0 is found to be significantly different from zero and γ_1 is found to be much smaller than expected. As a result, the estimated SML can be identified to be too flat in comparison to the theoretical predictions.

Although the two-stage procedure employed in these tests (i.e., first estimate security betas using a time-series regression and then use these betas to test the SML relationship between risk and average return) seems straightforward, the methodology is questionable on several points:

(1) Stock returns are extremely volatile (the average annual standard deviation of stocks in the S&P 500 is about 40%), so the use of yearly average returns as a proxy for expected returns is statistically very suspicious.
(2) The market index used in tests is not the market portfolio of the CAPM. The S&P 500 index is used in these tests and it does not include all possible assets as the CAPM assumes.
(3) Due to the volatility of asset returns, the security betas from the first-stage regressions are necessarily estimated with substantial sampling error.

Following the critiques brought to the initial tests that rejected CAPM, the second type of tests were designed first by Black, Jensen and Scholes (1972) and Fama and MacBeth (1973). Their results interestingly provided general support for the basic proposition of a single linear pricing function explaining security returns, indicating that the CAPM is robust to most of the methodological problems cited in the literature previously.

The methodology used in these new version tests differs from the initial tests mainly in the use of monthly return data rather than annual returns and use of portfolios rather than individual securities. Combining securities into portfolios diversifies away most of the firm specific part of the risk inherent in the returns, thereby enhancing the precision of the estimates of beta and the expected rate of return of the portfolio of securities.

Although this grouping procedure mitigates the statistical problems related with the measurement error in beta estimates, it reduces the number of observations available for the second-pass regressions. To summarize, this new methodology results in a trade-off between more accurate beta estimates and more significant second-pass regression coefficients. Fama and MacBeth (1973) use pre-ranking betas of individual stocks to form portfolios rather than a random formation. This way, they are able to construct portfolios with the largest possible dispersion of beta coefficients. Other things being equal, a sample yields more accurate regression estimates if the observations of the independent variables (i.e., β 's) are more widely spaced.

It is plausible to argue that Fama and MacBeth (1973) tests represent a significant improvement and provide a sound background for studies related with empirical asset pricing or the testing CAPM. Fama and MacBeth simply test four implications of CAPM:

(1) The relationship between the expected return on a security and its risk in any efficient portfolio *m* is linear.
(2) β_i is a complete measure of the risk of security *i* in the efficient portfolio *m*; no other measure of risk exists.

(3) In a market of risk-averse investors, higher risk should be associated with higher expected return; that is, $\left[E(\tilde{R}_m) - E(\tilde{R}_f)\right] \geq 0$.

(4) The Sharpe-Lintner Hypothesis which states that $E(\tilde{\gamma}_{0t}) = R_{ft}$ is true.

If implications (1) and (2) do not hold, market returns do not reflect the attempts of investors to hold efficient portfolios. That is, some assets are systematically underpriced or overpriced relative to what is implied by the expected return-risk or efficiency equation. In order to test these implications, Fama and MacBeth express the CAPM equation in stochastic form in the following manner:

$$R_{it} = \gamma_{0t} + \gamma_{1t} \times \beta_i + \gamma_{2t} \times \beta^2{}_i + \gamma_{3t} \times \sigma(e)_i + \eta_{it} \tag{3}$$

By using monthly percentage returns for all common stocks traded on the NYSE during the period from January 1926 through June 1968, and using an equally-weighted average of the returns on all stocks listed on the NYSE as a proxy for the market index, they run monthly cross-sectional regressions. $\beta^2{}_i$ is included to test the linearity and $\sigma(e_i)$ is included to test whether factors other than beta (non-systematic risk) are priced in the market. According to CAPM, both γ_2 and γ_3 should have zero coefficients in the second-pass regressions.

The results show that the four implications described above cannot be rejected for the sample period. Although the Sharpe-Lintner Hypothesis is not supported strongly by data ($E(\tilde{\gamma}_{0t}) \geq R_{ft}$) and SML is found to be flat to some extent ($\gamma_1 \leq r_M - r_f$), CAPM is not clearly rejected because these differences do not appear to be so significant. Substantial month-to-month variability of the parameters might indicate the existence of some seasonal anomalies. Also variables other than beta that systematically affect period-by-period returns might exist due to the low explanatory power of regressions.

Although these earlier tests provide some support for the CAPM, later studies do not always support the model. In the late 1970s, the central prominence of beta comes into question with the first tests of ad hoc alternatives to the CAPM. The earliest of these tests are those of Basu (1977) and Banz (1981). They find that earnings yield (E/P) and the market capitalization of equity (firm size) provide considerably more explanatory power than beta. Other studies show the significant effect of other ad hoc variables such as the ratio of book-to-market value and prior return performance.

The findings of some researchers in this area are reported either in cross-sectional regression form as in Fama and MacBeth or they report their results by examining the portfolio returns formed by sorting stocks on the values of their characteristics.

There exist several empirically justified stock price anomalies in the literature. Basu (1977) examines the 1400 industrial firms on the NYSE between September 1956 and August 1971 and finds that the high E/P (earnings yield ratio) stocks have on average earned higher absolute and risk-adjusted rates of return than the low E/P stocks. The results of this study are consistent with the view that E/P ratio information is not fully reflected in stock prices as rapid as implied by the semi-strong form of efficiency. Also, Ball (1978) argues that E/P ratio is a catch-all proxy for unnamed factors in expected returns. He claims that prices are lower relative to earnings for such stocks with higher risks and higher expected returns and it results in higher returns for higher earnings-price ratios.

Banz (1981) studies the relationship between the market value of equities (ME = stock price x number of shares outstanding) and return for NYSE stocks in the 1936 and 1975 period. The results show that small firms have, on average, higher risk-adjusted returns than those of large firms and this result is referred to the well known ‘size effect’.

Reinganum (1981) states that size and E/P seem to be related to the same set of factors missing from the CAPM and size effect subsumes the E/P effect. In contrast to Reinganum findings, Basu (1983) shows that E/P effect is clearly significant even after controlling for size and size effect disappears when returns are controlled for E/P ratios. These conflicting results may arise from using different methodologies to control for the effect of risk. Reinganum employs a methodology that does not control any risk (either systematic or total) on returns, while Basu adjust the returns not only for the systematic risk but also for the total risk levels by using standard deviations of equity returns.

Rosenberg, Barr, Reid, and Lanstein (1985) shows that average risk-adjusted returns on U.S. stocks are positively related to the ratio of a firm's book value of common equity to its market value (B/M). Also, Chan, Hamao, and Lakonishok (1991) find that B/M has a strong role in explaining the cross-section of average returns on Japanese stocks.

Chan and Chen (1991) show that the risk captured by B/M signals a relative distress factor. Firms that the market judges to have poor prospects, signaled here by low stock prices and this process result in relative higher book-to-market ratios, higher expected stock returns and therefore such firms are penalized with higher costs of capital.

Bhandari (1988) proposes to use a firm's debt-to-common equity ratio (DER) as an additional variable to explain the expected common stock returns and he finds that the average common stock returns are positively related to the ratio of debt (non-common equity liabilities) to equity, after controlling for both beta and the firm size.

Among the studies related with the explanatory power of prior return performance, the most outstanding one is the DeBondt and Thaler's (1985) over-reaction story that predicts 3-year losers have strong post-ranking returns relative to 3-year winners. Unfortunately, the 3-year lagged return that is used in the Fama and Macbeth regressions for individual stocks has no significance in explaining average returns.

A study by Fama and French (1992) received great attention when it reported that two easily measured variables, size and book-to-market equity, combine to capture the cross-sectional variation in average stock returns associated with market β, size, leverage, book-to-market equity, and earnings yield ratios. Moreover, when the tests allow for variation in β that is unrelated to size, the relation between market β and average returns is flat, even when β is the only explanatory variable.

The most interesting conclusion of the Fama and French study is the lack of a positive relation between average returns and beta. FF find that both size and beta are positively correlated with average returns. However, since these explanatory variables are highly (negatively) correlated with each other, FF seek to isolate the effect of beta. They accomplish this by forming 10 portfolios on the basis of pre-ranking betas within each of the 10 size groups. For the period 1941-1990, average returns of U.S. stocks are not positively related to beta. The two highest-beta portfolios have the two lowest average returns, and the highest average returns occur in the forth- and fifth-beta portfolios.

FF indicate some economic explanations for the roles of size and book-to-market equity in average returns:

(1) Chan, Chen and Hsieh (1985) argue that the most powerful factor in explaining the size effect is the difference between the monthly returns on low- and high- grade corporate bonds (a proxy for default risk) and FF say that it would be interesting to test whether loadings on such a factor can explain the roles of size and book-to-market equity in FF tests.

(2) Examining the relationship between returns on portfolios designed by sorting stocks according to ME or B/M and economic variables that measure variation in economic or business conditions might help to extract the nature of the economic risks proxied by ME and B/M.

(3) If stock prices are rational, B/M should be a direct indicator of the relative prospects of firms. So, in a rational environment, one should expect that, for example, high B/M stocks will have low earnings on assets (ROA) relative to low B/M stocks have in future. Therefore, studies investigating the relationship between B/M ratios and future economic performance of these firms can extract useful information about risks carried by B/M.

The suggestions above assume that asset-pricing effects of size and book-to-market effect are rational. In contrast to these, FF also mention an alternative explanation for the B/M variable. The cross-section of book-to-market ratios might result from market over-reaction to the relative prospects of firms and if this over-reaction tends to be corrected in time, B/M can predict the cross-section of stock returns.

After Fama and French (1992) documents that for the 1963-1990 period, size and book-to-market equity ratio capture the cross-sectional variation in average stock returns, in a study one year later, Fama and French (1993) determine five potential factors (three stock-market factors and two bond-market factors) to test their explanatory ability on the variation of the stock and bond returns. In this study, FF use a time-series regression approach where monthly excess returns on portfolios sorted on size and B/M are regressed on the monthly excess returns to a market portfolio of stocks and mimicking portfolios for size and book-to-market equity. For the dependent variable, $R_t - Rf_t$, the sample (All NYSE, Amex and NASDAQ stocks) is divided into five quintiles along the size dimension and five quintiles along the B/M dimension. As a result, 25 size-B/M portfolios are formed by taking the intersection of portfolios sorted on size and B/M at the end of June of each year. The value-weighted monthly return in excess of the monthly T-bill return from June 1963 to December 1991 is the dependent variable for the time-series regressions shown in Equation (4) below. On the right-hand-side of the regression equation, first all stocks (from NYSE, Amex and NASDAQ) are divided into two groups, small and big (S and B), according to the median NYSE firm size. Then, all stocks are classified into three book-to-market equity groups based on the breakpoints for the bottom 30% (Low), middle 40% (Medium) and top 30% (High) of the ranked values for the NYSE stocks. As a result, six portfolios are constructed. Monthly value-weighted returns on these six portfolios are calculated from July of year t to June of year t+1, and portfolios are reformed yearly at the end of June of year t+1.

Next, the size-mimicking portfolio return SMB (Small minus Big) is calculated as the average of the difference between the sum of the returns of three small-size portfolios and three large-size portfolios. Similarly, the book-to-market-mimicking portfolio return HML (High minus Low) is calculated as the average of the difference between sum of the returns of two high-B/M portfolios and two low-B/M portfolios. The time-series regression shown below is estimated for each of the 25 portfolios for the 342 months between July 1963 and December 1991.

$$R_t - Rf_t = \alpha + b \times (Rm_t - Rf_t) + s \times SMB_t + h \times HML_t + e_t \tag{4}$$

The slopes of these three factors (b, s and h) are strongly statistically significant and the R-squares are at the level of 90 percent. As it is expected, in every size quintile of stocks, the HML slope (h) increases monotonically from the lowest B/M quintile to the highest one. Also, in every B/M quintile, the SMB slope (s) increases monotonically from biggest to smallest size quintile.

The test results here show that there are common return factors related to size and book-to-market equity that help the market factor to explain the cross-section of stock returns in a way consistent with multifactor asset-pricing models. It should not be forgotten that the choice of the common risk factors used here (SMB and HML) is not theoretically or economically justified but only determined by the previous empirical studies such as the one by Fama and French (1992).

After this point, FF attempts to fill this economic void in later studies. Specifically, FF (1995) study analyzes whether the behavior of stock prices, in relation to size and book-to-market equity, is consistent with the behavior of earnings. They test whether stock prices properly reflect differences in the evolution of profitability when stocks are grouped on the basis of their size and B/M. FF find that B/M is related to some persistent properties of earnings. High B/M (a low stock price relative to book value) signals sustained low earnings on capital. High B/M stocks are less profitable than low B/M stocks for four years before and at least five years after the grouping dates. At the opposite side, low B/M (a high stock price relative to book value) is typical of firms with high average returns on capital (growth stocks), whereas high B/M is typical of firms that are relatively distressed. In addition to these findings, controlling for B/M, small stocks seem to have lower earnings on capital than that of big stocks. However, B/M is a stronger indicator of profitability than size.

In a related study, Lakonishok, Shleifer and Vishny (LSV) (1994) argue that the market incorrectly extrapolates the strong earnings growth of low B/M stocks and the weak growth of high B/M stocks. Due to this suboptimal behavior of investors, low B/M stocks then have lower average returns after portfolio formation because their earnings growth is weaker than the market expects, and high B/M stocks have higher average returns after portfolio formation because their earnings growth is stronger than expected.

As a response to the LSV hypothesis, FF (1995) argue that the LSV story implies a prediction about the earnings-to-price ratios. That is, if the market incorrectly extrapolates the strong earnings growth of low book-to-market stocks through the year of portfolio formation, then the ratio of next year's earnings to this year's price, EI (t+i) / ME (t+i-1), should be low in the year after portfolio formation when earnings cease to grow as fast as the extrapolation predicts. The opposite of the above process is also implied for high book-to-market stocks. However, FF (1995) demonstrate that for the two low-B/M and the two high-B/M portfolios, EI (t+i) / ME (t+i-1), have quite stable returns in the 11 years around the portfolio formation.

In addition to this argument, FF argue that the persistence of average stock returns in the years after portfolio formation is a strong contradiction to the LSV hypothesis. If the low post-formation returns of low-B/M stocks are due to the incorrect extrapolation of strong past earnings growth, then the low returns should be temporary as it becomes clear to the investors that post-formation earnings growth is weaker than expected. As far as FF can show, the average returns on low-B/M stocks are low and rather flat for at least five years after portfolio formation. Similarly, the high average returns on high-B/M stocks continue for at least five years after portfolio formation. Therefore, FF mention that such a long period of high returns is difficult to explain as the response to surprisingly strong earnings, since the improvement in the earnings growth for high-B/M stocks occurs soon after portfolio formation.

In summary, FF (1995) find that there are size and book-to-market factors in earnings like those in returns, and the market, size and B/M factors affect the earnings of firms in different size-B/M groups in much the same way that they affect their stock returns. FF mention that their effort to document that the common variation in returns is driven by common factors in returns is not entirely successful. They find that the market and size factors in earnings help explain the market and size factors in returns, but they find no evidence that returns respond to the book-to-market factors in earnings.

In Fama and French's 1996 study, they argue that many of the CAPM average-return anomalies are related to each other and they are captured by the three-factor model in Fama and French (1993). FF (1993) show that the 3-factor model is a good description of returns on portfolios formed on size and B/M, and later FF (1996) show that the three-factor model captures the returns to portfolios formed on E/P, (cash flow / P), and sales growth, as well. In addition to these rankings, the three-factor model captures the reversal of long-term returns documented by DeBondt and Thaler (1985). Stocks with low long-term past returns (losers) tend to have positive SMB and HML slopes (they are smaller and relatively distressed) and so higher future average returns are predicted by the three-factor model. Conversely, long-term winners tend to be strong stocks that have negative HML slopes and so low future returns are predicted. However, in contrast to all this supportive empirical evidence for the three-factor model, FF (1996) can not explain the continuation of short-term returns documented by Jegadeesh and Titman (1993). According to Jegadeesh and Titman (JT), like long-term losers, stocks that have low short-term past returns tend to load positively on HML and like long-term winners, short-term past winners load negatively on HML. Therefore, as the three-factor model predicts for long-term returns, the JT model predicts reversal rather than continuation for future returns, and the continuation of short-term returns is thus left unexplained by the FF three-factor model.

In a follow-up study, Daniel and Titman (DT) (1997) argue that the Fama and French tests of the three-factor model lack power against an alternative hypothesis, which DT call the "Characteristic Model". This model indicates that the expected returns of assets are directly related to the characteristics of assets. In short, after stocks are grouped according to their book-to-market equity ratios and market capitalization, a further grouping within each portfolio is made based on the factor loadings of stocks determined by the Fama and French three-factor model. When returns are analyzed, DT finds that the relationship between returns and factor loadings are considerably weaker than predicted by the three-factor model. Daniel and Titman (1997) reject the Fama and French three-factor model but not the characteristic model based on the results of tests using U.S. stock returns between 1973 and 1993.

After these controversial results, it is important to test the robustness of Daniel and Titman results on different samples. However, examining the out-of–sample results is difficult because these tests require a cross-section of stocks that is large enough to allow the researcher to form diversified portfolios with independent cross-sectional variation in factor loadings and characteristics. In addition, one needs to examine a sample in which returns are strongly related to the characteristics. Due to these data requirements, the best stock market to test Daniel and Titman results out of sample is the Japanese stock market for the period from 1975 to 1997. Daniel, Titman and Wei (2001) replicate the Daniel and Titman (1997) tests on a Japanese sample, and end up rejecting the Fama and French three-factor model, but not the characteristic model.

An interesting criticism for the reliability of value effect comes from the study by Trecartin (2000). He examines whether the book-to-market equity ratio predicts returns consistently from 1963 to 1997 using monthly intervals. In this study, the emphasis is on short-term performance of the value effect, and its reliability through time. Following the FF (1992) methodology, by using univariate regressions, he finds that B/M has more significant monthly regression coefficients of the appropriate sign than other growth variables such as “cash flow”, “sales growth”, “size”. Of the 414 monthly regressions, 43% are significantly positive for B/M variable.

Results of this study show that the high returns of value stocks found over long time horizons are not uniform or dependable over short time intervals. The book-to-market effect is statistically related to return as predicted in less than 50% of the monthly time periods examined. Also, when the test period is divided into 10-year sub periods, it is found that B/M is significant in three of the 10-year periods although over half the monthly regression coefficients are not positive for three of the time periods. When it is divided into 5-year sub-periods, B/M is statistically significant in 5 of the 7 five-year sub-periods and it has positive coefficients more than 50% only in 1 of these sub-periods. Finally, Trecartin (2000) mentions that short-term B/M unreliability does not remove the usefulness of the value effect for a patient investor as evidenced by the long-term positive and statistically significant coefficients presented in literature

In addition to the using U.S. and Japanese stock market data to test for the cross-section of expected returns, studies using independent datasets also exist. For example, Strong and Xu (1997) examine a relationship between expected returns and market value (ME), book-to-market equity ratio, leverage, earnings-to-price ratio, and market beta for U.K. equities between 1973 and 1992. This paper reports the results of a study employing the Fama and French (1992) approach to explain the cross-section of U.K. expected stock returns.

Their results show that the only variables consistently significant in explaining the cross-section of U.K. expected stock returns are book-to-market equity and leverage and also it is important to note that the explanatory power of any combination of accounting and market variables for average monthly returns is low.

Bryant and Eleswarapu (1997) study the cross-sectional relation between security returns and beta, firm size and book-to-market ratio over the period 1971 to 1993 on the New Zealand share market. By using the FF (1992) methodology, their results suggest no role for beta in explaining expected returns cross-sectionally. Also, there exists a significant positive relation between book-to-market ratio and average return. These results are in harmony with FF results but with one exception that they find no significant relation between market capitalization of a firm and average return.

Keith S.K Lam (2002) investigates the relation between stock returns and beta, size, leverage, book-to-market equity ratio, and earnings yield (E/P) in Hong Kong stock market using the Fama and French (1992) approach for the period July 1984 to June 1997. The results show that beta is unable to explain the average monthly returns and size, book-to-market equity, and E/P ratios seem to capture the cross-sectional variation in average monthly returns. Other variables used in tests, book leverage and market leverage also explain the cross-sectional regressions but their effects seem to be dominated by size, book-to-market equity and E/P ratios. These results are consistent across sub-periods, across months and across size groups, therefore the results are not driven by extreme observations or abnormal return behavior in some of the months.

For size and value effects, there exist also larger empirical studies in literature. For example, FF (1998) show that sorting on book-to-market equity, value stocks outperform growth stocks in twelve of thirteen major markets during the 1975-1995 period. Also, they report that the results from emerging markets confirm the pervasive value premium. However, the high volatility of emerging market returns and short test period prevents concluding that the value premium in emerging markets is as reliable as in major markets. In addition to FF (1998), Chui and Wei (1998) investigate the relationship between expected stock returns and market beta, book-to-market equity, and size in five Pacific-Basin emerging markets: Hong Kong, Korea, Malaysia, Taiwan, and Thailand. In all of these markets, the relationship between average stock return and market beta is weak. On the other hand, the book-to-market equity and size can explain the cross-sectional variation significantly. Moreover, Arshanapalli (1998) find size and value effects in 18 global markets.

In addition to these empirical findings related with the emerging markets, studies related with the Istanbul Stock Exchange also indicates some explanatory power for the firm-specific characteristics. Akdeniz et al. (2000) investigates the market risk measured by beta, firm size, book-to-market, and earnings-to-price ratios on monthly stock returns. The results of this study indicate that stock returns vary directly with the book-to-market, and inversely with the firm size; market beta has no effect at all in ISE. Another study that is in contradiction with the findings of the Akdeniz et al. (2000) comes from H.Gönenç and M.B. Karan (2003). The empirical findings of this study show no significant 'value' and 'size' effect in ISE for the period 1993-1998. These differences in results of the 2 studies that use same sample period in ISE are mainly due to the different methodologies used. The former one uses cross-sectional regressions and the latter one uses a portfolio analysis similar to the FF (1993) study. In addition to these, Aydoğan and Güney (1997) shows that stock returns are found to be higher in the range of 3 to 12 months following the periods that have low P/E ratios and high dividend yields averaged across the stock market. As a final note about studies related with ISE, the study of Muradoğlu, Aslıhan and Mercan (2002) mentions that during early years of ISE, an active strategy of mean variance portfolio investing with monthly balancing outperforms the passive strategy that invests in indexes.

Although huge body of empirical research shows that certain empirical anomalies such as size and book-to-market equity exist in both developed and emerging markets, financial researchers have found little evidence for the economic rationale behind these return anomalies.

Liew and Vassalou (2000) perform an extensive study that investigates the linkage between the return-based factors and future growth in the real economy. They use HML, SMB and WML portfolio returns to explain the future growth in GDP (Gross Domestic Product). The SML and HML are constructed as in FF (1993) and WML (winners minus losers) are returns to long in winners and short in losers, holding the size and book-to-market constant. They simply regress the future growth in the economy on past holding period's returns as shown below:

$$GDP_{t,t+1} = a + b \times (R_m - r_f)_{t-1,t} + c \times SMB_{t-1,t} + d \times HML_{t-1,t} + e \times WML_{t-1,t} \tag{5}$$

For 10 developed markets, Liew and Vassalou test these relationships in both univariate and multivariate regressions. They find that the HML and SMB portfolios are positively related to future growth in the real economy and these linkages are independent of the market factor. Also, relation between WML and future growth in real economy is not statistically significant. Their results also confirm previous findings that the HML, SMB and WML portfolios have statistically significant positive returns in most countries. Therefore, the results of Liew and Vassalou (2000) study indicate that a risk-based explanation for the returns of HML and SMB is reasonable.

CHAPTER 3

METHODOLOGY

The main purpose of this study is to investigate the relative statistical power of various firm-specific characteristics in explaining the expected stock returns in the Istanbul Stock Exchange (ISE). For this purpose, portfolio analysis and monthly cross-sectional regression techniques are applied. Moreover, the existence of any relationship between some macro-economic variables and the effect of the firm-specific characteristics on stock returns is investigated.

The study is divided into three major parts. In the first part, monthly returns are calculated for portfolios formed on the basis of a single dimension such as firm size (ME), book-to-market equity (B/M), earnings yield (E/P), leverage ratios (market leverage, book leverage), pre-ranking betas and momentum. Later, the time-series patterns of these portfolio returns and other properties are examined and also interactions among the portfolio returns are analyzed.

In the second part of the study, monthly cross-sectional regressions are estimated by taking the monthly returns of individual firms as the dependent variable and the various firm characteristics as the independent (explanatory) variables. Following this, in the last part of the study, univariate and/or multivariate linear time-series regression models are used to investigate the relationship between the states of the economy and the degree of the effect of the firm-characteristics on stock returns.

3.1. Portfolio Returns

In constructing the portfolios used in the tests, first, all stocks are ranked on the basis of pre-determined values of their characteristics which are defined below. Second, breakpoints are determined in this ranking such that each portfolio has an approximately equal number of stocks. In the third step, stocks are allocated to portfolios. At the end of June of each year during the sample period, portfolios are reformed depending on the changing values of stocks' characteristics. The equally-weighted monthly returns of portfolios are calculated for the next 12 months, that is, from July 1st of year t to June 30th of year t+1. As a result, the monthly returns of these portfolios are obtained from July of 1993 to June of 2003, for a total of 120 months.

The reason for the use of portfolio returns is that feasible portfolio strategies may provide a useful perspective about the economic significance of the results. In this study, the purpose is to examine whether a significant relationship exists between firm-specific characteristics and stock returns which is a well-documented empirical finding in the anomalies literature. These firm-specific characteristics used in this study are described in sections 3.1.1 through 3.1.6.

3.1.1. Size Effect

According to the well-known 'size effect' in the literature, small market capitalization stocks are found to have higher returns than large capitalization stocks. Therefore, a negative statistical association between stock returns and firm size is expected. Size-based portfolio returns are also tested to investigate whether the return differences between portfolios can be explained by their theoretical betas or whether an anomaly exists in the ISE.

Firm size is defined as the Market Value of Equity (ME) and it is calculated at the end of June of each year by multiplying the number of shares outstanding by the stock's market price at that point in time.

3.1.2. Book-to-Market Effect

Many empirical studies have documented a significant positive relation between book-to-market value of equity ratios and stock returns. In some studies, the book-to-market effect is called the 'relative distress factor'. This means that the firms that the market judges to have poor prospects are signaled here by lower stock prices and, thus, have higher book-to-market ratios. Therefore, these firms have higher expected stock returns (they are penalized with higher costs of capital). As a result, a positive relationship is expected between the book-to-market equity and stock returns.

Book-to-market value of equity ratio (B/M) used for the period from July of year t to June of year t+1 is calculated by dividing the book value of a firm's equity at the end of year t-1 by the market value of equity calculated as multiplying the total number of shares with the stock price at the end of year t-1.

3.1.3. The Earnings Yield Effect

Earnings-related strategies have a long tradition in the investment community. A "reasonable" level of the ratio of market price to earnings is known to be a necessary but not a sufficient condition for investing in a common stock. In empirical studies analyzing the relationship between Earnings-to-Price (or its reciprocal) and subsequent returns, it is documented that, after controlling for differences in systematic risk, high E/P stocks consistently provide returns greater than the low E/P stocks in many stock markets.

Earnings yield (E/P) for the period from July$_t$ to June$_{t+1}$ is calculated as the ratio of net income at the end of year t-1 to the market value of equity at the end of year t-1.

In addition to this, net sales-to-price ratio (S/P) may be used as an alternative to the E/P ratio. Compared to earnings, sales revenue is less influenced by accounting rules and conventions and this is argued to be an advantage of the net sales-to-price ratio over the E/P ratio. However, this ratio also ignores all processes in a firm except sales and this is said to be the disadvantage of this ratio. In the literature, there is evidence of a sales-to-price effect both in the United States and Japan; i.e., higher sales-to-price ratio stocks provide higher monthly average returns than other stocks in both of the markets. In order to provide comparable results with the earlier results, sales-to-price ratio is also used in this study. Sales-to-price ratio for the period from July$_t$ to June$_{t+1}$ is calculated as the ratio of sales revenue at the end of year t-1 to the market value of equity at the end of year t-1.

3.1.4. Financial Leverage

Another empirical finding that is in contradiction with the single-index argument of CAPM is the positive relationship between a firm's leverage and its subsequent stock returns. It is a convincing argument that leverage is associated with risk, but if CAPM is correct, this risk should be explained by the differences in the systematic risk, that is, beta. In literature, it is found that high financial leverage firm returns outperform the low leverage firm returns.

There are two possible ways to measure the leverage of a firm. The first one is the market leverage ratio (also known as the equity multiplier) which is found by dividing total assets to the market value of equity. The second one is the ratio of total assets to the book value of equity. The two leverage ratios for the period from $July_t$ to $June_{t+1}$ are calculated by using the total asset, book and market values of equity at the end of year t-1.

3.1.5. Pre-Ranking Beta

Beta is one of the most widely used measures of systematic risk in the literature. In this study, the betas for individual stocks are estimated by using a firm's 16- to 48- monthly returns (depending on data availability) during the 4 years preceding the July of year t. The estimation is carried out by regressing each firm's monthly excess return on the market portfolio's excess return over the same period[2]. The ISE-100 index[3] is used as a proxy for the market portfolio. As a result, a beta coefficient for each stock in the sample is obtained for all of the sample years starting from the July of 1993 to the July of 2002. So, the variations in the level of beta of a stock can be observed for 10 years.

3.1.6. Prior Return Effect

In the literature, there is evidence that prior returns can explain the cross-sectional behavior of subsequent stock returns. There exist two unrelated phenomena. The first one is the existence of return reversals (past losers become 'winners' or vice versa) over both long-term horizons (3 to 5 years) and very short-term periods (a month and shorter). The second return behavior that is observed is the continuation of the past performance (momentum) over time horizons of intermediate lengths: when prior returns are measured over periods of 6 to 12 months, 'losers' and 'winners' retain their characteristic over the subsequent periods. The momentum is measured as a stock's average monthly return during the past 12 months excluding the most recent one. Asness (1995) argues that defining the momentum in this way avoids measurement problems

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[2] Excess return is defined as the difference between individual stock's (or portfolio's) return and the risk-free rate of return. For the risk-free rate of return, the weighted average of the monthly deposit rates are used.
[3] ISE-100 is a value-weighted index including 100 stocks.

induced by the bid-ask spread. In this study, only the momentum effect is analyzed. For this analysis, stocks are ranked at the end of June of each year t based on the past 12 months average monthly return from June of year t-1 to May of year t. Then, the equal weighted returns of these deciles for the subsequent 12 months from July of year t to the June of year t+1 are calculated.

The differences in monthly returns between the extreme portfolios (e.g., highest book-to-market portfolio return minus lowest book-to-market portfolio) can be defined as the "risk premium" associated with a given firm-specific characteristic. If the characteristics discussed above are proxies for separate risk factors, then the premiums should be uncorrelated across characteristics. Therefore, in this study, pair-wise correlations between the monthly risk premiums for different characteristics are examined to determine whether they are significantly different from zero in absolute value.

3.2. Monthly Cross-Sectional Regressions

In the second part of the study, the monthly cross-sectional regressions are estimated using the monthly returns of individual firms as the dependent variable, and firm characteristics mentioned above as the independent (explanatory) variables as shown in Equation (1):

$$R_{i,t} = b_0 + b_{1,t}\beta_{i,t} + b_{2,t}\ln(ME_{i,t}) + b_{3,t}\ln(B/M_{i,t}) + ... + \varepsilon_{i,t} \tag{1}$$

In these regressions, variables other than the post-ranking beta coefficients for individual firms are calculated using the same methodology as in the first part of the study.

For the estimation of individual post-ranking beta coefficients, stocks are first grouped into portfolios according to their pre-ranking betas at the end of June of each year t. Second, equally-weighted monthly excess returns of these portfolios are regressed on the market portfolio's monthly excess return and the beta coefficients for all portfolios are obtained over the full sample period. Finally, an individual security's beta is proxied by this second-pass beta of the portfolio to which the security is assigned for a 12-month period. This does not mean that a stock has a constant value of beta during the whole sample period. At the end of June of each year, the pre-ranking betas are re-calculated and when the portfolio in which a stock is placed changes, the beta assigned to that stock also changes. It is important to note that it is probably not possible to rank stocks into portfolios both on the basis of beta and firm size[4] due to the small number of firms qualifying for analysis. Creating more portfolios would increase beta variation but endangers reliability as a result of insufficient data points in each portfolio.

As an alternative to the above methodology for beta estimation, it is also possible to use a much simpler method such that the pre-ranking betas of individual firms may be used as explanatory variables in the cross-sectional regressions. Although it is simple, it causes the 'errors-in-the variables' problem due to the high volatility of individual firm's betas.

It is possible to construct several different models by using different combinations of variables to explain the stock returns. These variables include beta, firm size (ME), book-to-market ratio (B/M), earnings yield (E/P), sales to price ratio, momentum (past (2, 12)). The different models used in the study are determined by intuition obtained from portfolio returns in the first part of the study and from results in the existing literature.

In order to conduct the t-tests for the slope coefficients, the cross-sectional regressions for each month of the sample period are estimated and then the time-series averages of the slope coefficients (and the corresponding standard errors)

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[4] In the Fama and French (1992) methodology, stocks are ranked on the basis of both their pre-ranking betas and market values of equity at the same time.

are calculated. These monthly slope coefficients are also used in examining the trends and seasonality with the help of the moving average technique.

3.3. Relationship between the Effect of Firm Characteristics on Returns and Macroeconomic Environment

In the third part of the study, the relationship between the states of the economic environment and the effects of the firm characteristics on stock returns is analyzed. For this purpose, first the portfolio returns are analyzed. The return behavior of the largest size, book-to-market portfolio or earnings yield portfolios constructed in section 3.1 are investigated especially in the periods preceding and following the economic downturns and upturns.

Second, multivariate linear time-series regression models are designed that relate the change in the loadings (risk premiums) calculated for the firm- specific characteristics in Equation (1) to several macro-economic variables, as shown in Equation (2).

$$Macro_{t,t+1} = \eta_0 + \eta_1 b_{1,t-1,t} + \eta_2 b_{2,t-1,t} + \ldots + e_t \qquad (2)$$

In Equation 2, the dependent variable, defined as Macro, is one of the three macroeconomic variables: industrial production index, consumer price index, and GNP. All of them are available for monthly periods except for GNP which is available on a quarterly basis.

The explanatory variables used in Equation (2) are taken from the results of the regression estimated as Equation (1) in the second part of the study. Moreover, the selection of which variables to use as explanatory variables in this step depends on the statistical significance of these variables in the second step of the study.

As an alternative to the slope coefficients directly obtained from the univariate cross-sectional regressions, the return differences between the extreme deciles of portfolios sorted on the value of firm characteristics mentioned in Section 3.1 are also used as the explanatory variables in predicting the future changes in macro-variables.

By estimating Equation (2), it is possible to measure the linkage between the changes in the effects of some firm characteristics on stock returns from one period to another and the future growth or decline in real economy by the help of measuring the change in macro-economic variables.

CHAPTER 4

RESULTS

The properties of the sample used and the results of the analysis mentioned in the methodology are discussed in a detailed manner in Sections 4.1 through 4.4.

4.1. Data

All accounting data including the book value of equity, net income after taxes, net sales and total assets are taken from the firms' yearly balance sheets and income statements available in the ISE electronic database. In addition to these, all stock market data including monthly stock returns and market returns adjusted for stock dividends, and also the end-of-month stock prices are extracted from the ISE electronic database.

The sample period analyzed in this study starts from July 1993 and ends at June 2003, including a total of 120 months. The market value of equity used in accounting ratios such as book-to-market-ratio, or the earnings yield, is calculated for a given year t by multiplying the number of shares outstanding with the stock price at the end of December of year t-1. On the other hand, the firm size calculation is based on the values of the number of shares outstanding and the stock price at the end of June of year t. This procedure ensures that all accounting data are known before the corresponding return is calculated between July of year t and June of year t+1.

The following three criteria are applied for the selection of stocks used in the study. First, a stock must have at least 16 monthly returns in the 48 month period before the July of year t. This criterion is needed in order to calculate the market beta for individual stocks. Second, a stock should not have a negative book-to-market equity at the end of December of year t-1. Third, a stock should not have a different fiscal-year-end other than December. Also, all financial firms are excluded from the sample because of their fundamentally different capital structure compared to non-financial firms in the sample. After all these filters regarding sample selection, the average number of firms in the sample is 127. This number reaches a minimum of 73 for the 1993-1994 period and a maximum of 178 for the 2002-2003 period. Table 1 presents some descriptive statistics of the sample for the period 1993-2003.

The monthly deposit rates weighted among the banks according to their deposit amounts is used as the risk-free rate of interest. This information is obtained from the Central Bank of Turkey electronic database. Also, data on all macro-variables are taken from the Central Bank of Turkey electronic database.

4.2. Portfolio Properties

Tables 2 through 9 present various properties of portfolios formed on the basis of one-dimensional sorting of stocks according to the values of their characteristics. For each variable, 10 stock portfolios are formed.

Table 10 shows the average correlation matrix among the variables. The average correlations are constructed by taking the average of correlation coefficients calculated among variables for each year over the 10 years analyzed. In addition to this, an overall correlation matrix constructed by using 1273 different values for each variable is shown in Table 11.

Table 2 presents the characteristics of the portfolios formed on the basis of the stocks' pre-ranking beta coefficients. The first noteworthy observation is that there is no clear relationship between average monthly returns and pre-ranking betas. As can be seen in Figure 1, there is no consistent pattern in average returns across pre-ranking beta portfolios. This finding is in contradiction with the a priori expectations. If the beta coefficient is the measure of a stock's systematic risk, then portfolios formed on the basis of this risk measure should exhibit, on average, increasingly higher returns with increasing portfolio betas. As shown in Table 10 and Table11, pre-ranking beta and post-ranking beta are significantly positively correlated. The average monthly correlation coefficient and the overall correlation coefficients are 0.811 and 0.74, respectively. Also, as can be seen in Table 2, the post-ranking beta of each pre-ranking beta portfolio increases generally with the increasing pre-ranking beta of the portfolio.

Table 3 presents the characteristics of the portfolios that are formed on the basis of the market value of equity. The portfolios with the relatively lower market value of equity seem to have relatively higher returns. However, the inverse relationship between average returns and the market value of equity is not monotonous. Therefore, it is not possible to draw a clear conclusion from the numbers in the table. This irregular trend is also observable in Figure 2. The difference between the average monthly return of the smallest and the largest market value of equity portfolios is 3.73% and this difference is significantly different from zero with a t-statistic of 2.49. This is a typical result that is in line with the previous findings from the literature where smaller firms have been shown to provide a higher return compared to larger firms (a phenomenon interpreted as evidence of a small firm risk premium being present in the markets). However, the small firm effect in the literature is usually attributed to the well-known January effect. Interestingly, when January returns are excluded from the sample, the difference between the smallest and largest firm portfolio returns increases to 4.26% and this return is also significantly different from zero with a t-statistic of 2.97. Therefore, it can be concluded that the size effect is not a result of the January returns. Also in Table 3, it is observed that there is a weak evidence of a positive correlation between the market value of equity and the beta coefficient. This finding is in contradiction to results from most of the developed market studies (such as the Fama and French study) where an almost perfectly negative correlation between market value and beta exists. The average monthly correlation coefficient found between market value of equity and pre-ranking and post-ranking beta are 0.237 and 0.204, respectively. The low positive correlation between beta and market value of equity suggests that either the firm size as measured by the market value of equity is not a risk factor that is significantly priced in the Turkish stock market or the beta coefficients calculated in this study are not able to capture this risk.

Another outstanding property of the market value of equity sorted portfolios is that smaller firm portfolios have higher market leverage and book-to-market equity ratios compared to larger firm portfolios. The average monthly correlation coefficient between market value of equity and market leverage is -0.441 and the average correlation coefficient between market value and book-to-market equity ratio is -0.328. And the overall correlation coefficient equals to -0.31. These results are not unexpected since, by definition, there is a negative relationship between the amount of leverage used and equity and a negative relationship between the book-to-market value of equity ratio and the market value of equity. Finally, the decile that has the smallest market capitalization firms is the one that has the highest percentage of negative earnings firms as of total number of firms among the 10 deciles.

Table 4 presents the characteristics of the portfolios formed by sorting stocks on the basis of their book-to-market value of equity ratio. This ratio is expected to convey the market's expectations about the future of the firm. The more favorable the expectations, the higher the market value of equity will be. Therefore, the more favorable the expectations, the lower the ratio will be. The most noticeable observation in Table 4 is that there is a positive relationship between the book-to-market value equity ratio and average returns. The difference between the average returns of the smallest and largest book-to-market ratio portfolios is 2.35% with a t-statistic of 1.88. This result is in line with the a priori expectations and suggests that as the market's expectations become less and less favorable regarding the future of the firm, the expected rate of return from the firm increases. So, it can be said that firms that the market judges to have poor prospects are signaled by higher book-to-market equity ratios and they are penalized with higher costs of capital.

Tables 5 and 6 give the characteristics of the portfolios formed on the basis of the book and market leverage ratios, respectively. Both tables show that there is a positive relationship between the amount of leverage and average returns. This is a result that is in line with the a priori expectations since the market seems to require a higher rate of return from firms that carry a higher degree of financial risk as evidenced by their higher leverage ratios. The average monthly return premium of the largest portfolio over the smallest portfolio is 2.24% (with a t-statistic of 2.24) and 3.17% (with a t-statistic of 2.34) for the book leverage and market leverage ratios, respectively. Figures 4 and 5 also confirm this observation.

For portfolios formed on basis of the earnings yield, there is an obvious negative effect in the monthly average returns, as shown in both Table 7 and Figure 6. The first decile in this table represents the firms with a negative earnings yield. This portfolio has an average monthly return premium of 3.5% (with a t- statistic of 3.48) over the highest positive earnings yield portfolio. The observation that average returns increase as the earnings yield decreases suggests that the market requires a higher rate of return from companies that cannot generate high earnings in relation to their market value. In addition to this, when negative-earnings-yield firms are excluded from the computations, the consistent decreasing pattern in average returns seems to be not consistent as before. So, apparently, it is the negative earnings yield firms that are driving the relationship between this ratio and average returns.

Also observable in Table 7 is the negative relationship between earnings yield and leverage variables. High leverage firms, measured in terms of book leverage, have lower earnings yield compared to low leverage firms. This is not a surprising result since higher leverage means higher interest expense and so results in lower earnings on average.

As an alternative to the earnings yield ratio, it is mentioned in the methodology section that net sales-to-price ratio may be used. When the return patterns of portfolios formed on the basis of net sales-to-price ratio are analyzed in Table 8 and Figure 7, it is seen that there is a strong positive relationship between the net sales-to-price ratio and monthly average returns. There is a monthly average return difference of 3.59% (with a t-statistic of 3.13) between the highest and the lowest sales-to-price ratio portfolios. This result suggests that the market is willing to pay a relatively higher price for firms that are able to generate higher sales revenue.

The last variable analyzed in this study is the continuation of short term return performance, defined as momentum in the literature. In this study, rather than continuation of short-term past return performance, the reversal of the past return performance is observed. For example, the lowest past 12-month return portfolio has an average monthly return premium of 2.27% (with a t-statistic of 2.15) over the portfolio that has the highest past 12-month return. Also, it is important to note that the momentum variable has no significant correlation with any of the remaining variables. These relationships are observable in Table 9 and Figure 8. In most of the previous studies, it is found that reversal exists for long-term return performance and momentum exists for shorter-term return performance such as 6-months or 12 months, therefore the results of this study are not consistent with previous research in other stock markets. The 12 month period can be said to be a long time horizon for young and emerging stock markets like Istanbul Stock Exchange, so the reversal of past 12 month return performance can not be so unexpected.

In literature, the difference in the returns of the extreme portfolios (e.g., B/M portfolio 10 minus B/M portfolio 1) can be loosely interpreted as risk premia. If the scenario that the seven variables discussed above are proxies for seven separate risk factors is correct, then the premia should be uncorrelated across variables. In Table 12, the pair-wise correlations between the monthly risk premia are reported. All of the correlations are positive and significantly different from zero. In this case, it can be concluded that these significant correlations indicate a high degree of commonality among the effects.

After these results, the relative power of the effects of these variables should be investigated. There are two possible methods to investigate these relations. The first one is to construct portfolios based on two-dimensional sorts to isolate a variable from the effect of other variable[5]. However, the sample size available is not sufficient to construct two-dimensional portfolios. The second possible method is to use cross-sectional regressions where individual firm returns are used as the dependent variable and the variables discussed above are used as explanatory variables. The results of this second method are discussed in the next section.

4.3. Cross-Sectional Regressions

In this section, the results of the cross-sectional regressions are discussed. These regressions are estimated by using the monthly returns of individual firms as the dependent variable and the variables discussed previously as the explanatory variables. The regression models are estimated for a 120-month period that runs from July of 1993 to June of 2003. Different models are tested to determine the relative explanatory power of the variables that represent firm characteristics. The time-series averages of the slope coefficients and the corresponding t-values are shown in Table 13.

[5] For instance, first sort on size and then within each size group, sort again on beta. This way, it is possible to isolate the effect of beta from the effect of size.

The most striking result for the full-sample period is that when the pre-ranking and post-ranking (second-stage) beta coefficients are used as the independent variable separately in Models 1 and 2, neither of these traditional systematic risk measures are found to have a significant time-series mean as computed over the 120 months in the sample[6].

After conducting the simple tests of the CAPM in Models 1 and 2 by testing whether beta has a role in explaining the cross-sectional variation in returns, Model 3 examines the 'size effect' which occupies an important place in this literature. In this model, the market value of equity is used as the only explanatory variable. Parallel to the findings in Table 3, firm size, which is measured as the natural logarithm of the market value of equity at the end of June of each year, is found to have a significant impact on the determination of the cross-section of average stock returns. The time-series average of the slope coefficient from the monthly regressions is -0.6%, with a t-statistic of -2.34. This result implies that the larger the size of the firm, the lower the stock return is expected to be (or, vice versa). The mean of the coefficient estimate suggests that for each one unit increase in the natural log of size, the stock return of the firm is expected to decrease by 0.006. The significant time-series mean for the coefficient of the size variable confirms the findings from the previous studies in the literature. In line with the interpretation in the literature, on average, smaller firms are perceived to be more risky by the market participants and therefore, a higher rate of return is required from these firms.

Model 4 includes the book-to-market equity ratio as the only explanatory variable. Estimation results show that there is a positive relationship between the book-to-market equity ratio and average returns. The time-series average of the slope coefficient is 1% with a t-statistic of 2.176. The mean of the coefficient

[6] The pre- and post-ranking betas have no explanatory power when they are included in the models with size, book-to-market equity, earnings yield, leverage, sales-to-price and momentum. Therefore, both types of beta estimates are excluded from the remaining regressions, and the focus is on the interactions between the remaining variables and average returns.

estimate implies that for every one unit increase in the natural log of the book-to-market value of equity ratio, an approximately 1 percent increase is expected in stock returns, on average. This finding also confirms the results from the previous studies in the literature. A high book-to-market ratio implies that the market does not have favorable expectations about the future of the company and, therefore, the market value of equity is low relative to the book value of equity. Consequently, and as evidenced by the significant and positive coefficient average, high book-to-market firms are expected to provide a higher rate of return to make up for the lack of favorable expectations regarding the future of the company.

Due to the statistically significant correlation found between market value of equity and book-to-market equity ratio, in Model 5, both of them are included as the explanatory variables to test whether any dominancy exist for the effects of these variables. Interestingly, it is seen that the slope coefficient of the market value of equity is still significantly negative; however, the time-series average of the slope coefficient on the book-to-market equity becomes insignificant. Based on these results, it can be inferred that some portion of the book-to-market equity effect is subsumed by the market value of equity.

In Model 6, the book leverage is used alone as the explanatory variable. It is found to have a significant positive average coefficient of 1.1% with a t-statistic of 2.624. The other possible way of measuring a firm's level of leverage, market leverage is used as the only explanatory variable in Model 7 and like book leverage, market leverage has a significant positive coefficient of 1.8% with a t-statistic of 3.34. In Model 8, both book and market leverage variables are included as the explanatory variables and the results show that only market leverage has a time series coefficient mean that is significantly positive. The mean of the coefficient estimates is 1.7% with a t-statistic of 3.013. However, the coefficient of book leverage equals to 0.3% and also its t-statistic drops to 0.786. It can be said that market leverage definitely subsumes the effect of book leverage. This result is in line with the a priori expectations and previous results from the literature. The leverage ratio measures the financial risk of a company and when this variable has a significant coefficient, it implies that this risk is being priced by the market participants.

In order to test the relative explanatory power of the size, book-to-market and market leverage variables in explaining stock returns, Models 9, 10 and 11 use combinations of these three variables as explanatory variables. In Model 9, size and market leverage are used and it is observed that market leverage dominates the effect of the market value of equity. In other words, market value of equity loses its significance when it is included in the model alongside the market leverage variable. In Model 10, book-to-market equity and market leverage are used and results show that once again the market leverage variable dominates the effect of the book-to-market equity variable. Finally, in Model 11 where all these variables are used as explanatory variables, it is seen that, among these three variables, market leverage is the only one that remains still statistically significant. Although the results of Model 11 can be reckoned after the results of Models 5, 9 and 10, it is included as it is done in most of the studies. An examination of Models 9 through 11 implies that although by themselves the book-to-market and market value of equity variables are significant, they lose their explanatory power when they are included in the models alongside the leverage variable. This further suggests that the leverage variable captures the risks that are measured by these two variables. Also, since the correlation coefficients between the market leverage variable and the size and book-to-market variables are quite high, including leverage alongside one or both of these variables in the regression model creates a problem of multicollinearity. In case of multicollinearity, it is expected that one of the collinear variables captures the effect of both variables on the dependent variable. Therefore, it is not surprising to find that when leverage is included in the model alongside one or both of the variables of size and book-to-market, only the leverage variable has a significant coefficient.

In Model 12, the earnings yield variable is included in the regression with a value of zero for stocks with negative earnings and as the actual earnings yield value for firms with positive earnings. Also, earnings yield dummy variable takes the value of zero for positive earning yield and 1 for negative earning yield. The average time-series coefficient of the earnings yield dummy is significantly positive with a t-value of 2.376. These results are consistent with the previous findings from portfolio analysis shown in Table 7 and Figure 6. The positive coefficient estimate for the firms with negative earnings yields implies that the market requires a higher rate of return from firms that generate negative earnings. This is in line with a priori expectations and results from previous studies in the literature. Negative profitability is interpreted as a negative signal by the market participants and the value of the firm is discounted at higher required rates of return. In other words, these firms are penalized with higher costs of capital. Firm size, market leverage and book-to-market equity are included as the explanatory variables alongside the earnings yield variables in models 13, 14 and 15, respectively, due to the high correlation coefficients found. It is found that only market leverage significantly dominates the effect of the negative earnings firms.

The net sales-to-price ratio is used in Model 16 as an alternative to the earnings yield in the previous model. The average slope coefficient on the net sales-to-price ratio is 0.8%, with a t-statistic of 2.830. This result implies that high sales-to-price stocks have higher average returns compared to low net sales-to-price stocks. Interestingly, the correlation between the net sales-to-price ratio and the earnings yield variables is almost zero. The low correlation suggests that these two variables measure two different capabilities of a company. The net sales-to-price ratio demonstrates the price that the market is willing to pay in relation to the firm's capability in generating sales revenue. The earnings yield shows the price that the market is willing to pay for the earnings that is provided by the firm after all expenses, including those that arise from the use of debt, are deducted from the sales revenue.

Another interesting point is that the correlation coefficient between market leverage and sales-to-price ratio is as high as 0.63. In Model 17 both of these variables are included as the explanatory variables. Estimation results indicate that the average slope coefficient on the market leverage remains positive and significant; however, the previous significant coefficient on the sales-to-price ratio becomes insignificant. Therefore, once again, it is seen that the effect of market leverage dominates the effect of the sales-to-price ratio. When firm size and book-to-market ratio are included alongside net sales-to-price ratio as the explanatory variables, there is no evidence of any dominant effect among these variables.

The last variable in the study, a stock's return performance during the last 12 months is included in Model 20. Results show that the average slope coefficient on the momentum variable is negative and statistically significant. The mean coefficient value is -0.2% with a t-value of -3.428. This result implies that firms who have lower average returns during the past 12 months have higher average returns in the subsequent months. This finding is in contradiction with the a priori expectations. The definition of the momentum concept suggests that stocks that have performed well in the past are expected to perform well in the future, as well. However, the negative value of the time series average for the momentum coefficient indicates that there is evidence of a reversal in return patterns during the sample period in the Istanbul Stock Exchange. In other words, within a contrarian investment strategy framework, stocks that have performed poorly in the past are expected to perform well in the future and, likewise, stocks that have performed well in the past are expected to perform poorly in the future. The time-series average of the momentum coefficient stays significant and negative when this variable is included in the models alongside the size, book-to-market and market leverage ratios. The results from Models 21 through 23 imply that the momentum variable measures a risk that is not captured by any of the other three variables.

As an additional exercise, it is worthwhile to examine the trend in the time-series that are created for the regression coefficients of the firm-specific variables. During the sample period, there are four major political and economic crises that are expected to have an impact on the investment behavior. The first one is the decisions made on the 5th of April in 1994 related with the devaluation of the Turkish currency against foreign currencies. This crisis is not investigated in this study due to the data limitations before the crisis period. The second one is the military coup threat associated with the February 28, 1997 decisions of the National Security Council. The third one is the financial crisis related with the open positions and the related liquidity crisis of the banking sector in November 2000. The fourth crisis on February 21, 2001 is the so called "Black Wednesday" when the overnight interest rates reached a maximum of 7500% and the stock market dropped by 18.1% in a single day.

The commonality between the results of these four political and economic shocks is the loss of confidence in the Turkish economy among both foreign and domestic investors. The signals of the loss of confidence can be seen in the stock market by analyzing the changing attitude of investors towards risk.

Figures 9 through 13 present the 1-year moving averages of the slope coefficients, or risk premiums of the 5 variables that are found to be significant in the cross-sectional regressions.

In Figure 9, it is observed that investors prefer mostly larger market capitalization stocks to the smaller ones approximately for the one-year period following the crises. Since smaller stocks are generally perceived to be riskier than the larger ones, it can be concluded that the investors are more risk-averse after the periods of crisis.

The same rationale underlying Figure 9 exists in Figure 10 as well. By looking at the negative trend in the moving averages of risk premiums after the periods of crises, it can be inferred that investors are more willing to invest in the low book-to-market stocks compared to the high book-to-market ratio stocks. Since the low book-to-market stocks are perceived to be less risky, investors can be said to be more risk-averse in the periods following the crisis.

The 1-year moving average of the slope coefficients on market leverage is shown in Figure 11. Although risk premiums related with size and book-to-market equity ratio signal the investors being more risk-averse in the 3 post-crisis periods, the market leverage does not have a very clear signal of such a relationship for the 28 February crisis. However, the strong negative trend after November 2000 crisis signals a more risk-averse investor behavior such that investors prefer to invest more in low market leverage firms than higher ones.

Figure 12 shows the 1-year moving average of the slope coefficient on the sales-to-price ratio. In this figure, there are two different results that are in contradiction with each other. The first one is the increasing trend in the slope coefficient after the 1997 crisis which implies a less risk-averse behavior by the investors after the crisis and it is in contradiction with the a priori expectations. Surprisingly, the trend becomes negative after the 2000 and 2001 crises implying a more risk-averse behavior by the investors after this particular crisis period.

Finally, the 1-year moving average slope coefficient on the past return performance (momentum) is shown in the Figure 13. There is no clear evidence of a more or less risk-averse investment behavior in the periods following the crisis.

4.4. Relationship between Macroeconomic Variables and Firm Characteristics

In this section, the relationship between the market risk premiums calculated in the cross-sectional regressions and return differences between extreme deciles obtained in the portfolio analysis section and the change in the macroeconomic environment is analyzed. Three different macroeconomic variables are used to proxy the macroeconomic environment: Industrial Production Index (IPI), Consumer Price Index (CPI) and Gross National Product (GNP). The IPI and CPI are measured monthly. However, the GNP is measured quarterly, and, therefore, in the regressions that use GNP as the dependent variable, the risk premiums obtained from cross-sectional regressions or the return differences between extreme portfolios are compounded for the three months preceding the GNP measurement.

The purpose of this section of the analysis is to test whether the well-documented observation that the stock market is a leading indicator of the macroeconomic environment can be shown to be valid for the Turkish stock market as well. The independent variables for this section of the analysis are either the difference between the extreme portfolio returns or the cross-sectional regression estimates of the slope coefficients from the previous section. The risk factors considered in this section of the study are the market value of equity, the book-to-market equity ratio, the market leverage ratio, the net sales-to-price ratio and the past twelve month's average return. According to the previous findings in the literature, the stock market indicators should change before any change occurs in the macroeconomic environment. In other words, the stock market acts as a leading indicator and it should be possible to forecast what will happen to some of the macroeconomic variables by looking at the changes that take place in the stock market. In this study, the stock market indicators are either the return differences between extreme deciles formed on risk factors themselves or the risk premiums (slope coefficients) that are required in the market by the investors for the different risk factors. If the stock market is indeed a leading indicator, then, in a chronological order, these risks or the risk premiums should change before the macroeconomic variables change. Therefore, the time-series regression models estimated in this section of the study take the contemporaneous values of the macroeconomic variables and regress them on the one-period lagged values of the return differences between extreme portfolios found in portfolio analysis or the risk premiums calculated in the cross-sectional regressions that are run in the previous section of the study.

As stated above, the stock market indicators are measured in two different ways. In the first set of regressions, the independent variables are the difference between the two extreme portfolio monthly returns where the portfolios are constructed on the basis of one of the five risk factors. For instance, if the risk factor is the market value of equity, then, the independent variable is the difference between the returns obtained from the smallest firm portfolio minus the largest firm portfolio. In the second set of regressions, the independent variables are the risk premiums that are required in the market for these risk factors. These risk premiums are the time-series that are constructed for the coefficient estimates of the five independent variables in the previous section. The results of these two sets of estimations are presented in Table 14.

Panel A of Table 14 presents the results when the independent variables are the risk premiums (coefficient estimates) calculated in the cross-sectional regressions from the previous section of the study. The t statistics show that none of the risk factors is significant in explaining the future variability in the three macroeconomic variables.

Panel B of Table 14 presents the results when the independent variables are the difference between the two extreme portfolio returns where the portfolios are constructed on the basis of each one of the five risk factors. This time, there is a significant and positive relationship between the one-period lagged value of the return differences between the extreme deciles sorted on book-to-market value of equity ratio and the future percentage change in industrial production index. The positive coefficient estimate suggests that when the positive difference between the returns on the high and low book-to-market portfolios increases, this is an indicator that the change in the industrial production index is going to increase in the next period. The low book-to-market ratio firms are the ones about which the investors have favorable future expectations and these positive expectations are demonstrated by the higher price that the investors are willing to pay for the stocks of these firms. As a result, the required rate of return from the low book-to-market firms is relatively lower compared to the high book-to-market firms. Hence, the realized return difference between the high book-to-market portfolio return and the low book-to-market portfolio return is positive. The positive regression coefficient of 0.088 in Table 14 implies that when the positive difference between the portfolio returns increases by one unit, the percentage change in the industrial production index is expected to increase by 0.088 units in the next period. Likewise, when the positive difference between the portfolio returns decreases by one unit, the percentage change in the industrial production index is expected to decrease by 0.088 units in the next period. Economically, the positive coefficient means that if the investors are hopeful about the future of the economy (an expectation about an increase in industrial production), they are willing to buy more of the high book-to-market stocks. In other words, when the investors are hopeful about the future of the economy, the relative importance of a lower book-to-market ratio decreases. When the investors have favorable expectations about the future of the macroeconomic environment, they are more willing to take risks and invest in higher book-to-market stocks. This willingness can be seen in the increase in the realized return differential between the high and low book-to-market stocks.

The other significant coefficient estimate in Table 14 is for the relationship between the consumer price index and the difference between the returns of the smallest and the largest market value of equity portfolios. The size effect that is documented in the portfolio analysis section implies that the investors require a relatively higher return from smaller firms compared to larger firms. As a result, the difference between the return on the smallest firm portfolio minus the return on the largest firm portfolio is positive. The coefficient estimate of -0.032 implies that when this positive return differential increases by one unit, the percentage change in the consumer price index is expected to decrease by 0.032 units in the next periods. In other words, when the investors have favorable expectations about the future of the macroeconomic environment (an expectation about a decrease in inflation), they are more willing to buy smaller firms' stocks. Therefore, an increase in the realized return differential between small and large firms' stocks can be interpreted as an indicator that inflation will decrease or the increase in inflation will decrease in the next period.

Finally, both return differences between the extreme portfolios and the coefficients obtained in the univariate cross-sectional regressions show no significant predictive ability for the future changes in GNP.

CHAPTER 5

SUMMARY AND CONCLUSION

This study attempts to provide a complete analysis of the relationship between average stock returns and firm-specific variables including beta, market value of equity, book-to-market value of equity ratio, book leverage, market leverage, earnings yield, sales-to-price ratio and past return performance. In addition, the relationship between the stock market and macroeconomic variables is analyzed to determine whether the stock market behaves as a leading indicator as has been suggested in the literature.

The relationship between the average stock returns and firm characteristics are analyzed in two ways. First, stocks are grouped into portfolios on the basis of rankings based on the firm characteristics and the average returns on these portfolios are compared against each other. Second, monthly cross-sectional regressions are estimated to determine whether the firm-specific variables have a significant power in explaining the cross-sectional variability in stock returns. The results of the two analyses are consistent with each other.

In the portfolio analysis section, ten decile portfolios are formed on the basis of each of the variables mentioned above. Except for the beta-sorted portfolios, there exist significant average return differences between the extreme deciles for all variables. According to the results, smaller firms with high book-to-market value of equity ratio and higher leverage have relatively higher average returns. Also, firms with negative earnings yield, higher sales-to-price ratio and lower past earnings have relatively higher average returns in the subsequent periods. These findings generally confirm the results from the previous literature except for the momentum portfolio returns. According to the momentum argument, past strong performer stocks should also perform better in the future. The results in this study suggest that a contrarian strategy, rather than a momentum strategy, generates higher average returns during the sample period.

In the second part of the study, monthly cross-sectional regressions are estimated. According to the results of the cross-sectional regressions, both pre-ranking and post-ranking beta estimates have no significant power in explaining the average stock returns. Instead of beta, all of the other variables except for positive earnings yield have significant power in explaining the variability in the cross-section of stock returns. In case of the earnings yield variable, the earnings-to-price dummy variable representing the negative earnings yield has significant explanatory power, but the positive earnings-to-price ratio has no explanatory power.

The well-known 'size effect' in the literature, that is, small firms having higher average returns than larger firms, seems to exist in the ISE during the sample period. Also, there is evidence that the 'value effect', that is, higher book-to-market equity firms having higher average returns than the low book-to-market firms, exists in the ISE during the sample period. This study further demonstrates that some proportion of the value effect is subsumed by the size effect. When these two variables are used together in the regressions, the significance of the book-to-market equity reduces to a level that is slightly less than the critical value.

Both leverage variables are found to be significant in explaining the cross-section of stock returns when they are used by themselves in the models. When they are both included in the regressions, it is found that market leverage dominates the effect of book leverage and book leverage loses most of its statistical significance. In addition, the market leverage variable dominates the effects of both firm size and book-to-market equity ratio when it is used in the same model alongside either of these latter variables.

Another interesting finding is the positive association between negative earnings with the stock returns. This result implies that firms that declare negative earnings have significantly higher returns in the subsequent months compared to the firms with positive earnings. As expected, the market interprets the negative earnings yield as unfavorable information about the firm and requires a higher rate of return from such companies.

Moreover, a positive and significant association between the sales-to-price ratio and stock returns is found. That is, the higher the sales-to-price ratio is, the higher the returns of firms have in the stock market. Also, it is shown that the market leverage again dominates the sales-to-price effect and the sales-to-price loses its statistical significance when it is combined with market leverage in the model.

Finally, an interesting result comes from the analysis of whether the short-term return performance continues; in other words, whether there is a momentum effect. It is found that stocks traded on the ISE on average experience a reversal of past return performance rather than a continuation. That is, winners during the past 12 months become losers in the subsequent 12 months, or vice versa. The predictability of equity stock returns by looking at the past 12-month return performance is found to be independent of the other variables. In other words, the momentum variable continues to have a significantly negative coefficient even when it is included in the models alongside the other variables. It should be noted at this point that the finding of a reversal rather than a continuation in short term return performance in ISE is probably dependent upon the timing of when the past 12-month return performance is measured. In this study, the past 12-month returns are calculated between the May of year t and June of year t-1. More than likely, if another 12-month return is calculated by taking another twelve-month period, for instance between January and December, the results may be found to be different.

In the last part of the study, contemporaneous values of three macroeconomic variables, IPI, GNP and CPI, are regressed on the one-period lagged values of either the slope coefficients obtained from the univariate cross-sectional regressions or the return differences between extreme decile of characteristic portfolios. The first finding is that the slope coefficients have no statistical power in explaining the future changes in macro variables. On the other hand, the return difference between the highest and lowest book-to-market equity portfolios is found to have a positive relationship with the future changes in the IPI. This result implies that when investors have favorable expectations about the future of the economy, they are more willing to invest in risky high book-to-market equity stocks. Similarly, the return difference between the smallest and the largest size portfolios has a negative relationship with the future changes in the CPI. This finding suggests that the preference by investors of investing in small capitalization stocks decreases when an increase is expected in the CPI. If price inflation is an indication of economic expansion, then investors are more willing to invest in risky small firm stocks when they expect an expansion in the economy.

Finally, analysis of the behavior of the slope coefficients after periods of financial and political crisis in Turkey demonstrates that investors become more risk-averse by choosing to invest more in large market capitalization firms and low book-to-market ratio firms.

In conclusion, using an out-of sample dataset, evidence is found to support the contention that risk factors other than the systematic risk measure of beta have significant power in explaining the variability in the cross-section of stock returns. It is crucial to note that these results cannot be a proof for the invalidity of the CAPM, but rather, these results suggest that the ISE-100 index is not a mean-variance efficient index; that is, the betas calculated with respect to the ISE-100 index have no use in explaining the cross-section of stock returns. However, the results obtained can still catch the attention of both practitioners and researchers who investigate the return predictability in emerging markets.

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TABLES

Table 1. *Summary Statistics of Firm-Specific Fundamentals for the 1993-2003 Period*[7]

	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
Number of firms in the sample	73	79	92	107	122	140	154	158	170	178
Number of firms with neg. E/P	11	7	12	8	8	13	29	51	41	73
Negative E/P firms as % of total	15.07	8.86	13.04	7.48	6.56	9.29	18.83	32.28	24.12	41.01
Average values of the sample										
Market value of equity	1527299	3031002	7827681	11588006	24024967	51465333	57859984	154835784	109377988	131394286
Book-to-market ratio	1.44	0.30	0.44	0.62	0.50	0.43	0.97	0.34	0.69	0.59
Book leverage (TA/BE)	2.63	2.46	3.96	2.18	2.67	2.78	2.97	4.00	5.09	4.64
Market leverage (TA/ME)	3.45	0.66	0.97	1.26	1.15	1.05	2.41	0.97	1.88	1.72
E(+)/P	0.17	0.07	0.10	0.13	0.11	0.09	0.14	0.04	0.08	0.10
Sales-to-Price	3.93	0.85	1.16	1.82	1.31	1.22	2.51	0.91	1.99	1.82

[7] Market value of equity is measured as of June 30 for each year and denominated in millions of Turkish Liras. Book-to-market equity ratio is found by dividing the book equity of a firm by the market value of equity. Book leverage is found by dividing the total assets of a firm by its book equity. Market leverage is found by dividing the total assets of a firm by the market value of equity. For E(+)/P, negative earnings are excluded and the positive net income after taxes value is divided by the market value of equity. S/P is found by dividing the net sales value by the market value of equity. The numbers in the table shows the equal weighted averages of the corresponding values of the characteristics of firms in the sample. For accounting variables, market value of equity is measured as of December of year t-1.

Table 2. *Summary Statistics of Portfolios Formed on Pre-ranking Beta*[8]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-small	6.51	15.35	0.33	-1.23	1.08	-0.15	0.75	0.07	0.21	1.51	7.27
2	6.95	15.18	0.58	-0.83	0.94	0.11	0.83	0.08	0.18	1.85	6.67
3	7.42	15.56	0.70	-0.81	0.87	0.07	0.89	0.09	0.22	1.79	7.10
4	7.40	15.33	0.79	-0.70	0.80	0.10	0.88	0.07	0.21	1.61	8.32
5	6.66	15.81	0.87	-0.71	0.78	0.08	0.92	0.10	0.16	1.61	9.09
6	7.34	15.86	0.94	-0.71	0.78	0.07	1.00	0.09	0.16	1.92	7.12
7	6.57	15.84	1.01	-0.73	0.86	0.13	0.88	0.10	0.14	1.69	8.02
8	7.35	16.09	1.10	-0.62	0.77	0.15	0.92	0.10	0.18	1.75	8.51
9	6.89	16.14	1.21	-0.79	0.85	0.06	1.03	0.10	0.14	1.90	7.32
10-large	5.41	16.54	1.45	-0.95	0.99	0.04	0.98	0.08	0.19	1.59	9.17

[8] The stocks are sorted into 10 portfolios based on pre-ranking beta using 15-48 monthly observations over the 4-year period ending June, year t. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. The post-ranking betas are found by regressing the monthly excess returns of each portfolio on the market's monthly excess returns for the 120 months during the period from July of 1993 to June of 2003. Then, stocks are assigned the full-period post-ranking betas of the portfolio to which they belong at the end of June of each year. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 3. *Summary Statistics of Portfolios Formed on ME*[9]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-small	10.77	13.61	0.77	-0.54	1.04	0.49	0.88	0.04	0.46	2.29	6.88
2	7.35	14.27	0.85	-0.55	0.99	0.45	0.89	0.07	0.30	2.58	6.48
3	7.35	14.73	0.79	-0.75	1.00	0.25	0.88	0.08	0.19	1.94	8.14
4	5.78	15.06	0.90	-0.61	0.92	0.31	0.90	0.10	0.15	2.02	8.59
5	6.26	15.42	0.90	-0.72	0.83	0.10	0.91	0.09	0.14	1.91	7.76
6	6.95	15.81	0.95	-0.71	0.80	0.09	0.93	0.10	0.12	1.54	7.12
7	5.55	16.21	0.97	-0.81	0.70	-0.11	0.92	0.12	0.08	1.34	7.93
8	5.78	16.63	0.92	-0.89	0.81	-0.08	0.92	0.10	0.08	1.30	7.93
9	5.62	17.30	0.91	-1.18	0.81	-0.37	0.91	0.09	0.10	0.97	9.01
10-large	7.04	18.66	1.06	-1.32	0.82	-0.50	0.94	0.08	0.16	1.35	8.92

[9] The stocks are sorted into 10 portfolios based on firm size at the end of June of year t. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent.. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 4. *Summary Statistics of Portfolios Formed on B/M*[10]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-Low	6.53	16.79	0.82	-2.26	1.51	-0.75	0.88	0.03	0.34	1.10	8.54
2	5.21	16.52	0.84	-1.48	0.96	-0.52	0.89	0.08	0.16	1.07	9.39
3	7.10	16.21	0.92	-1.17	0.90	-0.27	0.91	0.09	0.10	1.34	7.84
4	5.70	15.72	0.90	-0.97	0.86	-0.12	0.90	0.10	0.10	1.58	8.58
5	6.42	15.59	0.92	-0.82	0.81	-0.01	0.91	0.10	0.08	1.65	8.01
6	6.36	15.72	0.90	-0.68	0.75	0.06	0.91	0.10	0.10	1.54	5.78
7	7.19	15.52	0.91	-0.54	0.76	0.22	0.91	0.11	0.15	1.98	6.95
8	6.87	15.30	0.93	-0.37	0.79	0.42	0.92	0.10	0.13	2.19	7.77
9	8.06	15.26	0.94	-0.13	0.77	0.65	0.92	0.08	0.27	2.29	7.65
10-High	8.88	15.07	0.94	0.36	0.63	0.99	0.91	0.07	0.33	2.49	8.12

[10] The stocks are sorted into 10 portfolios based on book-to-market ratio at the end of December of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 5. *Summary Statistics of Portfolios Formed on Book Leverage*[11]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-Low	5.74	15.71	0.94	-0.40	0.22	-0.19	0.92	0.10	0.11	0.80	7.73
2	7.00	15.96	0.89	-0.52	0.36	-0.15	0.90	0.11	0.13	1.16	7.36
3	6.28	16.04	0.87	-0.75	0.48	-0.26	0.91	0.12	0.05	1.13	7.14
4	5.38	16.18	0.92	-0.81	0.59	-0.21	0.91	0.10	0.08	1.35	8.12
5	6.72	15.68	0.89	-0.73	0.72	-0.01	0.90	0.10	0.10	1.40	7.88
6	7.54	15.73	0.89	-0.79	0.82	0.03	0.91	0.08	0.19	1.56	8.23
7	7.14	15.88	0.89	-0.81	0.95	0.13	0.91	0.08	0.15	1.76	8.02
8	7.08	15.57	0.90	-0.81	1.11	0.31	0.91	0.07	0.21	2.54	7.00
9	7.82	15.55	0.96	-0.91	1.36	0.45	0.91	0.07	0.32	2.34	8.33
10-High	7.60	15.38	0.86	-1.56	2.12	0.56	0.89	0.05	0.44	3.16	8.70

[11] The stocks are sorted into 10 portfolios based on the ratio of total assets to book value of equity at the end of December of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 6. *Summary Statistics of Portfolios Formed on Market Leverage*[12]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-Low	5.04	17.19	0.81	-1.84	0.71	-1.13	0.89	0.07	0.12	0.63	8.69
2	5.47	16.41	0.84	-1.29	0.64	-0.65	0.89	0.10	0.06	0.78	7.96
3	5.69	16.12	0.84	-1.07	0.66	-0.41	0.90	0.10	0.09	0.92	8.22
4	6.00	15.93	0.93	-0.88	0.65	-0.22	0.92	0.11	0.11	1.35	7.30
5	6.66	15.80	0.94	-0.81	0.77	-0.04	0.92	0.10	0.12	1.29	7.81
6	7.76	15.60	0.90	-0.67	0.81	0.14	0.92	0.09	0.15	1.59	7.40
7	7.10	15.46	0.95	-0.72	1.04	0.32	0.92	0.09	0.19	1.95	7.66
8	7.98	15.26	0.97	-0.48	1.01	0.53	0.92	0.08	0.23	2.21	8.29
9	8.41	15.08	0.94	-0.28	1.09	0.80	0.91	0.07	0.30	2.71	7.41
10-High	8.21	14.83	0.88	-0.02	1.35	1.33	0.90	0.06	0.41	3.86	7.76

[12] The stocks are sorted into 10 portfolios based on the ratio of total assets to market value of equity at the end of December of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 7. *Summary Statistics of Portfolios Formed on Earnings Yield*[13]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-Low	9.30	15.14	0.87	-0.86	1.24	0.38	0.90	0.00	1.00	2.23	8.81
2	7.47	15.70	0.88	-0.89	1.00	0.11	0.90	0.01	0.00	1.71	7.64
3	6.24	15.78	0.90	-0.82	0.84	0.02	0.90	0.04	0.00	1.62	7.52
4	6.94	15.89	0.86	-1.02	0.81	-0.21	0.90	0.06	0.00	1.34	7.71
5	6.35	16.08	0.97	-0.88	0.76	-0.12	0.91	0.08	0.00	1.44	7.88
6	5.96	16.11	0.92	-0.84	0.75	-0.09	0.91	0.10	0.00	1.57	7.85
7	6.31	15.71	0.87	-0.80	0.75	-0.04	0.91	0.12	0.00	1.35	7.61
8	6.85	16.13	0.90	-0.72	0.69	-0.03	0.91	0.14	0.00	1.58	7.49
9	6.22	15.96	0.93	-0.60	0.72	0.12	0.91	0.17	0.00	2.02	7.43
10-High	5.80	15.80	0.93	-0.58	0.63	0.05	0.92	0.23	0.00	1.65	8.63

[13] The stocks are sorted into 10 portfolios based on the ratio of net income after taxes to market value of equity at the end of December of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 8. *Summary Statistics of Portfolios Formed on Sales-to-Price Ratio*[14]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-Low	5.42	16.45	0.86	-1.21	0.52	-0.69	0.90	0.07	0.17	0.34	7.82
2	5.81	16.49	0.84	-1.15	0.61	-0.54	0.90	0.09	0.14	0.61	8.11
3	4.77	16.24	0.88	-0.98	0.65	-0.32	0.90	0.10	0.07	0.78	8.20
4	7.09	15.93	0.88	-0.91	0.73	-0.18	0.91	0.10	0.15	0.97	8.03
5	6.83	15.94	0.91	-0.93	0.86	-0.08	0.91	0.08	0.14	1.21	7.03
6	7.04	15.54	0.90	-0.81	0.95	0.13	0.91	0.08	0.24	1.43	8.11
7	7.41	15.51	0.97	-0.55	0.87	0.32	0.92	0.08	0.19	1.76	7.52
8	6.98	15.46	0.95	-0.54	1.01	0.46	0.92	0.09	0.16	2.14	8.34
9	7.99	15.09	0.91	-0.44	1.02	0.58	0.91	0.09	0.18	2.86	7.59
10-High	9.02	15.04	0.90	-0.54	1.50	0.95	0.90	0.07	0.33	5.14	7.76

[14] The stocks are sorted into 10 portfolios based on the ratio of net sales to market value of equity at the end of December of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 9. *Summary Statistics of Portfolios Formed on Past Return Performance*[15]

Portfolio	Return	Ln (ME)	Pre-beta	Ln (B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/P dummy	Sales/Price	Momentum
1-low	7.85	15.38	0.85	-0.84	1.00	0.16	0.91	0.07	0.20	1.84	-0.22
2	7.95	15.70	0.92	-0.67	0.82	0.16	0.91	0.08	0.21	1.66	2.48
3	6.85	15.58	0.86	-0.72	0.80	0.08	0.89	0.09	0.15	1.92	4.16
4	7.92	15.40	0.86	-0.71	0.87	0.16	0.90	0.08	0.23	1.66	5.26
5	6.36	15.91	0.92	-0.87	0.77	-0.11	0.91	0.09	0.11	1.55	6.43
6	7.04	15.72	0.93	-0.70	0.90	0.21	0.91	0.10	0.13	1.72	7.77
7	6.29	16.09	0.91	-0.78	0.79	0.01	0.92	0.09	0.13	1.79	9.26
8	6.94	15.85	0.87	-0.87	0.82	-0.04	0.90	0.10	0.13	1.54	10.83
9	5.51	16.04	0.97	-0.90	0.89	-0.02	0.92	0.10	0.18	1.67	13.34
10-high	5.58	16.04	0.92	-1.02	1.05	0.03	0.91	0.07	0.29	1.79	19.15

[15] The stocks are sorted into 10 portfolios based on the average monthly returns during the past 12 months at the end of June of year t-1. Return is the time series average of 120 monthly equal-weighted portfolio returns from July 1993 to June 2003, in percent. Book equity, total assets, net sales are for each firm's fiscal year end of year t-1. Firm size is measured at the end of June of year t. The pre-ranking beta, post-ranking beta, ln(ME), ln(B/M), ln(TA/BE), ln(TA/ME), E/P, E/P dummy, sales-to-price ratio and momentum are the time-series average of the monthly averages of these variables in each portfolio. All accounting variables used are denominated in millions of TL. E/P dummy is 0 when earnings are positive and 1 when earnings are negative. Therefore, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

Table 10. *Average Correlation Coefficients*[16]

	Ln(MVE)	Pre-beta	Ln(B/M)	Ln(A/BE)	Ln(A/ME)	Beta	E/P	E/Pdummy	S/P	Momentum
Ln(MVE)	1.000									
Pre-beta	0.237	1.000								
Ln(B/M)	-0.328	0.109	1.000							
Ln(A/BE)	-0.121	-0.046	-0.460	1.000						
Ln(A/ME)	-0.441	0.089	0.662	0.349	1.000					
Beta	0.204	0.811	0.124	-0.092	0.060	1.000				
E/P	0.119	0.052	0.136	-0.285	-0.094	0.066	1.000			
E/Pdummy	-0.195	-0.045	-0.022	0.289	0.217	-0.037	-0.522	1.000		
S/P	-0.271	0.049	0.242	0.447	0.626	0.023	-0.051	0.116	1.000	
Momentum	0.119	0.065	-0.068	0.015	-0.050	0.035	0.004	0.045	0.002	1.000

[16] The average correlations are constructed by taking the average of correlation coefficients calculated among variables for each year over the 10 years analyzed.

Table 11. *Overall Correlations and t-Statistics*[17]

Panel A. Overall Correlation Matrix between the values of the variables

	Ln(MVE)	Pre-beta	Ln(B/M)	Ln(A/BE)	Ln(A/ME)	Post-Beta	E/P	E/Pdummy	S/P	Momentum
Ln(MVE)	1.00									
Pre-beta	0.03	1.00								
Ln(B/M)	**-0.31**	**0.07**	1.00							
Ln(A/BE)	-0.01	**-0.08**	**-0.42**	1.00						
Ln(A/ME)	**-0.33**	0.02	**0.73**	**0.32**	1.00					
Post-Beta	**0.16**	**0.74**	**0.09**	**-0.09**	0.03	1.00				
E/P	**-0.11**	**0.13**	**0.25**	**-0.30**	0.04	**0.07**	1.00			
E/Pdummy	-0.02	**-0.09**	-0.05	**0.40**	**0.25**	-0.05	**-0.52**	1.00		
S/P	**-0.26**	-0.01	**0.39**	**0.34**	**0.67**	0.01	**0.06**	**0.15**	1.00	
Momentum	**-0.09**	**0.10**	**-0.21**	-0.01	**-0.23**	0.03	-0.02	-0.02	**-0.13**	1.00

Panel B. T-statistics for the correlation coefficients

	Ln(MVE)	Pre-beta	Ln(B/M)	Ln(A/BE)	Ln(A/ME)	Post-Beta	E/P	E/Pdummy	S/P	Momentum
Ln(MVE)										
Pre-beta	0.94									
Ln(B/M)	-11.50	2.59								
Ln(A/BE)	-0.43	-2.84	-16.52							
Ln(A/ME)	-12.46	0.56	37.73	11.94						
Post-Beta	5.75	39.01	3.36	-3.40	0.93					
E/P	-3.89	4.59	9.29	-11.11	1.37	2.44				
E/Pdummy	-0.56	-3.13	-1.82	15.65	9.24	-1.73	-21.61			
S/P	-9.65	-0.42	15.21	12.82	31.85	0.50	2.17	5.59		
Momentum	-3.14	3.64	-7.62	-0.40	-8.31	1.19	-0.83	-0.54	-4.82	

[17] The correlations are calculated by using the overall data including 1273 values for each variable.

Table 12. *Correlations b/w Return Differences of Extreme Deciles*[18]

	Book Lev.	**Mrkt. Lev.**	**B/M**	**MVE**	**S/P**	**Momentum**	**E/P**
Book Lev.	1.00						
Mrkt. Lev.	0.48	1.00					
B/M	0.25	0.76	1.00				
MVE	0.21	0.50	0.31	1.00			
S/P	0.45	0.71	0.63	0.36	1.00		
Momentum	0.35	0.36	0.20	0.17	0.31	1.00	
E/P	0.21	0.33	0.16	0.45	0.30	0.08	1.00

[18] First, the return differences between extreme deciles constructed by sorting stocks on the corresponding variable are calculated for each month during the period from July 1993 to June 2003. Then, the correlation coefficients between these return differences are calculated.

Table 13. *Average Slope Coefficients and Corresponding t-Values from Monthly Cross-Sectional Regressions*[19]

Model #	constant	Pre- β	Post-β	ln(MVE)	ln(B/M)	ln(TA/BE)	ln(TA/ME)	E(+)/P	E/P dummy	S/P	Momentum
1	0.074	-0.007									
t-stat.	4.940	-0.767									
2	0.070		-0.001								
t-stat.	2.806		-0.046								
3	0.157			**-0.006**							
t-stat.	3.545			-2.337							
4	0.075				**0.010**						
t-stat.	4.259				2.176						
5	0.149			**-0.005**	0.006						
t-stat.	3.406			-2.031	1.409						
6	0.060					**0.011**					
t-stat	3.880					2.624					
7	0.067						**0.018**				
t-stat.	4.258						3.340				
8	0.065					0.003	**0.017**				
t-stat.	3.962					0.786	3.013				
9	0.121			-0.004			**0.014**				
t-stat.	2.906			-1.429			2.759				
10	0.065				-0.003		**0.020**				
t-stat.	3.962				-0.786		3.446				
11	0.121			-0.004	-0.004		**0.017**				
t-stat.	2.875			-1.485	-1.010		2.926				

[19] Firm size ln(ME) is measured in June of year t. BE is the book value of equity, TA is the total book assets, S is the net sales figure and E is the net income after taxes. BE, TA, S and E are for each firm's fiscal year ending in year t-1. The accounting ratios are measured using market equity in December of year t-1. If earnings are positive, E(+)/P is the ratio of total earnings to market equity and E/P dummy is zero. If earnings are negative, E(+)/P is 0 and E/P dummy is 1. The average slope is the time-series average of the monthly regression slopes for July 1993 to June 2003, and the t-statistic is the average slope divided by its time series standard error. On average, there are 130 stocks in the monthly regressions.

Table 13. *(Cont'd)*

Model #	constant	Pre-β	Post-β	ln(MVE)	ln(B/M)	ln(TA/BE)	ln(TA/ME)	E(+)/P	E/P dummy	S/P	Momentum
12	0.070							-0.061	**0.023**		
t-stat.	4.339							-1.618	2.376		
13	0.139			-0.005				-0.056	**0.021**		
t-stat	3.232			-1.868				-1.467	2.226		
14	0.071						**0.016**	-0.065	0.014		
t-stat	4.383						2.986	-1.714	1.463		
15	0.078				**0.009**			-0.076	0.017		
t-stat	4.320				2.191			-1.996	1.819		
16	0.056									**0.008**	
t-stat.	3.786									2.830	
17	0.063						**0.015**			0.003	
t-stat.	3.976						2.726			1.155	
18	0.136			**-0.005**						**0.006**	
t-stat.	3.185			-2.049						2.280	
19	0.063				0.008					**0.008**	
t-stat.	3.878				1.898					2.793	
20	0.078										**-0.002**
t-stat.	4.628										-3.428
21	0.078						**0.017**				**-0.001**
t-stat.	4.705						3.218				-3.306
22	0.156			**-0.005**							**-0.001**
t-stat.	3.546			-2.063							-3.084
23	0.084				0.008						**-0.002**
t-stat.	4.657				1.920						-3.482

Table 14. *Slopes, t-Values and p-Values from Uni-variate Time Series Regressions*[20]

DEPENDENT VARIABLE	***PANEL A***					***PANEL B***				
	Ln(MVE)	Ln(B/M)	Ln(TA/ME)	S/P	Past(2,12)	MVE (R_1-R_{10})	B/M $(R_{10}-R_1)$	TA/ME $(R_{10}-R_1)$	S/P $(R_{10}-R_1)$	Past(2,12) (R_1-R_{10})
IPI	-0.395	0.211	0.079	0.054	1.610	0.053	**0.088**	0.036	-0.009	-0.012
t-value	-1.550	1.400	0.650	0.240	1.110	1.190	1.680	0.740	-0.150	-0.180
p-value	0.125	0.164	0.520	0.809	0.269	0.236	0.097	0.461	0.882	0.856
CPI	0.126	-0.030	-0.008	0.065	0.326	**-0.032**	-0.019	-0.015	-0.026	-0.011
t-value	1.340	-0.550	-0.170	0.800	0.610	-1.960	-0.960	-0.840	-1.210	-0.460
p-value	0.184	0.587	0.866	0.426	0.544	0.052	0.340	0.400	0.230	0.648
GNP (quarterly)	-2.010	0.130	-0.360	-1.230	3.300	0.659	0.141	-0.159	-0.122	0.222
t-value	-0.760	0.090	-0.340	-0.690	0.240	1.430	0.290	-0.350	-0.220	0.370
p-value	0.451	0.927	0.739	0.493	0.811	0.160	0.772	0.726	0.829	0.717

[20] Future growth/stagnation is measured as the percentage change in Industrial Production Index (IPI), Consumer Price Index (CPI), Gross National Product (GNP) in the next period. The independent variables in Panel A are the slope coefficients obtained in the uni-variate cross-sectional regressions. The independent variables in Panel B are the monthly return differences between extreme deciles of the portfolios sorted on different variables.

FIGURES

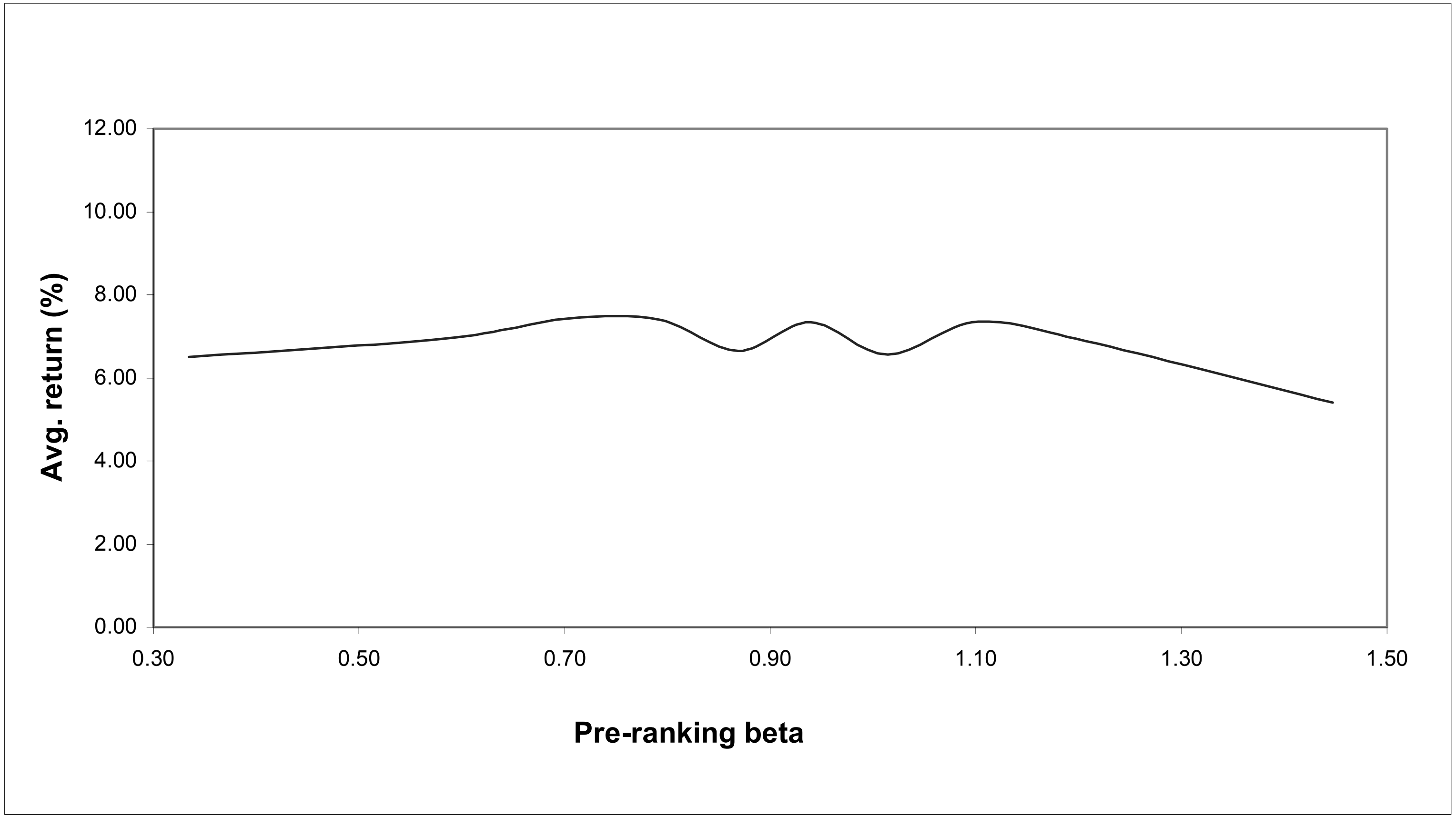

Figure 1. *Avg. Return vs. Pre-ranking Beta*

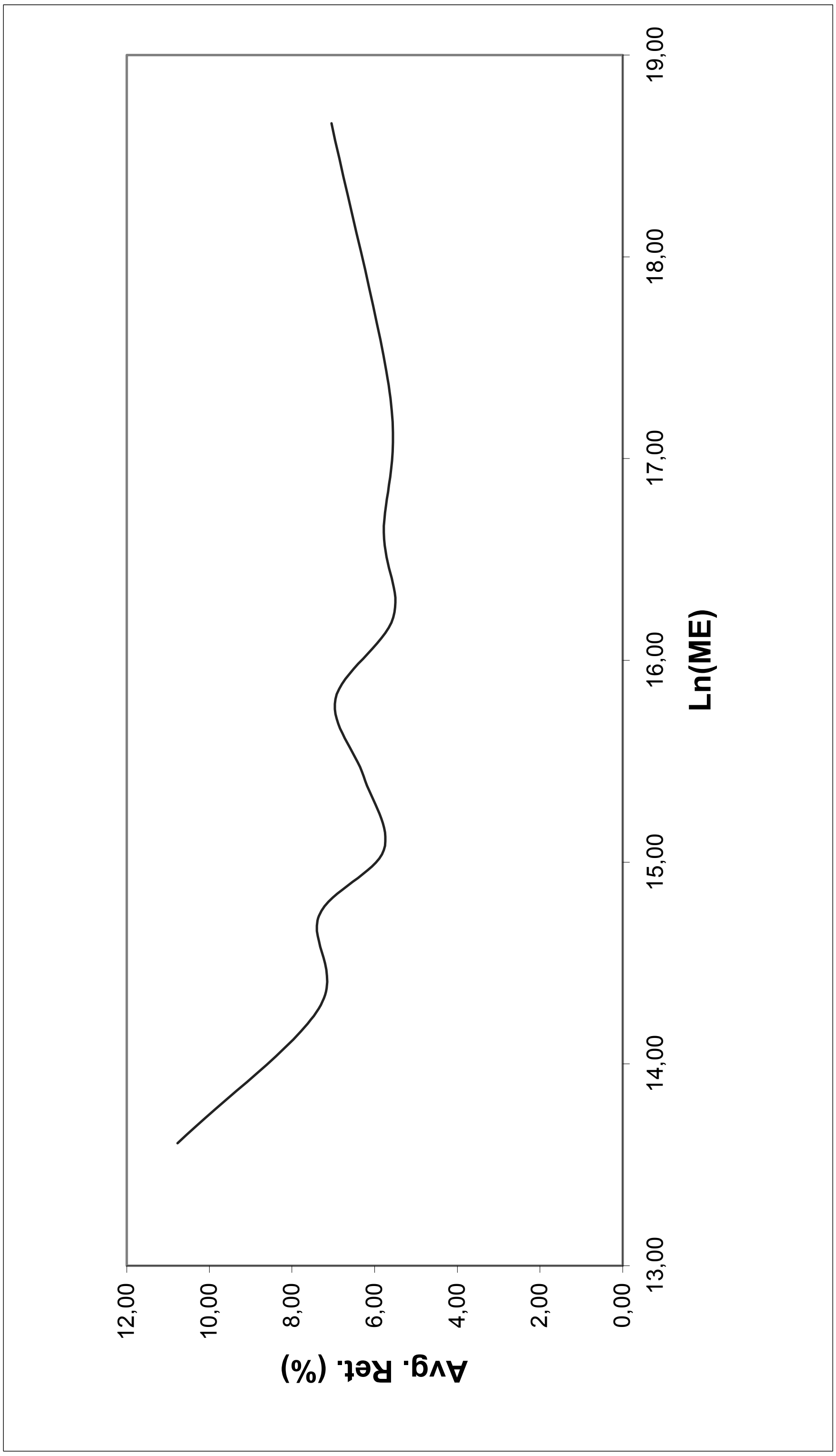

Figure 2. *Avg. Return vs. ME*

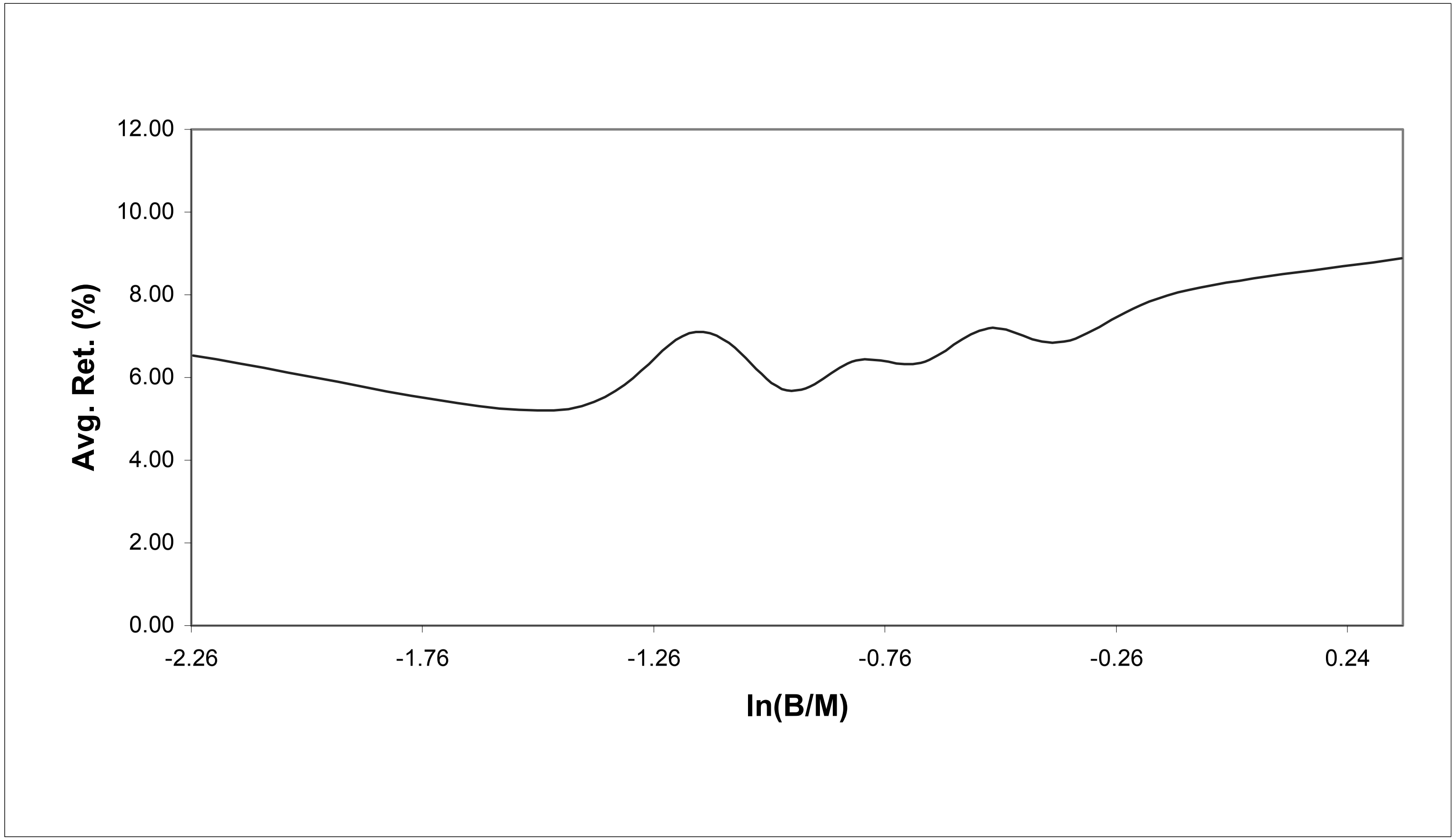

Figure 3. *Avg. Return vs. B/M*

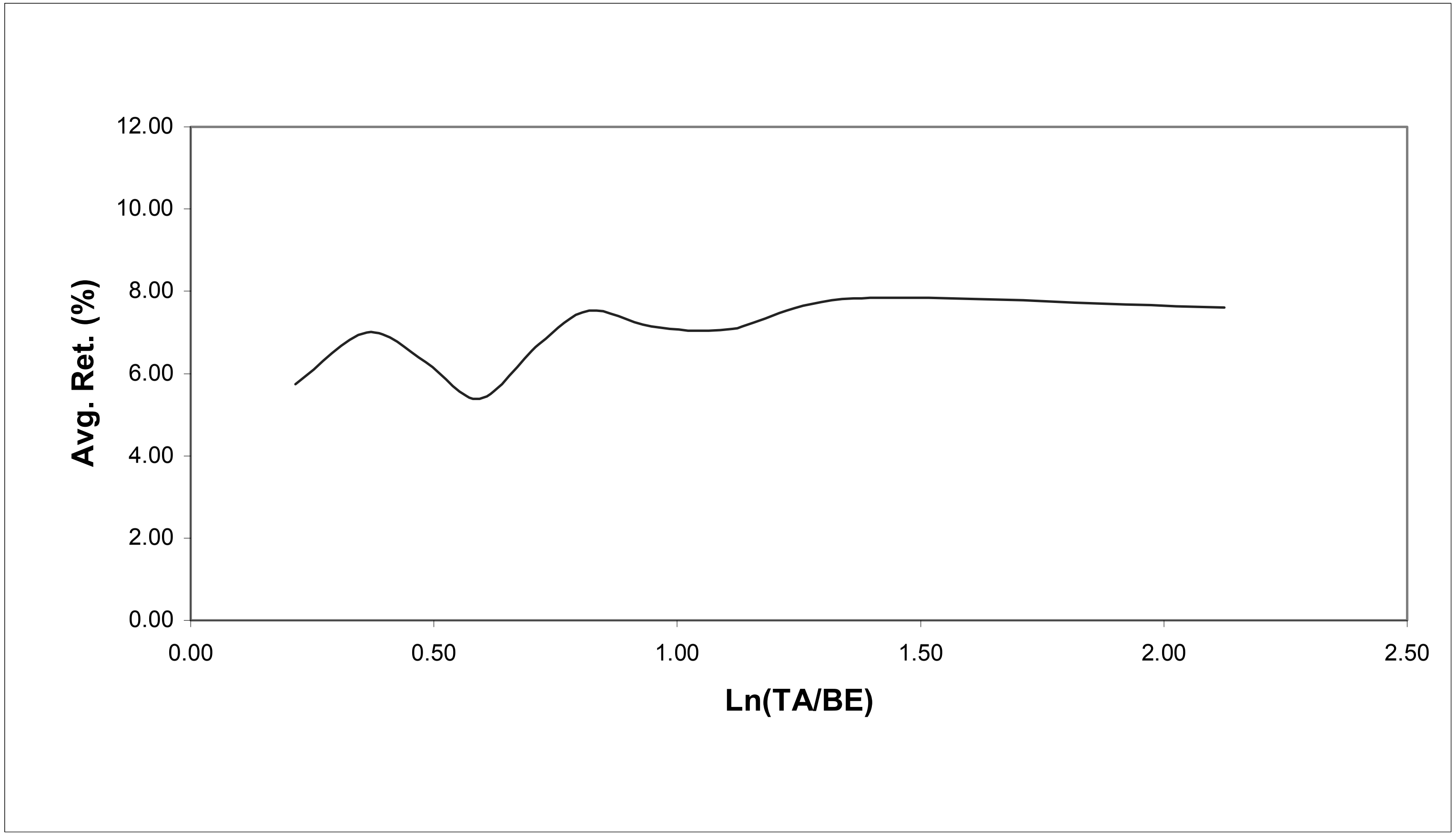

Figure 4. *Avg. Return vs. Book Lev.*

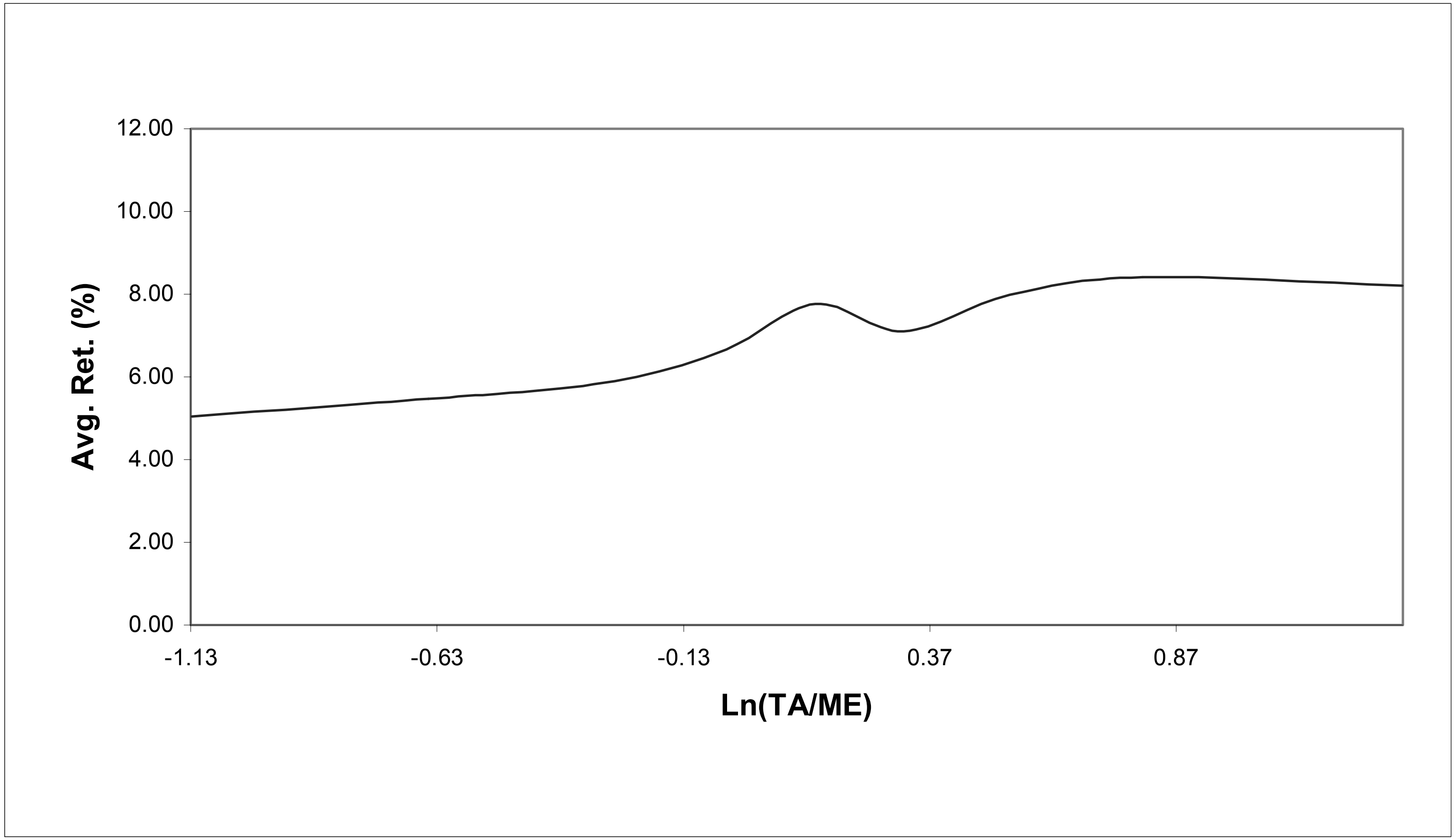

Figure 5. *Avg. Return vs. Market Lev.*

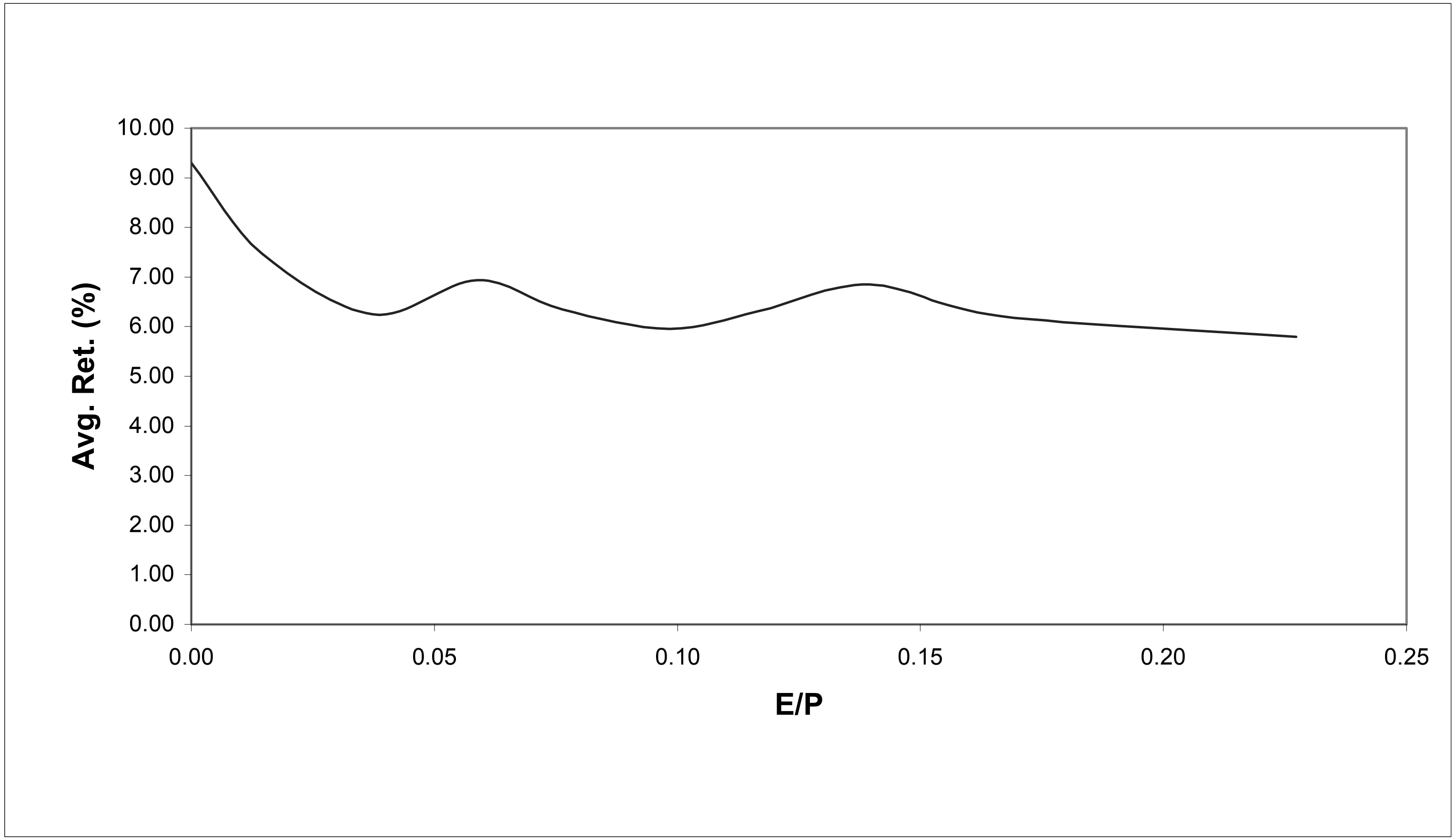

Figure 6. *Avg. Return vs. Earnings Yield*

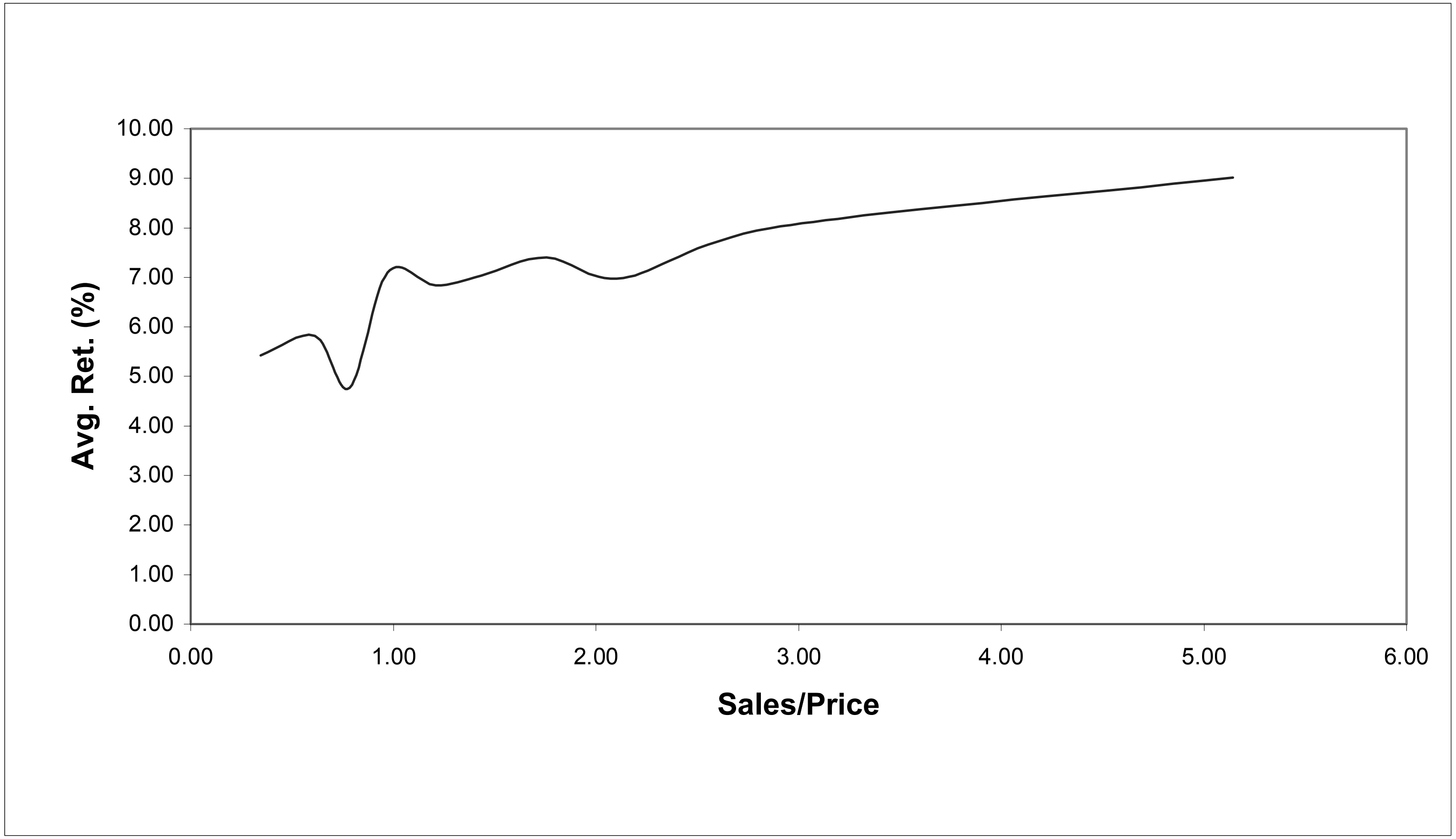

Figure 7. *Avg. Return vs. Net Sales-to-Price Ratio*

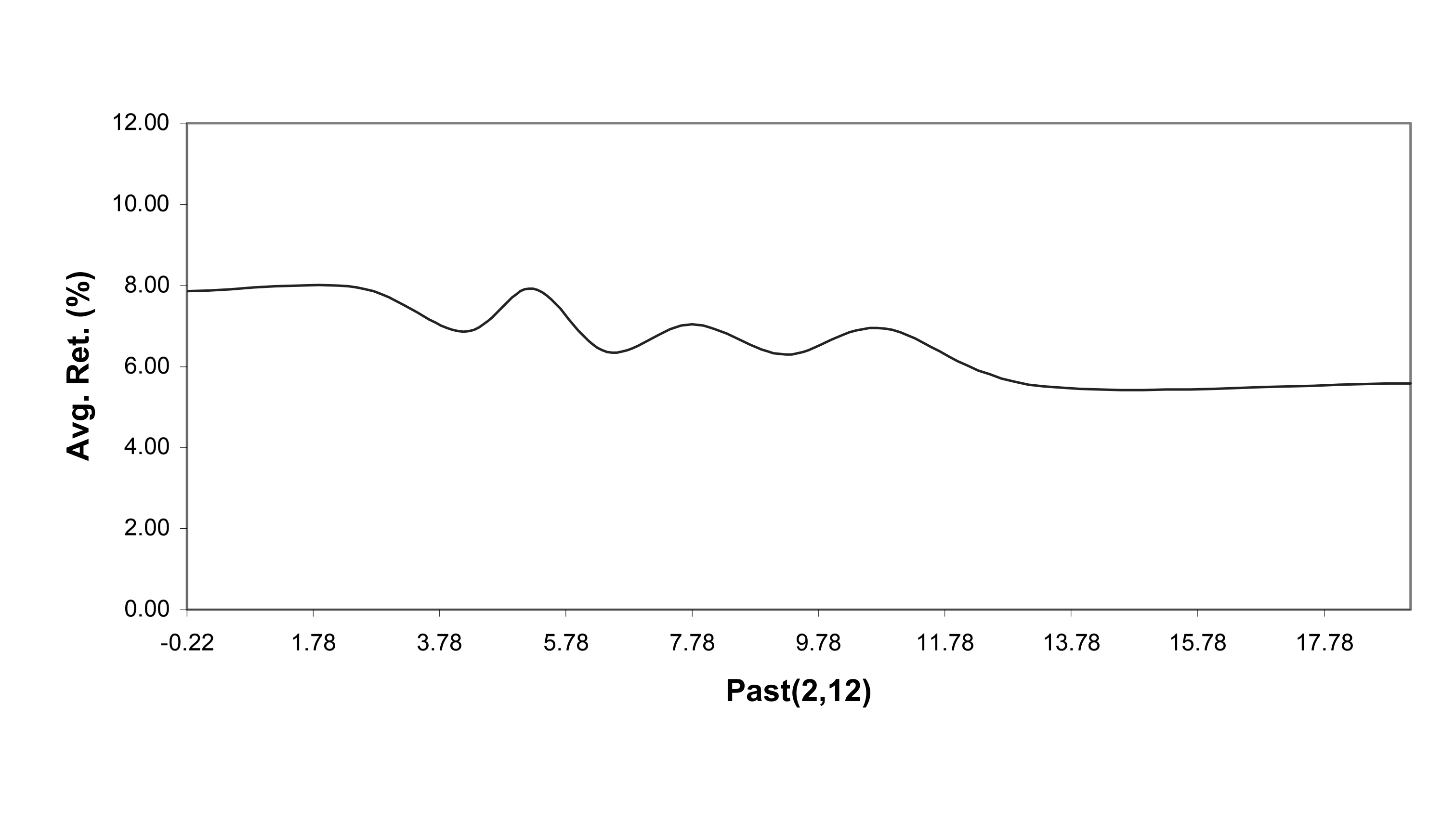

Figure 8. *Avg. Return vs. Past Return Performance*

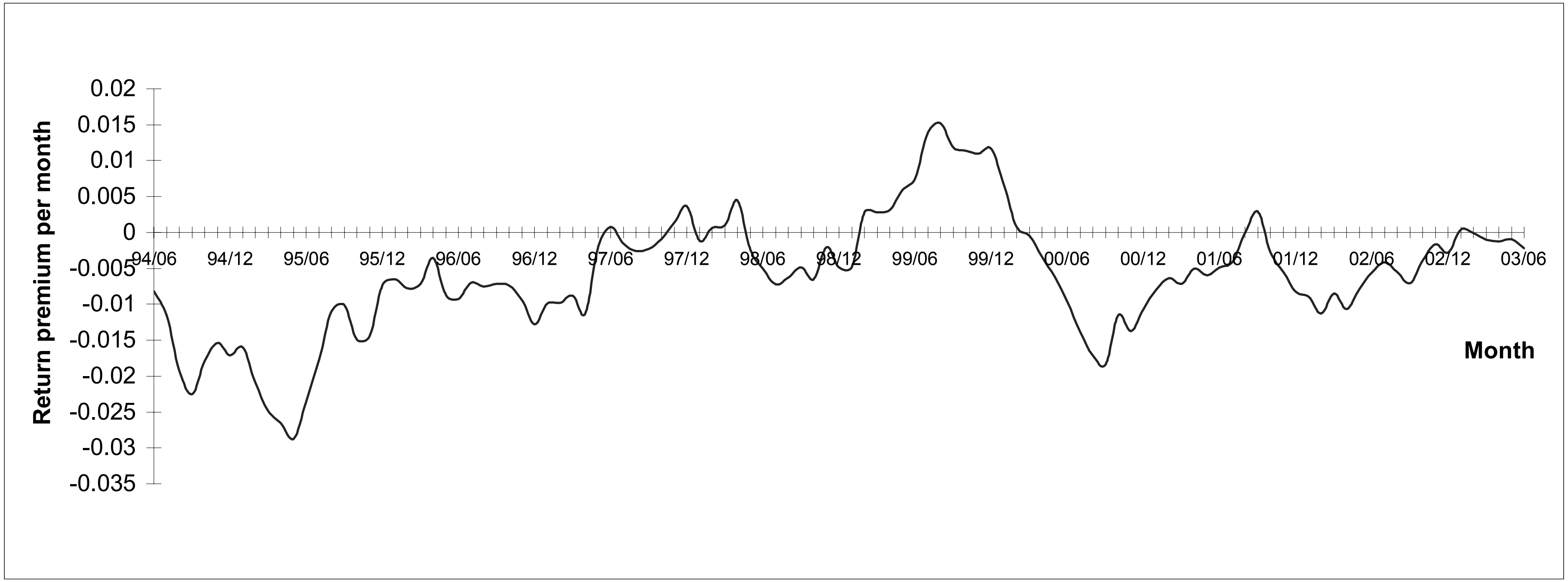

Figure 9. *1-Year Moving Average of Coefficients: Firm Size*

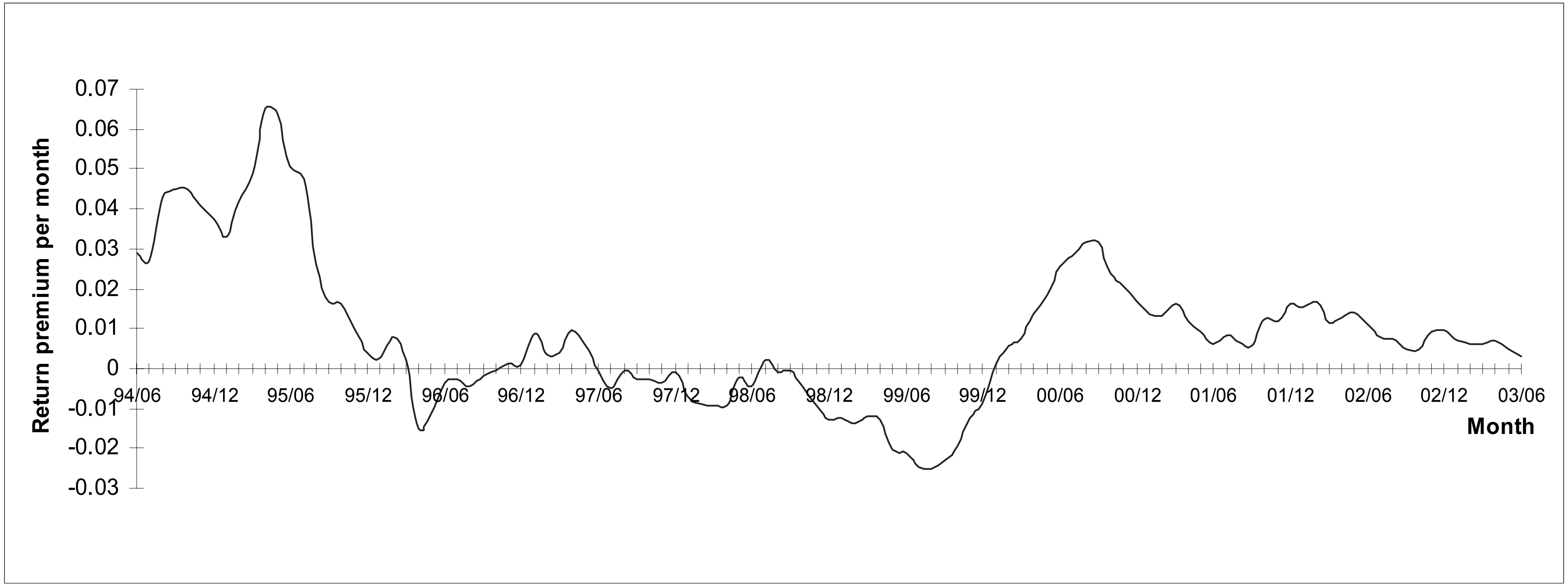

Figure 10. *1-Year Moving Average of Coefficients: B/M*

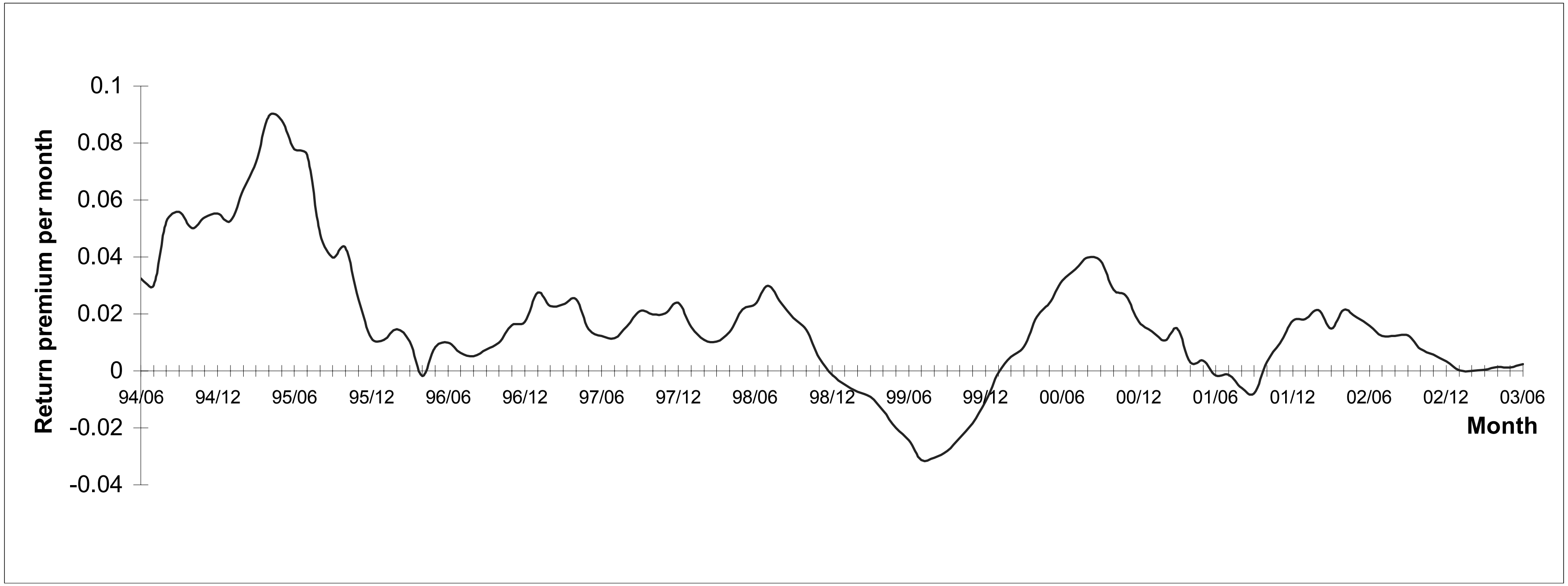

Figure 11. *1-Year Moving Average of Coefficients: Market Leverage*

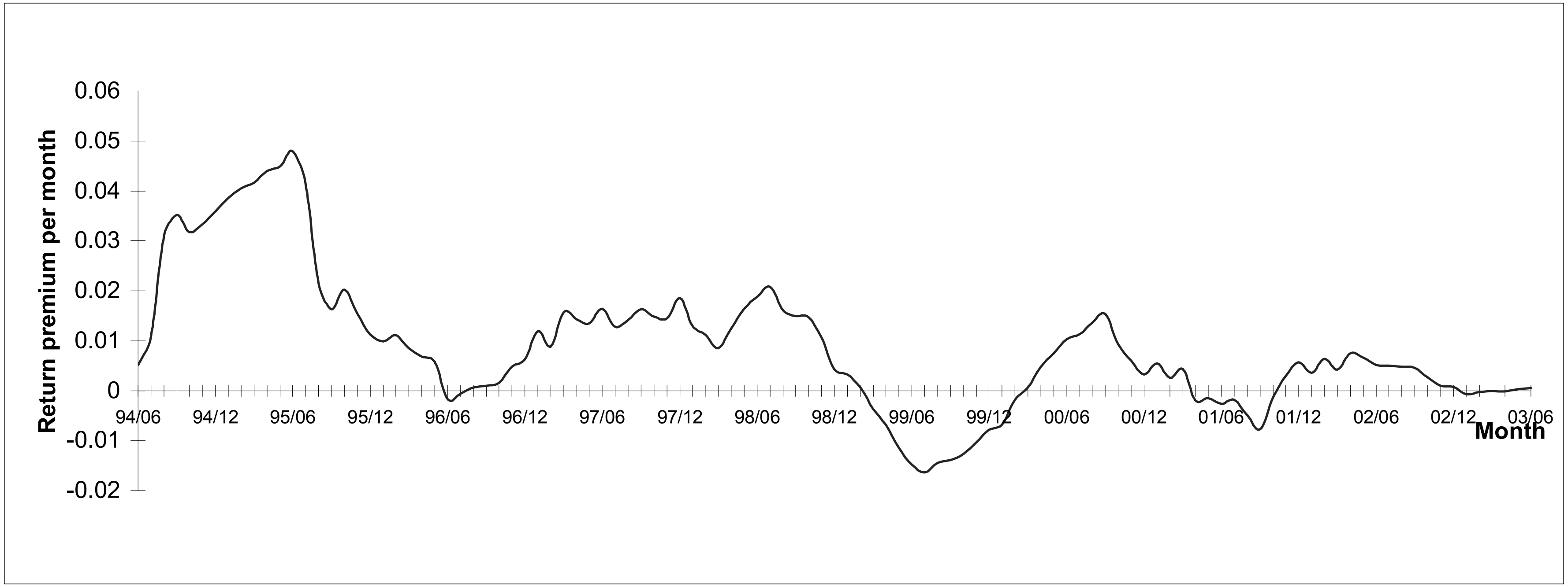

Figure 12. *1-Year Moving Average of Coefficients: Net Sales-to-Price ratio*

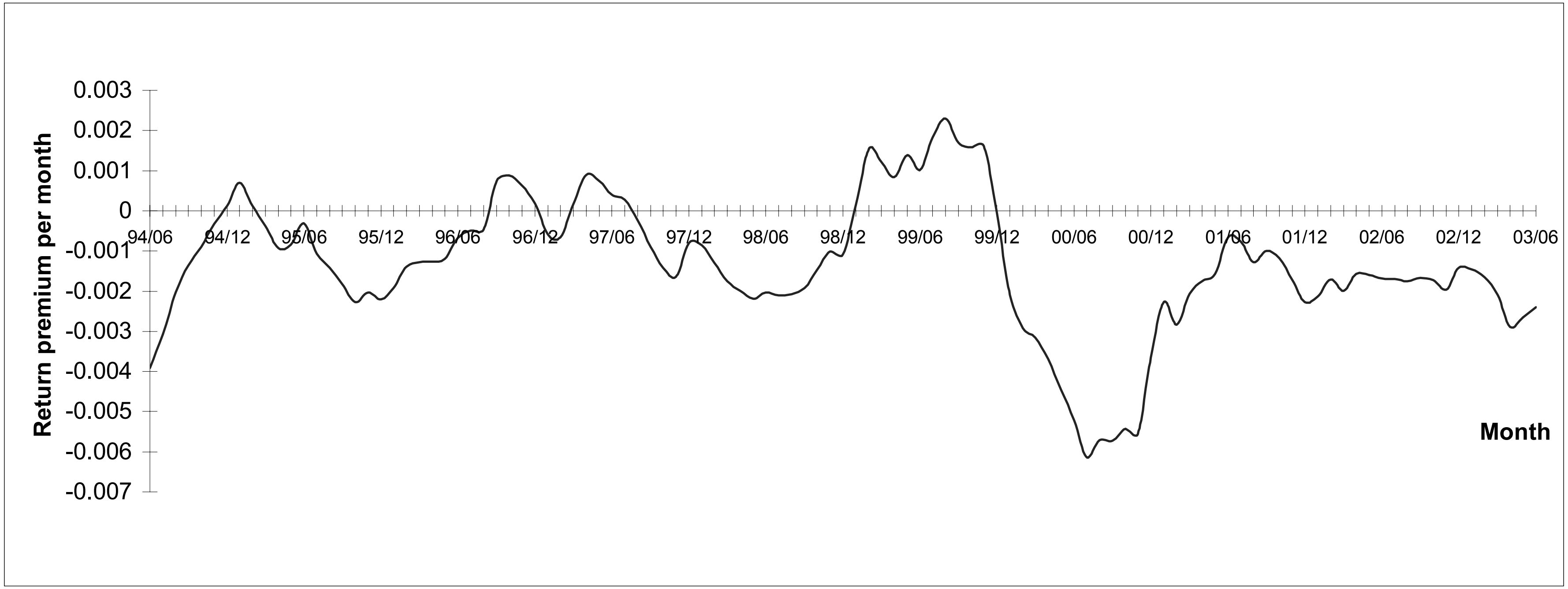

Figure 13. *1-Year Moving Average of Coefficients: Past(2,12)*