A Test of Market Efficiency: Evidence from the Icelandic Stock Market

by

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Abstract
This extensive study examines the relationship between the price-to-earnings (P/E) ratio, the market-to-book (M/B) ratio, dividend yields, size, past returns, and current returns of Icelandic stocks. The study uses monthly return data on stocks from the Iceland Stock Exchange from January 1993 to June 2003. The model, which uses multiple regression analysis with dummy variables, is based on the classical Capital Asset Pricing Model, so the beta coefficient is the sole measure of risk. The findings are that the returns of stocks with a low P/E ratio are much higher than returns of other stocks, and that these returns are statistically significantly higher when differences in systematic risk are accounted for. The returns of small stocks and stocks with a low M/B ratio are higher than that of other stocks but the difference is not statistically significant. However, there is no relationship between current returns and historical returns, or between returns and dividend yields.

JEL classification: G12
Keywords: Market efficiency, Icelandic stock market, P/E ratio
Introduction

An efficient capital market is one in which stock prices fully reflect available information. The notion that stocks already reflect all available information is referred to as the efficient market hypothesis (EMH). A precondition for the strong version of the hypothesis is that information and trading costs, the costs of getting prices to reflect information, are always zero (Grossman and Stiglitz, 1980). A weaker and economically more sensible version of the efficiency hypothesis states that security prices reflect information to the point where the marginal benefits of acting on information, i.e., the profits to be made, do not exceed the marginal costs (Jensen, 1968). Therefore, according to the EMH, stock prices change in response to new and unpredictable information and they follow a random walk—that is, they are random and unpredictable.

It is common to distinguish between three versions of the EMH: the weak, the semistrong, and the strong forms. The weak form of the hypothesis asserts that stock prices already reflect all information that can be derived by examining market trading data. The semistrong form of the hypothesis states that all publicly available information regarding the prospects of a firm must already be reflected in the stock price. Finally, the strong version of the EMH states that stock prices reflect all information relevant to the firm, even information available only to company insiders.

Testing capital markets for signs of inefficiency is difficult because ambiguity about information and trading costs causes problems. The joint-hypothesis problem is even more serious. It states that we can only test whether information is properly reflected in prices in the context of a pricing model that defines the meaning of “properly”. Consequently, when we find anomalous evidence on the behavior of returns, we cannot be sure whether it is clear evidence of market inefficiency or if the model we use is ambiguous. Therefore, market efficiency \textit{per se} is not testable (Fama, 1991).

Despite these problems, a great deal of research has been done on capital market efficiency. Most of the research supports the EMH, but some studies have found signs of capital market inefficiency. The most important signs are:

- Size. Small stocks, i.e., stocks with small market capitalization, have outperformed stocks with large market capitalization over long periods. The general belief is that small stocks give superior returns, even when accounting for risk (Fama and French, 1992).
• Temporal anomalies. Studies indicate that average stock returns have been higher in January than in other months. Across the days of the week, average stock returns have been found to be lowest on Mondays (Berument and Kiymaz, 2001).

• Value vs. glamour. A number of studies have shown that stocks with low price-to-book ratios and/or low price-to-earnings (P/E) ratios, generally called value stocks, outperform stocks with high ratios, called glamour stocks (Fama and French, 1992).

• Reversals. Several studies have found that stocks that perform poorly in one time period have a strong tendency to experience sizeable reversals over the subsequent period. Likewise, the best performing stocks in a given period tend to perform poorly in the following period (De Bondt and Thaler, 1985).

In this paper, empirical tests are undertaken to determine whether the Icelandic stock market shows signs of market inefficiency. The results of these tests are discussed in relation to the EMH and alternative theories that might explain the findings. The empirical tests search for the appearance of the abovementioned important signs of market inefficiency, which have been found on other capital markets. Therefore, the relationships between the P/E ratio, the market-to-book (M/B) ratio, size, historical returns, dividend yields, and returns on the Icelandic stock market are examined.

The Icelandic stock market

Size and activity

The total market value of quoted companies on the Icelandic stock market at the end of 2003 was approximately 9,200 million USD, or 82% of GDP. By contrast, in 1993, the total market value was only 270 million USD, which was then 4% of GDP. Figure 1 shows the total value of transactions of stocks on the Icelandic Stock Exchange (ICEX) and the total market value of quoted companies from 1993 to 2003. As the figure shows, the size of the market and its turnover has increased exponentially. In 1993, the total volume of stock trading on the ICEX was only 13 million USD but by 2003, it had grown to 7,750 million USD.
The number of registered companies reached a peak in 1999–2000, when 75 companies were trading on the exchange. Since then, the number has declined steadily, mainly because of mergers and acquisitions. Figure 2 shows the number of registered companies on ICEX and the year-end value of the ICEX-15 index. The ICEX-15 index is an index consisting of the 15 largest stocks quoted on the ICEX weighted by market capitalization. The figure shows clearly that the Icelandic stock market has been an excellent place in which to invest. The geometric mean annual return of the ICEX-15 index was 17.1% from the beginning of 1993 to the end of 2003. The return of the market was negative only in 2000 and 2001.
Figure 2. Number of registered companies on ICEX and the year-end value of the ICEX-15.
Source: The Icelandic Stock Exchange.

Data
This study uses monthly return data of ICEX stocks from January 1993 to June 2003. The data used to calculate monthly returns was obtained from the ICEX price database. End of the month prices were used to calculate monthly returns for every stock. Returns were adjusted for stock splits and dividends; i.e., dividends were included in returns. Data on earnings, dividends, stockholders’ equity, and the total number of shares outstanding were obtained by examining each firm’s financial reports for the period observed. To avoid the look-ahead bias, the previous years’ figures were not used until they were made available to investors.

The stocks used in this research were randomly selected. There are 20 stocks in the sample for 1993, with five in each portfolio during that year. For 1994, there are 24 stocks, with six in each portfolio, and for 1995 to June 30, 2003, there are 28 stocks in the sample, with seven in each portfolio.

Methodology
Finding a suitable methodology for this study was a problem. The limited number of stocks quoted and the short period of trading on the Icelandic stock market reduce the scope for a suitable methodology. The methodology used is almost identical to that used by Jahnke, Klaffke, and Oppenheimer (1987) to analyze the performance of low and high P/E portfolios.
The main difference is that they constructed a portfolio and held it for the entire period. In this paper, new portfolios are constructed each month because new information regarding earnings, yield, etc., is published for some of the stocks almost every month. Therefore, by regrouping the portfolios every month, the new information is incorporated into the research sooner. In addition, the denominator of most of these factors changes every month because the prices of the stocks change.

The main fault in this methodology is that some of the variables examined here may be related. For example, it is likely that the size of firms may be related to their P/E ratios, i.e., the price per share divided by earnings per share. To overcome this problem, it would have been necessary to split the available sample into a number of portfolios that combine attributes in a controlled manner. Because of the limited number of stocks observed, this was impossible. The reader should bear these limitations in mind when interpreting the results.

This methodology is based on grouping procedures and the construction of portfolios. For every month from January 1993 to June 2003, four portfolios were constructed based on the value of the variable examined. The stocks were equally weighted in the portfolios; i.e., the return of the portfolio equals the average return of the stocks. Then the returns of the stocks were measured and compared, and the returns of the extreme portfolios were tested to determine whether they were statistically different when accounting for systematic risk.

Markowitz (1959) laid the groundwork for the Capital Asset Pricing Model (CAPM). In his seminal research, he cast the investor’s portfolio selection problem in terms of expected return and variance of return. He argued that investors would optimally hold a mean–variance-efficient portfolio—that is, a portfolio with the highest expected return for a given level of variance. Sharpe (1964) and Lintner (1965) built on Markowitz’s work to develop economy-wide implications. They showed that if investors have homogeneous expectations and optimally hold mean–variance-efficient portfolios, then, in the absence of market friction, the portfolio of all invested wealth, or the market portfolio, is itself a mean–variance-efficient portfolio.

The Sharpe and Lintner derivations of the CAPM assume the existence of lending and borrowing at a risk-free rate of interest. Using this version of the CAPM, for the expected return of asset \(i\) we have:

\[
(1) \quad E[R_i] = R_f + \beta_m (E[R_m] - R_f)
\]

\[
(2) \quad \beta_m = \frac{Cov[R_i, R_m]}{Var[R_m]},
\]
A Test of Market Efficiency

where $E[R_i]$ is the expected return of a security, $R_f$ is the risk-free return, and $E[R_m]$ is the return of a market index. An approach known as Jensen’s alpha is one of many performance measures that are based on the classical CAPM. It is easily computed by finding the intercept, $\alpha_p$, in the regression:

$$ (3) \quad R_p - R_f = \alpha_p + \beta_p (R_m - R_f) + u_p. $$

This method was introduced by Jensen (1968). The procedure allows the efficient estimation of $\alpha_p$, a measure of the monthly excess return after adjustment for portfolio risk. Assuming the CAPM holds, the alphas on passively managed portfolios are expected to be zero because all securities are expected to lie on the security market line. Therefore, a significantly positive alpha of a portfolio indicates an excess return.

The goal of this study is to compare the performance of portfolios by applying the methodology of Jahnke et al. (1987). Rather than estimating the previous equation for two extreme portfolios, the required performance is estimated by using ordinary least squares (OLS) on the following regression:

$$ (4) \quad R_{pt} - R_{ft} = \alpha_p + d_p D_{pt} + \beta_p (R_{mt} - R_{ft}) + s_p S_{pt} + u_{pt}, $$

where: $R_{pt}$, is the return in month $t$ ($t = 1,...,126$) earned by a portfolio purchased at the beginning of the month; $\alpha_p$ is the intercept, which equals the monthly abnormal performance of the portfolio that is not represented by a dummy variable, i.e., $\alpha_H$; $R_{ft}$ is the risk-free rate, i.e., the return of one-month Treasury bills in month $t$; $\beta_p$ is the slope, which equals the systematic risk of the portfolio $\beta_H$, which is not represented by a dummy; $R_{mt}$ is the rate of return on the ICEX-15 index in month $t$; $D_{pt}$ is equal to zero for observations of the portfolio that are not represented by a dummy and one for all observations of the portfolio that are represented by a dummy variable; and $u_{pt}$ is an error term assumed to have an expected value of zero and to be serially uncorrelated. $S_{pt} = D_{pt} (R_{mt} - R_{ft})$ for all observations. The coefficient $\alpha_p$ in the equation equals $\alpha_H$, i.e., the measure of monthly abnormal performance.
for the portfolio that is not represented by a dummy variable, which means that $D_{pt} = 0$ for that portfolio. The coefficient $d_L$ is a key parameter in this regression. It measures the difference between the excess returns of the portfolio that is not represented by a dummy variable and the portfolio that is represented by a dummy variable. It should be noted that $\alpha_p + d_L$ is equal to the alpha of the portfolio, which is represented by a dummy variable. Thus, we may use a t-test to determine if $d_L$ is significantly different from zero. If $d_L$ is significant, then the returns of the portfolios are significantly different when differences in systematic risk are taken into account. $\beta_p$ equals $\beta_H$, i.e., the systematic risk (beta) of the portfolio, which is not represented by a dummy variable. Finally, $s_L$ provides an estimate of the difference in systematic risk between the portfolio that is represented by a dummy variable and the one that is not, with $\beta_p + s_L$ being the systematic risk of the portfolio that is represented by a dummy variable, $\beta_L$.

**Performance according to firm size**

*Previous research*

The size of a company is normally measured by the market value of its ordinary shares. Over long periods, and in many countries—for example, Australia, Belgium, Canada, Finland, France, Japan, the Netherlands, the UK, the US, and former West Germany—small firms have produced higher returns than large firms (Lofthouse, 1994). In an extensive study, Fama and French (1992) analyzed data from the American stock market from 1963 to 1990. They constructed portfolios based on betas and the size of firms. They found that small firms outperformed large firms for both low- and high-beta stocks. Reinganum (1992) analyzed the returns of New York Stock Exchange (NYSE) stocks ranked by size from 1926 to 1989. He found that small firms gave returns with a higher average arithmetic mean for that period. The returns of the small firms were superior even when accounting for risk. In a study of UK market data from April 1961 to March 1985, Levis (1989) found that small firms outperformed larger firms in that they gave excess returns when adjusted for risk.

The reason that small stocks outperform large stocks has been related to the higher cost of trading. The bid/ask spread is generally much higher for small stocks, making the cost of trading much higher. Another suggested reason is that smaller firms have different sector or industry distributions than do larger firms.
**Study and results**

For every month covered by this study, four portfolios were constructed according to the market capitalization of common stocks. The returns of the portfolios were measured and the performance of the extreme portfolios (the smallest and largest stocks) was measured by using standard OLS to estimate the parameters in equation 4.

Figure 3 shows the geometric mean returns of the portfolios. The portfolio with the smallest stocks has the highest returns, whereas the portfolio with the largest stocks has the lowest returns.

![Figure 3. Returns of portfolios constructed according to firm size.](image)

Table 1 gives the most important results of the regression when applying equation 4. The systematic risk (beta) is estimated to be 0.97 \((\beta_p equals \beta_H)\) and 0.76 \((\beta_p + s_L)\) for the highest and lowest market capitalization portfolios, respectively. The difference in systematic risk is statistically significant as the t-statistic of –2.13 for \((s_L)\) indicates. The alphas of the higher and lower market capitalization portfolios are estimated to be 0.15% \((\alpha_p equals \alpha_H)\) and 1.04% \((\alpha_p + d_L)\), respectively. The difference is not statistically significant as the t-statistic of 1.93 for \((d_L)\) indicates. Therefore, the returns of portfolios 1 and 4 are not statistically different even when the lower systematic risk of portfolio 1 is taken into account. The Durbin–Watson coefficient of 1.90 indicates that there is not a significant first-order autocorrelation.
Table 1. Results of the regression of portfolios constructed according to firm size.

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_p$</th>
<th>$d_L$</th>
<th>$\beta_p$</th>
<th>$s_L$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.0015</td>
<td>0.0089</td>
<td>0.97</td>
<td>−0.21</td>
<td>0.56</td>
</tr>
<tr>
<td>t-statistics</td>
<td>(0.45)</td>
<td>(1.93)</td>
<td>(*14.03)</td>
<td>(*−2.13)</td>
<td></td>
</tr>
<tr>
<td>p-statistics</td>
<td>0.65</td>
<td>0.054</td>
<td>&lt;0.0001</td>
<td>0.034</td>
<td></td>
</tr>
<tr>
<td>Durbin W.</td>
<td>1.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 5% level.

Performance according to dividend yield

Previous research

Dividend yield is defined as dividends per share divided by the market value of the share. There has been some debate as to whether high-yield stocks offer superior returns. There are many reasons for different findings. For instance, in many countries, income, including dividends, is taxed at a higher rate than are capital gains. Another reason may be that some clients prefer income and will buy high-yield stocks, whereas other investors may prefer capital gains.

Litzenberger and Ramaswamy (1979) examined the effects of taxes and dividend yields on returns. They used NYSE data from January 1936 to December 1997. They found that high returns and high yields went together and that high-yield stocks offered excess returns. In his investigation of the UK market, Levis (1989), studying data from April 1961 to March 1985, found that high-yield stocks gave excess returns. Levis tested many variables and found that yields affected returns for most of the variables tested. In a study analyzing NYSE data from January 1927 to December 1976, Elton, Gruber and Rentzler (1983) examined the effects of dividend yields on returns. They found that there was a persistent relationship between dividend yields and excess returns. In particular, except for those stocks that had previously paid zero dividends, the higher the dividend yield was, the higher was the excess return.

Study and results

For every month covered by this study, we constructed four portfolios according to the dividend yield of common stocks. Figure 4 shows the geometric mean returns of the
portfolios. Portfolio 1, the portfolio with the lowest dividend yield, had the highest monthly return. The portfolio with the highest dividend yield had the second highest average return.

![Figure 4. Returns of portfolios constructed according to the dividend yields of firms.](image)

Table 2 shows that there is no statistically significant difference between the returns of portfolios 1 and 4 because the coefficient $d_L$ is not statistically significant. Therefore, it is safe to conclude that there has not been a relationship between returns and dividend yields for Icelandic stocks.

**Table 2. Results of the regression of portfolios constructed according to dividend yields.**

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_p$</th>
<th>$d_L$</th>
<th>$\beta p$</th>
<th>$s_L$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.0083</td>
<td>0.0015</td>
<td>0.79</td>
<td>0.14</td>
<td>0.46</td>
</tr>
<tr>
<td>t-statistics</td>
<td>(2.09)</td>
<td>(0.26)</td>
<td>(*9.37)</td>
<td>(1.19)</td>
<td></td>
</tr>
<tr>
<td>p-statistics</td>
<td>0.037</td>
<td>0.79</td>
<td>&lt;0.0001</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Durbin W.</td>
<td>1.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 5% level.
Performance according to P/E ratios

Previous research

The performance of stocks based on P/E ratios is one of the most widely analyzed issues in relation to capital markets. Many US studies have shown that low P/E-ratio stocks outperform high P/E-ratio stocks over long periods. Studies of other markets have come to similar conclusions (Lofthouse, 1994). In an extensive study on the US, German, French, English, and Japanese equity markets, Haugen and Baker (1996) studied data from 1985 to 1993. They found that the ratio of earnings to price, that is, the reciprocal of the P/E ratio, affected returns in all these markets. In all countries studied, low P/E stocks gave excess returns during the period. The effect of the P/E ratio was highest in the US and France. Basu (1977) attempted to determine empirically whether the investment performance of stocks was related to their P/E ratio. He analyzed data from the NYSE between September 1956 and August 1971 and found that a low P/E portfolio gave, on average, a 13.5% return per year, whereas a high P/E portfolio gave a 9.5% return. This higher return was not associated with higher levels of systematic risk. Indeed, the systematic risk of the low P/E portfolio was lower than that of the high P/E portfolio. In an extensive study on the UK stock market from 1961 to 1985, Levis (1989) found that low P/E stocks gave excess returns during that period.

The reason for low P/E ratio stocks outperforming high P/E ratio stocks has been related to the tendency of investors to overestimate growth for high-growth companies and to underestimate growth for low-growth companies. High-growth companies normally sell at high P/E ratios, whereas low-growth companies sell at low P/E ratios, with the result that the stocks with low P/E ratios outperform the others.

Study and results

In this study, earnings are defined as profits after tax plus exceptional and extraordinary items. To rank the stocks into portfolios and compare the performance of high and low P/E portfolios, we used the E/P ratio (i.e., earnings divided by price) because companies with negative earnings are automatically ranked as having the lowest E/P ratio. For every month under study, we constructed four portfolios based on E/P ratios. The performance of the extreme portfolios, portfolios 1 and 4, was measured by estimating parameters in equation 4 using OLS.
Figure 5. Returns of portfolios constructed according to the P/E ratios of stocks.

Figure 5 shows the average returns of the four portfolios. The returns of portfolio 1, which contained the stock with the lowest P/E ratios, were much higher than the returns of other portfolios. Portfolio 4’s returns were the lowest. The figure indicates that a relationship between returns and P/E ratios might have existed.

Table 3 shows the results of the regression. The systematic risk (beta) is estimated to be 0.89 and 0.74 ($\beta_p + s_L$) for the low and high P/E ratio portfolios, respectively. The alphas of the low and high P/E ratio portfolios are estimated to be 1.3% and 0.1% ($\alpha_p + d_L$), respectively. The difference is statistically significant as the t-statistic of –2.06 for ($d_L$) indicates.

Table 3. Results of the regression of the portfolios constructed according to P/E ratios.

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_p$</th>
<th>$d_L$</th>
<th>$\beta_p$</th>
<th>$s_L$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.013</td>
<td>–0.012</td>
<td>0.89</td>
<td>–0.15</td>
<td>0.43</td>
</tr>
<tr>
<td>t-statistics</td>
<td>(*3.16)</td>
<td>(*–2.06)</td>
<td>(*10.03)</td>
<td>(–1.23)</td>
<td></td>
</tr>
<tr>
<td>p-statistics</td>
<td>0.0018</td>
<td>0.041</td>
<td>&lt;0.0001</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Durbin W.</td>
<td>1.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 5% level.
Forming portfolios based on low P/E-ratio stocks provides considerably higher returns than portfolios based on high P/E-ratio stocks. Moreover, the difference in returns is statistically significant.

**Performance according to M/B ratios**

*Previous research*

M/B ratios, also referred to as price-to-book ratios, express the market value of common stocks divided by the book value of ordinary shareholders’ funds. Many studies have found that buying stocks with low M/B ratios has resulted in excess returns. Rosenberg, Reid and Lanstein (1985) analyzed the performance of a strategy of purchasing stocks with low price-to-book ratios using data from January 1973 to March 1980 from the COMPUSTAT database. The stocks analyzed were mainly NYSE stocks. The study was constructed as a hedge study, which means that stocks with low price-to-book ratios were bought and stocks with high price-to-book ratios were sold short. The study showed that this strategy gave excess returns; i.e., it resulted in a positive return of 0.32% per month. In their extensive study, Haugen and Baker (1996) analyzed data for five countries from 1985 to 1993. They found that stocks with low price-to-book ratios gave excess returns in the US, Germany, France, the UK, and Japan. The excess return was statistically highly significant in all of these countries. Capula, Rowley, and Sharpe (1993) analyzed the performance of stocks with low price-to-book ratios (called value stocks) and stocks with high price-to-book ratios (called growth stocks) from January 1981 to June 1992 in France, Germany, Switzerland, the UK, Japan, and the US. They found that the value stocks outperformed the growth stocks in all countries studied, as they gave higher average returns when adjusted for risk during the period under study.

*Study and results*

For every month of the study, we constructed four portfolios according to the M/B ratios of the stocks in the sample. Figure 6 shows that portfolio 1, which consisted of the stocks with the lowest M/B ratios, had the highest average returns, whereas portfolio 4 provided the lowest average returns.
Figure 6. Returns of portfolios constructed according to firms’ M/B ratios.

Table 4 shows that the systematic risk (beta) is 1.04 and 0.71 for the highest and lowest M/B portfolios, respectively. The difference in systematic risk between the portfolios is statistically significant as the t-statistic of –2.76 for $s_L$ indicates. The alpha is estimated to be 0.29% and 0.94% for the highest and lowest M/B portfolios, respectively. The difference between the alphas of the portfolios is not statistically significant. Therefore, there is not a statistically significant difference in returns between the two portfolios when accounting for risk.

Table 4. Results of the regression of portfolios constructed according to M/B ratios.

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_p$</th>
<th>$d_L$</th>
<th>$\beta_p$</th>
<th>$s_L$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.0029</td>
<td>0.00653</td>
<td>1.04</td>
<td>–0.33</td>
<td>0.47</td>
</tr>
<tr>
<td>t-statistics</td>
<td>(0.73)</td>
<td>(1.17)</td>
<td>(*12.22)</td>
<td>(*–2.76)</td>
<td></td>
</tr>
<tr>
<td>p-statistics</td>
<td>0.46</td>
<td>0.245</td>
<td>&lt;0.0001</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>Durbin W.</td>
<td>2.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 5% level.

A portfolio based on stocks with low M/B ratios provides a considerably higher return than does a portfolio with high M/B stocks. The risk (beta) of the low M/B portfolio is
significantly lower than that of the high M/B portfolio. However, the different in risk-adjusted returns between the portfolios is not statistically significant.

**Performance according to previous returns**

*Previous research*

De Bondt and Thaler (1985) studied market behavior by analyzing monthly return data for NYSE common stocks from January 1936 to December 1982. They found that the market did overreact. They formed portfolios based on winners—i.e., stocks that had provided positive abnormal returns—and losers—i.e., stocks that had given negative risk-adjusted returns over the previous three years. Then they held the portfolios for 36 months. They found that, over this time, the portfolios of the 35 loser stocks outperformed the market by 19.6%, on average. In contrast, the winner portfolios performed about 5.0% below the market average. Thus, the difference in the cumulative average residual between the extreme portfolios equaled 24.6%. Jagadeesh (1990) studied the behavior of security returns using NYSE data for the period 1934 to 1987. He found that there was a negative first-order serial correlation in monthly stock returns and that it was statistically highly significant. This meant that high returns were followed by low returns. In addition, Jagadeesh found that there was significant positive serial correlation of longer lags, with the 12-month serial correlation being particularly strong. He found that the overreaction was most notable in January. Jagadeesh concluded that his research reliably rejected the hypotheses that stock prices follow a random walk. Haugen and Baker (1996) studied data from the US, Germany, France, the UK, and Japan from 1985 to 1993. They found that, in all of these countries, stocks that had given excess returns relative to an index in the previous month underperformed the following month.

The reason for the overreaction of markets has been related to the overreaction of investors to new information. Investors observe each other and the market as a whole, and some investors chase trends. This makes the market excessively volatile, as trends persist for overly long periods and then reverse.

*Study and results*

To compare the performance of winners and losers and to analyze the difference, we formed four portfolios for each month of the study according to the previous month’s return.
Table 5 shows the results of the regression, and figure 7 shows the returns of the portfolios. The average monthly returns are similar for all the portfolios: there is no statistically significant difference in returns. Therefore, there was no apparent relationship between the returns of Icelandic stocks and the previous returns.

**Table 5. Results of the regression of portfolios based on losers and winners.**

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_p$</th>
<th>$d_L$</th>
<th>$\beta_p$</th>
<th>$s_L$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.0051</td>
<td>–0.00001</td>
<td>0.87</td>
<td>–0.18</td>
<td>0.47</td>
</tr>
<tr>
<td>t-statistics</td>
<td>(1.45)</td>
<td>(–0.02)</td>
<td>(*11.56)</td>
<td>(–1.48)</td>
<td></td>
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<tr>
<td>p-statistics</td>
<td>0.15</td>
<td>0.99</td>
<td>&lt;0.0001</td>
<td>0.14</td>
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<tr>
<td>Durbin W.</td>
<td>2.07</td>
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</table>

* Significant at the 5% level.
Conclusions

In this paper, empirical tests were performed to determine whether the Icelandic stock market showed clear signs of market inefficiency, which have appeared on other capital markets.

The performance of portfolios was measured and compared both in absolute terms and when accounting for systematic risk. The model applied in this research, which used multiple regression analysis with dummy variables, was based on the classical Capital Asset Pricing Model, so the beta coefficient was the sole measure of risk. The findings were that returns of stocks with low P/E ratios were much higher than returns of other stocks, and that the returns were statistically significantly higher than those of other stocks when accounting for differences in systematic risk. The returns of small stocks and stocks with low M/B ratios were higher than that of other stocks, but the difference was not statistically significant. However, there was no relationship between current returns and historical returns, or between returns and dividend yields.

The finding that stocks with low P/E and M/B ratios provide high returns on the Icelandic stock market is consistent with findings on other stock markets. It is interesting that the small and underdeveloped Icelandic stock market shares the same signs of inefficiency that appear in larger and more developed stock markets.
References


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✓ provide research, consulting and advisory opinions to private and public organisations,
✓ ensure cooperation with both domestic and international research institutes,
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