

## Firm Characteristics and Stock Return

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### Abstract

“What determines stock returns?” Although the answer to this question has been much sought by researchers and investors, most studies to date are empirical in nature and provide a very limited view of the problem. The general findings are that certain firm characteristics do have an affect stocks returns. Among these characteristics, the popular ones studied include market-to-book value ratio, size, and price-earning ratio. However, many studies have found these characteristics to have a negative relationship with stock returns. Nonetheless, some researchers show that market-to-book value has stronger explanatory power than others in specific markets. All in all, there is no consensus on which single or combination of characteristic(s) best explain stock returns universally, leaving interested academics and investors to find out which research settings are best proxies for their situations and which characteristics should be taken into consideration.

### 1. Introduction

The question of “What determines stock returns?” has caught the interest of both investors and researchers for years. Although there have been many published studies on stock returns, most of them are empirical in nature and they generally focus on a limited set of variables at a time. Besides, the sample of stocks and periods of study vary from research to research. To date, there is no study that attempts to ties all these research pieces together in a ‘big picture’ mode. Therefore, the present study seeks to fill this void by reviewing the salient literature and providing a comprehensive summary on the relationship between firm characteristics and stock returns.

When it comes to stock returns, studies have explored links between firm characteristics and stock returns. Some characteristics have been shown to have a strong ability to forecast stock returns. However, in the real world, creating a portfolio based on those characteristics does not always produce results as expected. For example, Morningstar reported that in 2006, the S&P 500 outperformed 69.1% of large-cap funds. Besides, in the last three (five) years, the S&P 500 have beaten 66.7% (71.4%) of large-cap funds. If certain characteristics, other than size in this example, do have predicting power for stock returns, why couldn’t the majority of managed funds beat the S&P 500? A possible explanation for the fact that research findings do not fully apply in real world may be various setting differences between research and the real world, including economic conditions, market domains, timing, sample selection, methodologies and so on. Thus, to be able to apply academic research to real world more efficiently, one should probe further to understand how different settings might influence the relationship between firm characteristics and stock return.

In academic research, stock returns have been found to be associated with various firm characteristics, including size (or Market Capitalization or Market value of Equity); Market-to-Book Ratio; Price-to-Sales and P/E ratio. However, most studies to date do not explore all these variables at once.

Size and Market-to-Book have been found to be important measures in explaining cross sectional stock returns (e.g. Fama and French, 1992; Davis, 1994; Lakonishok, Shleifer, and Vishny, 1994; Chan, Jegadeesh and Lakonishok, 1995; Loughran, 1997; Jensen, Johnson and Mercer, 1997; Gerald et al, 1997; Chui and Wei, 1998; Cochrane, 1999; Drew, Naughton and Veeraraghavan, 2003). Some researchers have studied size and Market-to-Book ratio in isolation, while others have studied them in combination. The following discussion

will examine these two variables individually as well as in combination with each other. We shall also look at other popular ratios, such as the price-earnings (P/E) ratio.

## 2. Size

Size is often measured by Market value of Equity or Market capitalization. One reason why size is a main focus in studies on cross-sectional stock returns is that institutional and foreign investors tend to prefer large-size and fundamentally strong firms. Banz (1981), Basu (1983) and Keim (1983) provide empirical evidence to show that on average, small-size firms yield higher stock returns than large-size firms. Banz (1981), whose work covered data from 1926-1981, also specified that the superior average returns of small-size firms are already risk-adjusted. This provides evidence against the belief that small-size firms are generally riskier than large-size firms and, thus, deserving higher returns. Berk (1995) agrees that the relationship between size and stock returns should be negative. However, he simply reasons that small size firms tend to be riskier than large size firms, *ceteris paribus*, because market value of equity (or size) will be generally pushed down in order to provide higher expected returns.

Reinganum (1982) demonstrates that small firms earn significantly higher returns than larger firms when systematic risk is held constant. Loeb (1991) examines the small stock performance during 1970-1989, considering the effects of both risk and liquidity. His findings also support the fact that small-size stocks yield higher returns than large-size stocks. Loeb also suggests that when adjustments for risk and transaction costs are taken into account, the raw total returns available to small stocks portfolios are reduced considerably.

Fama (1991) further added that on average, small-size firms earn higher stock returns in January than in the remaining months. This January effect will be further discussed later on. Dhatt, Kim and Mukherji (1999) explore stock returns among small size stocks in the Russell 2000 index (which is used to measure the performance of US small size stocks). In contrast to the above findings, they found that large-stocks provide higher average stock returns with less risk than small-size stocks.

## 3. Market-to-Book Ratio

Market-to-book ratio has been called differently in different studies. It is also known as (1) Market value of Equity to Book value ratio or MV/BV or ME/BE, and (2) Price-to-Book value ratio or P/BV. Some researchers use its inversion as a variable, resulting in opposite reading. To be consistent, this study will use the term Market-to-Book Ratio hereinafter.

Market-to-Book ratio is significant in that it is one of the powerful measures that divide stocks into value and growth stocks (other measures of valuation include price-to-earning (P/E) ratio and sales-to-price ratio). Value stock is marked by low Market-to-Book ratio and growth stock is marked by high Market-to-Book ratio. The rationale behind these two terms is not hard to come by. Low Market-to-Book ratio signifies value because for every stock investors buy, there are relatively high underlying assets as reflected in the book value of that stock. Unlike value stock, growth stock, which has high Market-to-Book ratio, implies the opposite. Whatever factors drive stock price until it is relatively high when compared to book value/share, those factors are combined and labeled as growth. The question why the value-growth dichotomy could relate to stock returns remains unclear as existing studies do not unanimously agree on what Market-to-Book value ratio actually measures. Harris and Marston (1994) suggest that growth and beta are part, but not all, of the book-to-market (Market-to-Book) puzzle.

However, several researchers discover that Market-to-Book ratio is one of the strongest explanatory variables for stock returns. Stattman (1980), Rosenberg, Reid and Lanstein (1985), Jacobs and Levy and Reinganum (1988), Fama and French (1992) and Daniel and Tittman (1997) found significant negative relationship between Market-to-Book ratio and stock returns, i.e. low Market-to-Book ratio stocks (value) have higher average stock returns than high Market-to-Book ratio stocks (growth)

Furthermore, Fama and French (1992) show that Market-to-Book has the strongest relation with stocks returns when compared to other variables examined, i.e. MVE, earning-price Ratio, Financial leverage and beta for stock returns. Fama and French (1992) also provide two alternatives for the explanatory power of Market to book ratio. First, low Market-to-Book ratio (value) stocks are associated with higher return because low market to book ratio is linked to high risk. Consequently, higher returns should be expected. However, Capaul et al. (1993) demonstrate that value stocks (low Market-to-Book ratio) have typically lower betas than growth stocks

(high Market-to-Book ratio). Therefore, if this risk agreement is valid, beta must not be a true measure of risk. Second, low Market-to-Book ratio (value) is attributable to under-priced stocks. The correction of mis-pricing subsequently leads to high return.

Dhatt Kim and Mukherji (1999), whose work use small-size stocks in the Russell 2000 Index as sample universe, also support the above findings. They report that investors generally earn higher stock returns as they buy stocks with low Market-to-Book ratios (value). Unlike Fama and French (1992) who found that Market-to-book has the greatest predictive power for stock returns when compared with other explanatory factors examined, Dhatt Kim and Mukherji (1999) found that for small-size stocks, price-to-sales is a better indicator of value than Market-to-Book ratio. And Market-to-Book ratio is superior to price-to-earning ratio.

Loughran (1997) finds a seasonality effect of Market-to-Book ratio by noting that during 1963-1995, low Market-to-Book (value) stocks have much higher January returns than high Market-to-Book (growth). He also documents that once January is excluded from the sample, Market-to-Book and size do not explain cross-sectional variation in returns for three largest size quintiles, which account for more than 90% of total market capitalization, during the same period.

Gonenc and Karan (2003) compile and summarize explanations for why low Market-to-Book (value) stocks earn higher average returns than high Market-to-Book (growth) stocks as follows.

- Black (1993) and MacKinlay (1995) show that the negative relationship between Market-to-Book and average returns is “a chance result unlikely to be observed out of sample. However, Chan et al. (1991), and Capual et al. (1993), obtain results against the sample-specific explanation for the value premium.”
- Fama and French (1992, 1996) show that low Market-to-Book (value) stocks are fundamentally riskier. Subsequently, their higher average return is a reflection of risk bearing.
- By using the overreaction hypothesis, Daniel and Titman (1997), De bondt and Thaler (1987), Lakonishok et al. (1994), and Haugen (1995) show that “investors overreact to performance and assign irrationally low values to weak firms that have high B/M (low Market-to-Book) and irrationally high values to strong firms that have low B/M (high Market-to-Book). When the overreaction is corrected, weak firms have high stock returns and strong firms have low returns.”
- The final explanation is based on behavioral overreaction. Daniel and Titman (1997) suggest that the model covers anything that produces a premium for the value characteristic relative to the growth characteristics and is not the result of risk. However, Davis et al (1999) show that the three-factor risk model explains the value premium better than the characteristic model of Daniel and Titman (1997). They concluded that the Daniel and Titman evidence is specific to their rather short sample period.

#### **4. International Evidence: Market-to-Book Ratio**

Chan, Hamao and Lakonishok (1991) document that during 1971-1988; stock returns are negatively related to Market-to-Book ratio but positively related to cash flow yield in Japan. Like Fama and French (1992), they found that Market-to-Book ratio has the largest explanatory power than any single variable.

Aggarwal et al. (1992) confirm the findings of Chan *et al* (1991) by exploring the relationship between Market-to-Book and stocks returns on the Tokyo Stock Exchange (TSE). They found that firms with low Market-to-Book ratios (value) achieve higher average stock returns than high Market-to-Book counterparts (growth). Besides, this Market-to-Book value effect is stronger in January and June and for smaller firms.

Capual, Rowley and Sharp (1993) also demonstrate a negative relationship between Market-to-Book value and risk-adjusted returns (value firms earn higher stock returns than growth firms) during January 1981–June 1992 in France, Germany, Japan, Switzerland, U.K. and the U.S.

Roll (1995) show the same trend in Indonesia where it was found that low Market-to-Book stocks (value) earns higher returns than high Market-to-Book ratio (growth) stocks, although the difference between the two groups is not statistically significant.

However, evidence from a study of the Istanbul Stock Exchange by Gonence and Karan (2003) is contrary to most of other findings in that high Market-to-Book ratio stocks (growth) has better average stock returns than low Market-to-Book ratio (value). Interestingly, both groups, which comprise the top 30% and bottom 30% of stocks ranked by Market-to-book ratio, were outperformed by the market index!

## **5. Size and Market-to-Book Ratio in Combination**

The study of size and Market-to-Book ratio in combination has received considerable attention since it was pioneered by Fama and French (1992). They study U.S. stock returns from the 1963-1990 period and conclude that Market-to-Book and size are two easily measured variables that play an important role in explaining stock returns that cannot be captured by beta. They also assert that Market-to-Book ratio explains stock returns better than size and that for stocks of same size; low Market-to-Book ratio (value) stocks earn higher returns than high Market-to-Book ratio (growth).

Contrary to the finding by Fama and French (1992) on Market-to-Book effect, Malkiel (1995) found that during 1982-1991, without survivorship bias, growth funds and value funds did not perform differently, with average annual returns of 15.81% and 15.97% respectively. He questions that if Market-to-Book has strong predictive power for future returns, why would value fund managers not be able to outperform growth fund managers?

Chan and Lakonishok (1993) also question Fama and French (1992) as they conclude that discarding beta might be premature since Fama and French (1992) might not have taken survivorship bias into consideration. Since survivorship bias is the tendency that default companies would be excluded from databases because they no longer exist, results of studies that do not consider survivorship bias usually include only firms that are successful enough to survive until the end of studied period. However, Miller (1999) argues that the beta CAPM has undergone intense scrutiny for three decades and that no single risk factor is sufficient in explaining cross-section of expected stock returns.

Besides, Loughran (1997) suspects the practicality of Market-to-Book and size effects. Using data during 1963-1995, he sorted stocks by size into quintile and found that stocks in the smallest size quintile have the largest Market-to-Book effect and such effect is not significant in the largest size quintile. Since large size stocks are followed by a large portion of investors, when Market-to-Book effect is absent, investors would not be able to exploit it. He also provides that "one reason that the S&P 500 and other broad indexes are so difficult to beat is that for large firms, there is little consistent relation between book-to-market (Market-to-Book) and realized return." At the same time, although Market-to-Book effect is available to small size stocks, Loughran (1997) particularly shows that a substantial portion of Market-to-Book effect (outside of January) is driven by low returns on small newly-listed growth stocks, which accounts for small portion of market's total capitalization. Additionally, these small stocks suffer from low liquidity and hence may not be an option for most investors and especially large fund managers.

## **6. International Evidence: Market-to-Book Ratio and Size**

Arshanapalli et al. (1998) found international evidence that superior stock performance of low Market-to-Book ratio stocks (value) over high Market-to-Book ratios stocks (growth) is positively related to firm size for most North America, Europe, The Pacific Rim and International securities during 1975-1995.

Consistent with Arshanapalli et al. (1998), Fama and French (1998) found that during 1975-1995, value stocks (low Market-to-Book ratio) yielded superior returns to growth stocks (high Market-to-Book ratio) in 12 out of 13 major markets. They also report that returns on small-size stocks outperform large stocks in 11 out of 16 markets. Heston et al. (1999) and Rouwenhorst (1999) also support evidence of these Market-to-Book and size effects in international markets.

Chui and Wei (1998) report that in 5 Pacific-Basin markets, the stocks returns are more related to firm size and Market-to-Book ratio as described by Fama and French (1992). Market-to-Book effect exists in Hong Kong, Korea and Taiwan, but not in Malaysia and Thailand. Size effect exists in all countries studied, except for Taiwan.

Drew and Veeraraghavan (2001, 2002a) report that a multi-factor model provide parsimonious description of cross-section of stock returns, with strong relationship among firm size, Market-to-Book ratio and average stock returns for several Asian countries and Australia.

Drew, Naughton and Veeraraghavan (2003) suggest that some combination of small-size and high Market-to-Book (growth) stocks in addition to market portfolios can create superior risk-adjusted returns in the Shanghai Stock Exchange.

Chen and Zhang (1998) compare low Market-to-Book (value) stock returns across Hong Kong, Japan, Malaysia, Taiwan, Thailand and the U.S. and report that Japan and U.S. have lowest value-weighted returns and these returns are highest in Taiwan and Thailand. Chen and Zhang (1998) use structure like Fama and French (1993, 1996) to measure portfolio returns and conclude that in high growth markets like Taiwan and Thailand, where the spread of risk between small low Market-to-Book (Value) stocks and big high Market-to-Book (growth) is small, value premium almost does not exist. It has some presence in Hong Kong, Japan and Malaysia and persists in U.S. In conclusion, the higher the growth of the market, the smaller the low Market-to-Book (value) effect. For size effect, Chen and Zhang (1998) confirm previous findings that small-size firms tend to earn higher average return than large-size firm in all countries studied except Taiwan. Consistent with this finding, Gonenc and Karan (2003) find that value premium does not exist in the Istanbul Stock Exchange, which is also considered a growing market.

Aggarwal et al (1992) rank stocks by Market-to-Book ratio into quintiles. Then, in each quintile, they further divide stocks by asset size (not market value of equity) into quintile. They found that average asset size of each Market-to-Book quintile has negative relationship with average Market-to-Book. In other words, high Market-to-Book firms (growth) are smaller than low Market-to-Book firms (value). Therefore, these two variables should not be proxy for each other. Large firm is expected to have lower stock returns (as Banz (1981), Basu (1983), Keim (1983) and Loeb (1991) suggest) but they yield higher return. Thus, this finding indicates that Market-to-Book effect has stronger effect than size.

## **7. Influence of Economic Conditions on Size and Market-to-Book Effect**

Chan and Chen (1991) and Fama and French (1995) found that small size firms and low Market-to-Book (value) firms are risky, while distressed firms are prone to default during adverse economic conditions. Therefore, they must provide relatively high risk premium during declining economic conditions.

Gerald et al (1997) report significant and consistent size and market-to-book ratio effects only during expansive monetary policy periods but not during restrictive periods. This view support findings by Jensen, Mecer and Johnson (1996), Fama and French (1995), Chen (1991) and Chan and Chen (1991).

Maroney and Protopapadakis (2002) examine the effects of Market-to-Book and Size in a general asset pricing model using data from Australia, Canada, Germany, France, U.K., Japan and U.S. They conclude that Book-to-Market and size effects are “international in character” and “strong under general model and against a variety of alternative macroeconomic and financial conditioning variables.”

## **8. Price-Earning (P/E) Ratio**

The P/E ratio indicates how many times investor pay for earnings of the last 12 months. Although P/E is one of the most frequently reported ratios, it is sometimes meaningless, especially when a company has abnormally high or low or negative earnings. Thus, as a valuation measure, P/E seems less reliable than Market-to-Book ratio, which usually yields meaningful reading more often than P/E does. Notice that for the same stock, these two ratios have the same nominator but the denominators, i.e. earning and book value, are influenced by different accounting procedures. Book value seems to be harder to manipulate than earnings. Evidence that earnings can be easily manipulated is provided by Ballon and Tomita (1988) who report that in Japan, executives consider it is justifiable to equalize profits from year to year.

Basu (1977) argues that low P/E ratio stocks earn higher average returns than those with high P/E ratio. He also found that as low P/E ratios portfolios earn higher returns, those returns were not associated with higher level of systematic risk. Breen (1978) and Dreman (1980a, 1980b and 1979) support Basu (1977) findings.

Reinganum (1981) shows that the P/E ratio effect is a result of a strong relationship between P/E ratio and firm size, and that the effect almost absent when returns are controlled for firm size. Basu (1983) further explores this relationship and reports that while the P/E ratio effect is not entirely independent of the size effect, the effect of these two variables is more complicated than expected. Keown et al. (1987) conclude that most

authors opine that the P/E ratio effect and the size effect are caused by a misspecification of CAPM rather than market inefficiency.

Works by Ander (1982), Dreman (1980a, 1980b and 1979) and Goff (1979) convince many investment advisors to recommend investing in low P/E ratios. Keown, Pinkerton and Chen (1987) argue that such advice is incomplete because investing in securities within some P/E ratios range will lead to “significant extra-market covariation or group effects among the selected securities thus, preventing the elimination of unsystematic risk that is typically achieved by diversification.” It has been shown that if investors limit their common stock selections to low or high P/E ratio firms, they expose themselves to abnormally high levels of unsystematic risk regardless of the size of the portfolio’

For non-U.S. evidence, Aggarwal, Hiraki and Rao (1990) demonstrate the P/E effect for Japanese equities.

## **9. Price to Sales Ratio**

Barbee, Mukherji and Raines (1996) report that price-to-sales ratio is positively related to stock returns. Besides, they provide evidence that price-to-sales ratio absorbs the role of Market-to-Book ratio and size in explaining stock returns in the U.S. during 1979-1991.

## **10. Debt to Equity Ratio**

Bhandari (1988) shows that there is a positive relationship between debt-to-equity ratio and stock return, but once the former is controlled, stock returns should be explained better by ROE, size or Market-to-Book ratio.

## **11. Conclusion**

In studying firm characteristics that have explanatory power for stock returns, one should consider all the variables that have been found to be significant by researchers. The degree of explanatory power varies depending on the universe of stocks, period of study, threshold values of each criterion and so on. Although there is no consensus on which single variable best explains stock returns, several studies find that Market-to-Book value, size and P/E ratio seem to have consistent and strong predicting power for average stock returns. These three characteristics could be considered first when selecting stocks. However, there is no guarantee that a characteristic that has been proven significant in specific markets and during specific time periods could be an efficient indicator in different markets or time periods. Thus, investors should not expect these research results to work perfectly in the real world. Rather, they should use these findings as guide for their own investment strategies and prepare to live with the results, whatever they may turn out to be.

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Firm efficiency and stock returns. *Journal of Productivity Analysis*, Vol. 37, Issue. 3, p. 295. Gaganis, Chrysovalantis Hasan, Iftekhhar and Pasiouras, Fotios 2013. Efficiency and stock returns: evidence from the insurance industry. *Journal of Productivity Analysis*, Vol. 40, Issue. 3, p. 429. Stock Market Returns, Size effect, Value effect, Firm characteristics. INTRODUCTION. The companies can be distinguished from one another on the basis of different financial and non financial characteristics including size, value, profitability, structure etc. These characteristics are unique to specific companies and raise a perception in the mind of the users of that information. 51. *Asian Economic and Financial Review*, 2013, 3(1):51-61. regarding the performance and future of the company. In the current scenario where all critical decisions of firm management quickly reach the markets as well We provide a theoretical model linking firm characteristics and expected returns. The key ingredient of our model is technological shocks embodied in new capital (IST shocks), which affect the profitability of new investments. Firms' exposure to IST shocks is endogenously determined by the fraction of firm value due to growth opportunities. Our calibrated model replicates: i) the predictability of returns by firm characteristics; ii) the comovement of stock returns on firms with similar characteristics; iii) the failure of the CAPM to price portfolio returns of firms sorted on characteristics; iv) the time-series predictability of market portfolio returns by aggregate investment and valuation ratios; and v) a downward sloping term structure of risk premia. Key words: Firm characteristics, Cross-sectional expected stock returns, Combination forecast, Machine learning, Fama-MacBeth regression, Forecast encompassing. 1. Introduction. Green, Hand, and Zhang (2017, GHZ) construct a comprehensive set of 94 firm characteristics and analyze their ability to explain cross-sectional US stock returns, addressing a challenge posed by Cochrane (2011). Specifically, instead of generating stock return forecasts by fitting a cross-sectional multiple regression that includes all 94 characteristics as predictor variables, our forecast combination approach produces return forecasts by first fitting a series of cross-sectional univariate regressions, each of which includes an individual firm characteristic as a predictor variable.