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Value investing using price earnings ratio in New Zealand

The value investing approach has been adopted by some highly successful investors. This research finds that a consistently superior return can be achieved from value investing in low Price-to-Earnings stocks. This cannot be explained by conventional risk measures and may indicate a mispricing phenomenon in the New Zealand market.

In March 2008, riding the surging price of his own company, Berkshire Hathaway, Warren Buffett became the world's wealthiest man with an estimated fortune of $62 billion. Berkshire Hathaway posted a compound annual gain between 1965 and 2007 of 21.1 percent, more than double the gain of 10.3 percent from the S&P500 in the same period. Had an investor put $1000 in Berkshire Hathaway when it first started, he or she would have earned over $4 million by 2007. Buffet's investment strategy is arguably the most triumphant ever and his success is attributed to his strict adherence to *value investing*.

Value investing is a style of investing that looks for securities with prices that are unjustifiably lower than their intrinsic value[1]. This approach of investing was first made famous by Professor Benjamin Graham at Columbia University and his protégé, David LeFevre Dodd, and later was successfully adopted by value investors like Buffett, William J. Ruane, Irving Kahn, Charles Brandes, John Templeton and Martin J. Whitman among others. When valuing stocks, quantifying the intrinsic value is a tricky exercise, and there is no universally accepted way to arrive at this figure. Value investors believe the intrinsic value can be approximated by deciphering a stock's fundamentals. Like bargain hunters, value investors ferret for stocks that they believe are currently undervalued by the market and not recognised by the majority of the investment community.

How would value investors determine whether a stock price is cheap or expensive? They could refer to the current trading price of the stock and get confused by such a wide range of prices that stocks in the market trade at. Also, stock prices can quickly change by companies' capital decisions but the stocks neither become cheaper nor more expensive. For example, a five-for-one stock split would bring the stock price five times smaller but the total wealth of investors stay unchanged as the number of shares also goes up five times accordingly. For decades, disciples of value investing have used price-earnings ratio (hereafter PE ratio) to make investment decisions[2]. Dividing the share price by the earnings per share, the comparison between low price stock and high price stock becomes more meaningful. A $100 share with $10 earnings per share and a $10 share with $1 earnings per share now look equivalent as they both have PE equal 10. The lower the multiples of earnings the stock trades at, the cheaper and safer the equity investment is often characterised.

This article provides empirical evidence on the performance of value investing in low PE stocks on the New Zealand Stock Exchange (NZX) from 1997 to 2007. While voluminous academic studies and industry reports have praised value investing as the most consistent strategy over time in the US as well as in several other international equity markets, we know little about how value investing performs in New Zealand.[3] First, I examine the return and risk characteristics of building up portfolios containing value stocks from the NZX. Second, I summarise a recently developed behavioural finance explanation for the value investing strategy and provide supporting empirical evidence from examination of data in New Zealand. I then show how the PE ratio cut-off for value investing should be adjusted to varying market conditions. The conclusion discusses several caveats of using the PE ratio in value investing. To begin with, I present a brief primer on the PE ratio, the intuition of using the PE ratio and the determinants of the PE ratio.

A primer on PE ratio

The PE ratio is easily the most well-known tool of investing and is often reported in major financial newspapers like The Wall Street Journal, Financial Times, The Australian Financial

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Review, New Zealand Herald and also can be found in most Stock Exchange reports, or investment companies' websites. This is a simple number obtained by dividing the current share price by earnings per share (EPS) over an accounting period.

$$PE = \frac{PRICE}{EPS}$$

Usually, the share price is the current trading price of the stock. Sometimes, it can be the historical share price (end of year price, end of month price etc.). The most common calculation of PE uses earnings per share for the latest financial year, yielding the *current PE ratio*. An alternative is to add up earnings per share in the previous four quarters (for the US) or the previous two half-years (for Australia and New Zealand). Dividing the share price by this number yields the *trailing PE ratio*. For some stocks covered by analysts, it is possible to compute the *forward PE* ratio by dividing stock price by the forecasted earnings per share in the next financial year. At one point in time, investors can also find different values for the PE ratio depending on whether the earnings number used is before or after extraordinary items or whether options and warrants have been exercised which result in increasing number of shares and diluted earnings per share.

At first glance, the PE ratio is an awkward number. The numerator is a market based trading price which is long term and forward looking in nature while the denominator is often a historical accounting number collected for one financial year. It seems reasonable to expect this combination to be rather meaningless. Yet, the ratio remains one of the most popular techniques for valuation, and investors keep relying on this seemingly futile measure.

While some argue that it is not easy to manipulate the PE ratio as the price is taken from the market trading, this is not necessarily always true. The other half of the PE ratio is the earnings number prepared by accountants who can use accrual earnings (earnings recognized when cash payment has not been received) or capitalise expenses (capital expenses are written off over their useful life and do not appear in the current income statement) to move an earnings figure to a level that pleases investors. Companies can choose to adopt depreciation and amortization schedules in such a way that there are smaller charges against earnings for the current accounting period. This story becomes even more complex when investors compare how earnings are measured under different accounting standards when they study the PE ratio across international markets.

Low PE stocks, cheap and safe investment?

While a share trading below three times earnings may be considered a cheap investment when the average PE in the market is around 15, how do we know it is not extremely risky? The presumption may be that the company can sustain the level of earnings for a long time, and this provides a shield against a stock price fall. Thanks to modern risk measurement in finance, we can now quantitatively evaluate the risk level of low PE stocks as will be discussed later in this article.

Investing in low PE stocks is characterised as being low risk but more attractive than investing in bonds. The reverse of the PE ratio is called the earnings yield, and this number often indicates a more attractive alternative to bond yield. For example, a PE ratio of 5 results in an earnings yield of 20 percent, and this is more attractive than a bond generating a 9 percent yield.

Investors who hunt for bargains within industries view that stocks trading at a PE ratio far below the average PE in their sector are likely to be mispriced. This peer comparison allows for heterogeneity of PE ratios across different sectors. A technology stock trading at 15 times earnings may be a "cheap stock" if the average PE ratio for the technology sector is 30 plus.

Determinants of PE ratio

A simple way to value equity investments is by using the Gordon Growth model which aims to capture the present value of the dividend stream of a stock that continues to grow at a constant rate forever. The formula is as follows:

(1)

$$P_0 = \frac{D_1}{k_e - g}$$

where P_0 is the current share price, D_1 is the expected dividend per share in the next financial year, k_e is the cost of equity or the rate of return required by investors and g is the constant growth rate of the dividend stream.

Suppose we want to compute the forward PE for the stock, we can divide both sides of the equation by the expected earnings per share (denoted as E(EPS)) :

(2)

$$\frac{P}{E[EPS]} = \frac{(\frac{D1}{E[EPS]})}{k_e - g}$$

and because

$$\frac{D_1}{E(EPS)} = E(PayoutRatio)(\text{expected payout ratio})$$

we can rewrite (2) as:

(3)

$$PE = \frac{E[PayoutRatio]}{k_e - g}$$

From this we can see how different factors can affect the PE of a stock. Higher growth firms should have higher PE ratios as higher g reduces the denominator which in turn increases the PE. This explains why a technology stock like RAKON, with substantial estimated future growth, is trading at a hefty PE premium[4]. Higher expected payout ratio also translates into higher PE ratio ceteris paribus. But the firm cannot simply adopt a maximum payout policy, because it will then be left with insufficient funds to maintain its growth. Higher risk firms have higher cost of capital, so they should be trading at lower PE ratio. This last factor is particularly important to note because if high return from low PE investments is to compensate for bearing higher risk firms in the portfolio, the risk-return trade-off from the strategy does not benefit the investors.

Low PE investment on the NZX

To investigate the value investing strategy in New Zealand, I gather stock price data from DataStream and actual earnings per share from IBES (Institutional Broker's Estimate System) for New Zealand firms in the period from January 1997 to December 2007. PE ratio is calculated by dividing the share price by the actual earnings per share released by the firm for the most recent financial year. I exclude any firm with a loss for the financial year as this creates a negative PE ratio which is not meaningful. At year end, I form five portfolios of firms based on their ranking of PE ratio for that year and assess the return of these portfolios in the following year[5]. This exercise is repeated yearly or we say the portfolios are rebalanced annually.

Table 1 presents the number of stocks in the sample and the average number of stock per PE portfolio across 11 years. The number of stocks increases consistently over time from 70 in 1997 to 166 in 2007. The average number of stocks per PE portfolio is lowest at 14[6] in 1997 and peaks at 33.2 in 2007. Figure 1 shows the average PE ratio values across the five PE portfolios. In the lowest PE portfolio, the average PE is 7.2, and in the highest PE portfolio, the average PE is 35.7. A rule of thumb used by many value investors is a PE below 8 indicates a cheap stock.[7] This value agrees with the average PE in portfolio 1. In Figure 2, we can see the average price performance of the five portfolios in ascending PE ratio ranking. The lowest PE portfolio posts very large average annual return of 19 percent, while the highest PE portfolio appears to destroy investors' capital as it earns an average annual return of -2 percent. While the price performance is not monotonically decreasing as we move to higher PE portfolios (3 percent for portfolio 3 and 7 percent for portfolio 4), the top performance does reside in the two lowest PE portfolios. The average returns for portfolio 1, 2, and 4 are highly significant at the 1 percent level.

A valid question is how persistent this phenomenon has been in the last 11 years? Figure 3 helps address this concern by showing the value premium (the difference of return between the lowest PE portfolio and the highest PE portfolio) on a yearly basis. Except for 1998, the lowest PE stocks outperform the highest PE stocks in all years, ranging from 7 percent (in 2007) to 40 percent (in 1999). A hedge strategy of going long (buy) in the lowest PE stocks and short (short sell) in the highest PE stocks[8] earns positive returns in 10 out of 11 years. The evidence is overwhelming that low PE stocks earn higher returns than high PE stocks in New Zealand over a reasonably long period of time.[9]

Table 1: This table presents the number of stocks in the sample and the average number of stock per PE portfolio across years

Year	Number of stocks	Number of stocks per PE portfolio
1997	70	14.00
1998	84	16.80
1999	94	18.80
2000	106	21.20
2001	111	22.20
2002	117	23.40
2003	125	25.00
2004	123	24.60
2005	136	27.20
2006	161	32.20
2007	166	33.20

A spectacular return does not complete the fairy story for low PE stocks. As mentioned earlier, stocks trading at low earnings multiples may do so because they have high risk. Table 2 compares two measures of risk between the lowest and the highest PE stocks. I compute two measures of risk that are widely used by both academics and practitioners, namely beta and standard deviation. Beta refers to the association between the stock movement and the general market movement. A beta larger than 1 indicates the stock has above-average risk and a beta less than 1 indicates the stock has below-average risk.[10] Standard deviation is the overall volatility of the stock. Surprisingly, both risk measures suggest that low PE stocks are not riskier than high PE stocks. On the contrary, low PE stocks are, on average, less volatile and less subject to market movement than high PE stocks.[11]

Table 2: This table presents the average beta and standard deviation of Low and High PE stocks

	Beta	Standard Deviation
Low PE	0.68	0.44
High PE	1.22	0.75

Value premium, a behavioural finance approach

The outperformance of low PE stocks and the underperformance of high PE stocks have been attributed to investors' incorrect extrapolation of a firm's past performance. Lakonishok et al.[12] suggest that high PE stocks (also called glamour stocks) have performed well in the past and are expected by the market to continue to perform well, while low PE stocks (or also called value stocks) have performed poorly in the past and are expected by the market to continue to perform poorly. La Porta et al.[13] argue that value stocks provide greater return because the market slowly realizes that the earnings growth for value stocks is actually higher than it expects and vice verse for glamour stocks. In other words, the market has overly optimistic expectations for glamour stocks and overly pessimistic expectations for value stocks. The correction of this extrapolation results in superior return for value stocks.

Earnings announcements provide a great setting to test whether the value premium is due to market mispricing. Actual earnings numbers and other new information about the firm are released to the market, and this should help correct any error in the market's expectations. I examine market reaction to earnings announcements made by low PE stocks and high PE stocks to determine whether there is any systematic reaction.

Figure 4 shows the 3 day return (from day -1 to day +1 with day 0 being the day of earnings announcements) for low PE stocks and high PE stocks. On average, low PE stocks earn almost 2 percent in the 3 days around earnings announcements while high PE stocks earn negative 0.36 percent.[14] Returns from portfolios 1, 2 and 3 are highly significant, and the difference of returns between low PE stocks and high PE stocks is also significant (not reported). Clearly, we see substantial market correction in the expected directions for low PE and high PE stocks as

suggested by the hypothesis that investors wrongly extrapolate past performance of low PE stocks and high PE stocks and adjust when new information arrives.

PE ratio across time

While the rule of thumb is investing in stocks with PE lower than 8, investors may find their portfolios concentrated in just a few stocks in certain years if they strictly adhere to this rule. A PE ratio of 15 may be the average in a normal year but was certainly very low in 2002 for New Zealand firms. PE ratio changes over time and the PE cut-off to form low PE portfolio should change accordingly. Figure 5 presents the distribution of PE ratios for New Zealand firms in the sample. While there are a large number of observations with PE ratio between 8 and 20, there are also a significant number of companies with PE ratio above 30.

Figure 6 presents the average PE ratio and the median PE ratio in the past 11 years in New Zealand. While the median is fairly stable around 15, the average PE does swing widely from the lowest of 13.1 in 2003 to the highest of 31.4 in 2002. Figure 7 shows the 10th percentile cut-off of PE value. In 1997, 10 percent of stocks have PE less than 9.6. In contrast, in 2007, 10 percent of the stocks have PE less than 11.1. This evidence stresses the fact that value investors need to customise their PE cut-off over time to avoid having a concentrated investment portfolio.

Conclusion

The key lesson learnt from this empirical work is that low PE stocks outperform high PE stocks in New Zealand. This value premium may represent a mispricing phenomenon in the New Zealand equity market as it cannot be attributed to conventional risk measures. The mispricing of low PE stocks over high PE stocks may be explained, although not solely, by investors' incorrect extrapolation of their past performance, and the market corrects itself when new information sheds light on erroneous expectations. Investors can, however, screen for other risk factors such as the level of debt and bond rating for the firm or avoid firms with any recent bad news so that the low PE portfolio can be truly low risk.[15] The mispricing is even more likely if investors can find low PE firms with reasonable expected growth rates.[15] This can be obtained from analysts' forecast if available or projected from historical growth rates. Investors should also be aware that a low PE portfolio can be highly undiversified as this portfolio may contain a few stocks from the same sector with low PE. Finally, a cut-off level PE must be chosen depending on how many stocks the investor wants in the portfolio and the average PE in the market at the time.

Figures

Figure 1: Average PE ratio by PE ratio Portfolios

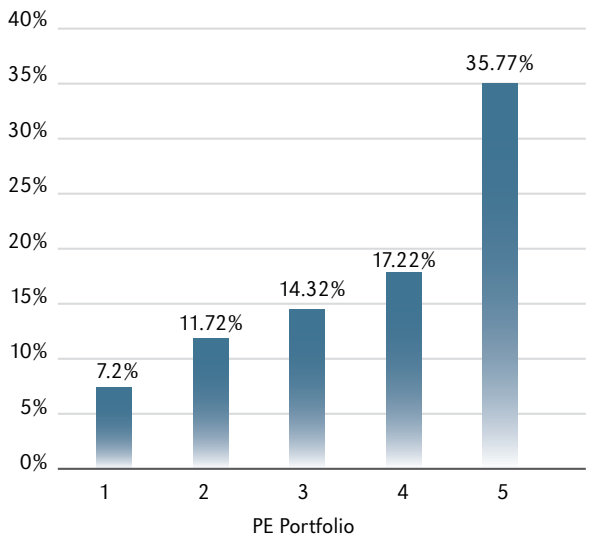
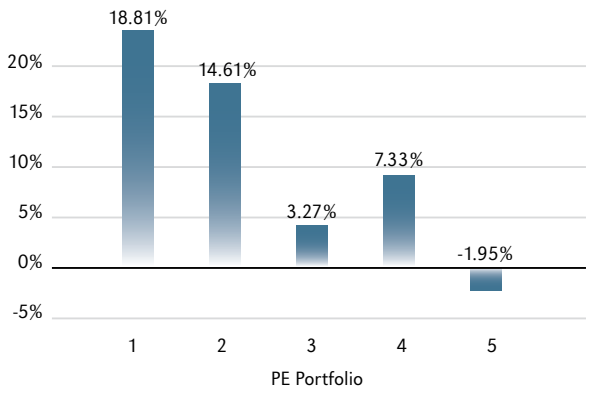


Figure 2: Annual Return by PE ratio Portfolios



Figures and graphes

Figure3: Value Premium (Lowest PE - Highest PE)

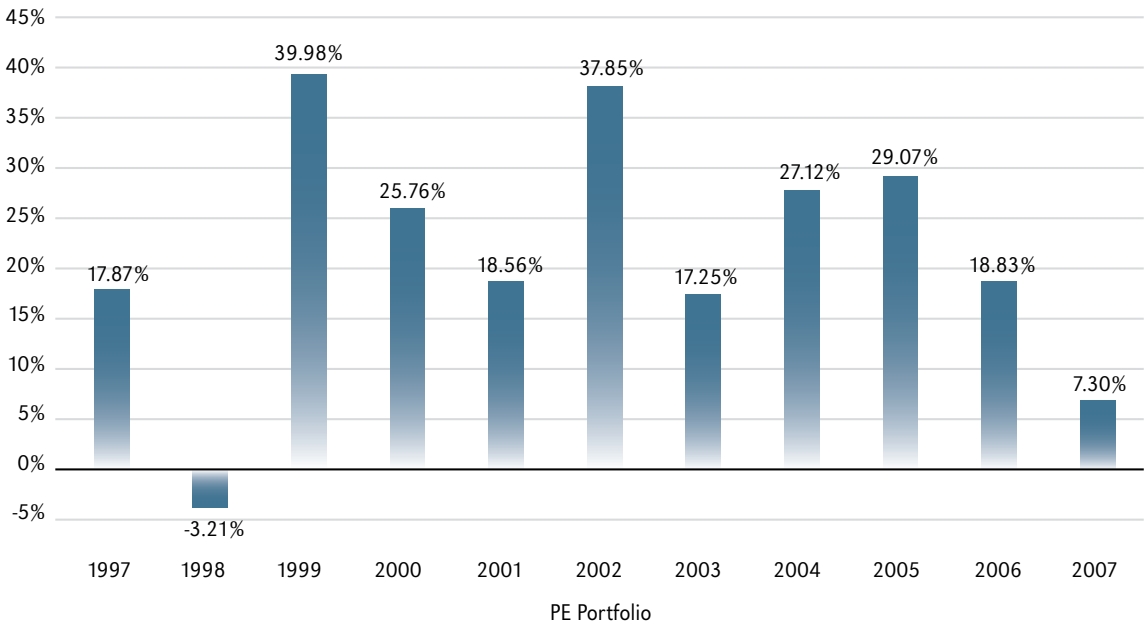


Figure 4: 3 day cummulative return around earnings announcement

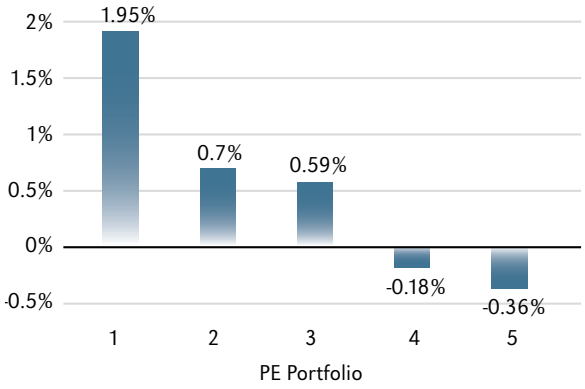


Figure 5: PE ratio distribution

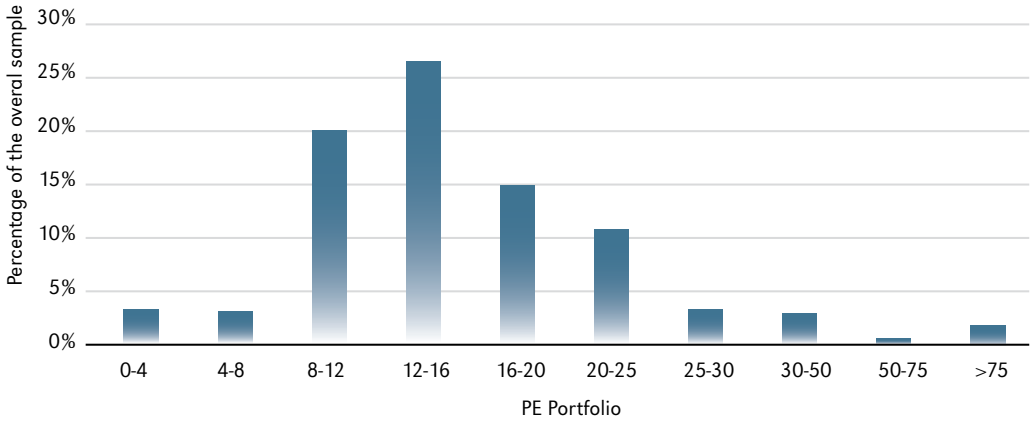


Figure 6: Average and median PE ratio in New Zealand

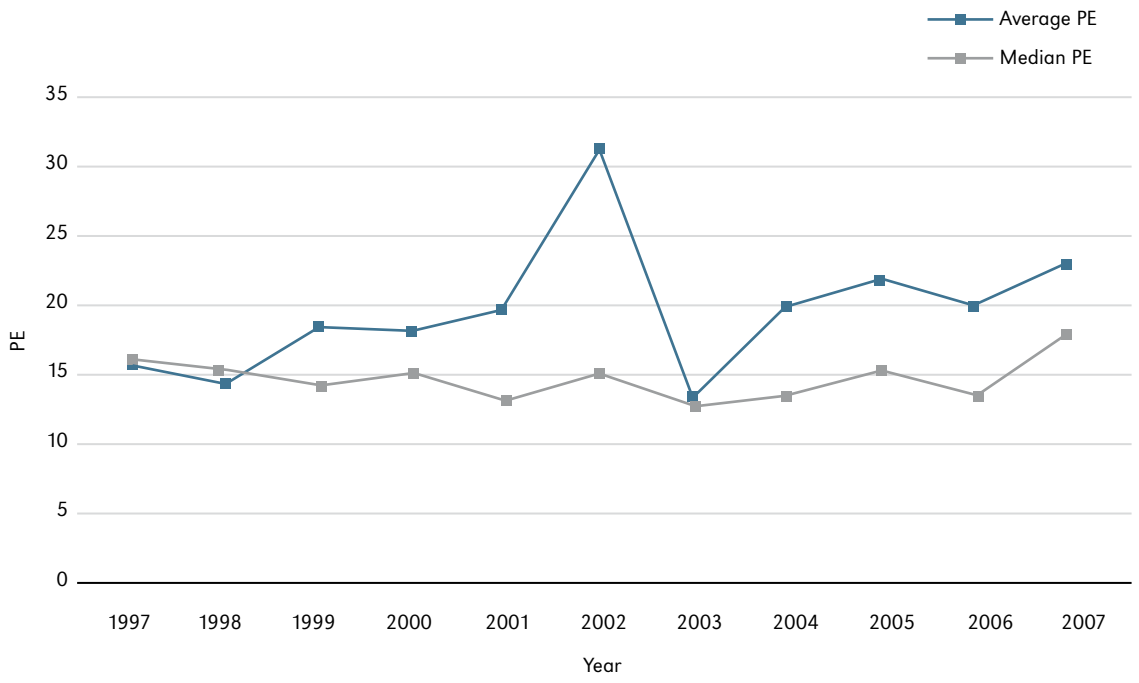
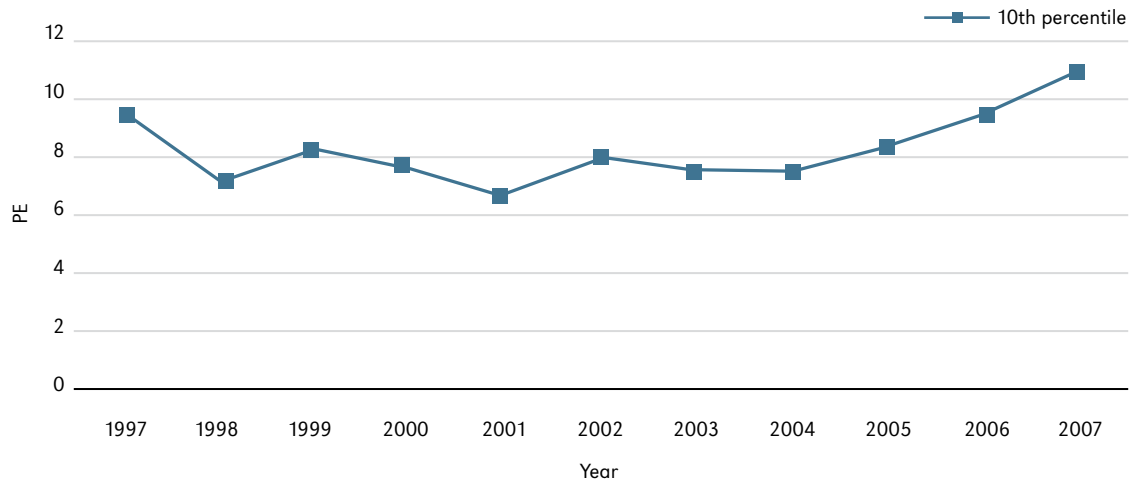


Figure 7: 10th percentile of PE ratio in New Zealand



References

1. Value investing is also referred to as Intrinsic *Value investing*, Graham and Dodd investing, or *Margin of Safety investing*.

2. Other techniques used to detect undervalued stocks include price-to-book ratio, price-to-cash flow ratio, price-to-sales ratio, and discounted cash flows. In this article, due to its simplicity and intuitive appeal in asset valuation, I only use the price-earnings ratio to identify undervalued stocks. The price-earnings ratio also best supports data availability for this particular empirical study.

3. For further evidence of value investing, see Basu, S. (1977). Investment performance of common stocks in relation to their price earnings ratios: A test of the efficient market hypothesis. *Journal of Finance,* 32, 663-682.; DeBondt, Werner F. M. and Richard Thaler. (1985). Does The Stock Market Overreact? *Journal of Finance,* 40(3), 793-805.; DeBondt, Werner F. M. and Richard H. Thaler. (1987). Further Evidence On Investor Overreaction And Stock Market Seasonality. *Journal of Finance,* 42(3), 557-581.; Jaffe, Jeffrey, Donald B. Keim and Randolph Westerfield. (1989). Earnings Yields, Market Values, And Stock Returns. *Journal of Finance,* 44(1), 135-148.; Chan, Louis K, C., Yasushi Hamao, and Josef Lakonishok. (1991). Fundamentals in stock returns in Japan. *Journal of Finance*, 46, 1739-1764.; Chan, Louis K,C., Narasimhan Jegadeesh, and Josef Lakonishok. (1995). Evaluating the performance of value versus glamour stocks: The impact of selection bias. *Journal of Financial Economics* 38, 269-296.; Fama, Eugene F. and Kenneth R. French. (1992). The Cross-Section Of Expected Stock Returns. *Journal of Finance,* 47(2), 427-466.; Lakonishok, Josef, Andrei Shleifer and Robert W. Vishny. (1994). Contrarian Investment, Extrapolation, And Risk. *Journal of Finance,* 49(5), 1541-1578.; La Porta, Rafael, Josef Lakonishok, Andrei Shleifer and Robert Vishny. (1997). Good News for Value Stocks: Further Evidence On Market Efficiency. *Journal of Finance,* 52(2), 859-874.

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4. The recent PE of Rakon is around 35.

5. I also form 10 portfolios based on PE ratio ranking and the results do not change. However, the number of stocks in each portfolio is rather small to keep a reasonably diversified portfolio.

6. This number is good enough to ensure a reasonably diversified portfolio.

7. Damodaran, A. (2004). Investment Fables. Prentice Hall

8. Short selling refers to selling the stock borrowed from the broker. Short sellers assume they can buy the stock at a lower value than the price at which they short sold. Selling short is the opposite of going long. That is, short sellers make money if the stock goes down in price. Some stock cannot be short sold on NZX and therefore the hedge strategy cannot be fully executed in practice. However, the hedge return is useful in describing the value premium over time.

9. Ideally, stock returns should be controlled for size risk and book-to-market risk to ensure that these factors are not driving the superior return of low PE stocks. Due to data unavailability, this analysis was not performed. As IBES covers medium to large firms, the size effect is less likely to play a significant role.

10. I measure beta of a stock by regressing the stock's monthly return against the market index NZALL for 30 months leading to the portfolio construction.

11. A similar conclusion is reached if I compare the risk of low PE stocks with the risk of the rest of the market.

12. Lakonishok, J., Shleifer, A. and Vishny, R. (1994). Contrarian Investment, Extrapolation, And Risk. *Journal of Finance,* 49(5), 1541-1578

13. LaPorta, Rafael, Lakonishok, Shleifer and Vishny, R. (1997). Good News fro Value Stocks: Further Evidence on Market Efficiency. *Jounral of Finance,* 52(2), 859-874

14. The results do not change when I calculate abnormal return by subtracting market return for the same 3 day period from stock's return.

15. For example, avoid firms that have more than 50 percent debt in the capital structure, firms that fall short of earnings expectation, or firms that are associated with scandals.

16. This research does not consider growth rate of low PE stocks as the information is not widely available for the stocks in the sample.