06 December 2017 | Strategy-Quant

ERP5 (modified)
Revisit with Top 100 companies

FBM KLCI: 1,724.84 points

2018 Year-end Target: 1,900 points

STRATEGY

ERP5 (modified). The Value strategies adopted for this study are **(i)** ERP5, a 4-factor (i.e. **E**arnings Yield, **R**OIC, **P**/B ratio, **5**-year average ROIC) based Value investment strategy developed by Philip Vanstraceele and Luc Allaeys, and this is enhanced by incorporating **(ii)** the price momentum factor as advocated by Philip Vanstraceele and Tim Du Toit in their research paper, "Quantitative Value Investing in Europe: What works for achieving Alpha". This hybrid value strategy is called ERP5 (modified). It is notable that this strategy only uses historical accounting data and no forecasts.

OBJECTIVE

The objective of this study is to gauge whether the ERP5 (modified), using 4 historical accounting ratios plus a price momentum factor, on various Holding Period strategy will work on Malaysian listed equities, specifically the top 100 companies based on market capitalization.

STUDY PARAMETERS

Top 100 companies... While our earlier ERP5 (modified) report dated 4 October 2017 was confined to FBM KLCI 30 constituents, this study has been expanded to include the top 100 companies (based on market capitalization) listed on Bursa Malaysia. The test period has also been expanded from January 2008 to September 2017.

...which were duly scored... To get the ERP5 (modified) score, all companies were scored on each of the five factors (i.e. Earnings Yield, ROIC, P/B ratio, 5-year average ROIC, and Price Momentum). These score were then added together to give the ERP5 (modified) score of the company. Companies with the lowest sum of factors score are the most attractive investment ideas.

...and divided into 5 portfolios... The stocks selected from the universe of top 100 stocks were then divided into five equal groups (quintiles) based on sum of factors scoring. The best 20% of companies (i.e. 20 stocks) with lowest sum of factors score were put in the first quintile (Q1), the next in the second 20%, and so on, with the 20 % of companies with the highest sum of factors score in the fifth quintile (Q5).

...on equal-weighted basis... In addition, the portfolios were all constructed on an equal-weighted basis.
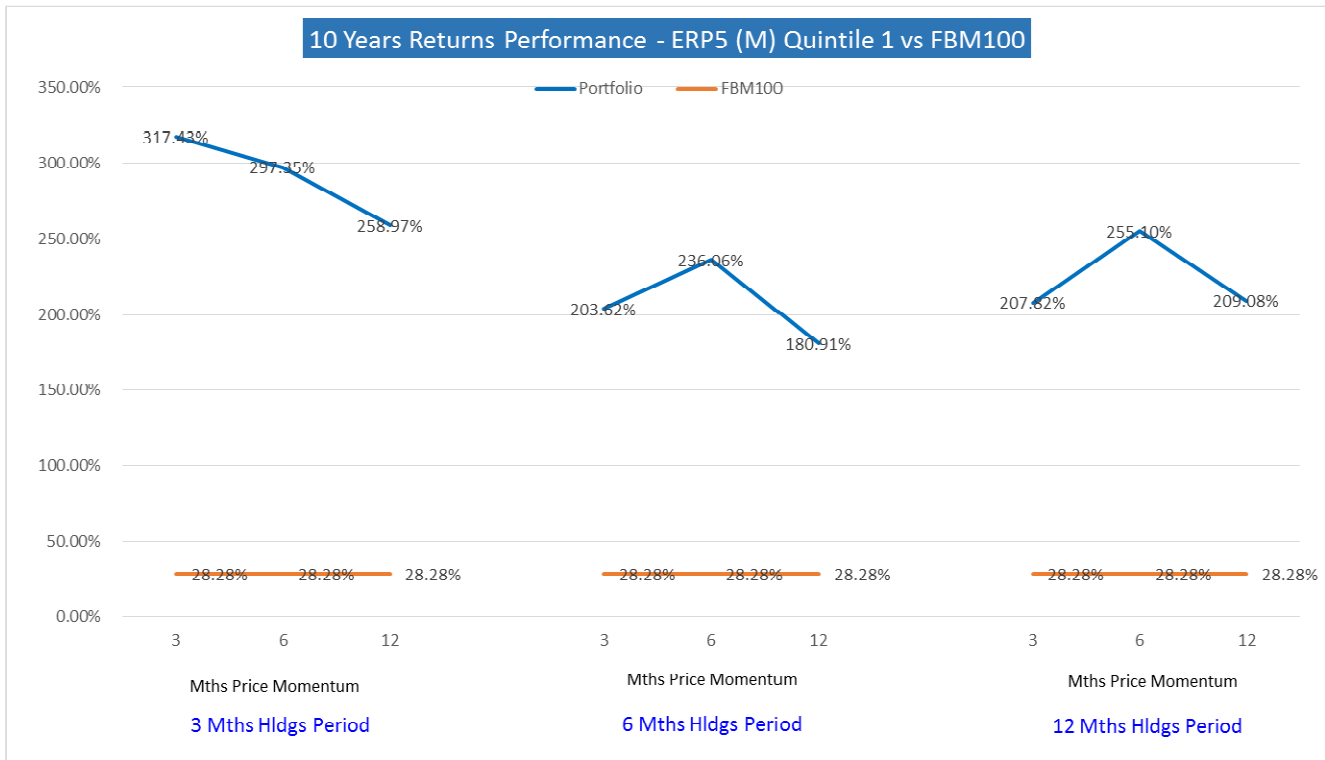
...were tested on multiple price momentum... The stock price momentum used for the testing was 3-, 6- and 12-month momentum. This was to gauge if these different time frame price momentum gave better returns in the Malaysian context.

...and holding periods. Furthermore, 3-, 6- & 12-month holding periods were used. All the back test portfolios were tested based from beginning of the year.

IR and TE added. It must also be noted that 2 additional risk metrics, namely Information Ratio (IR) and Tracking Error (TE), are added to our study.

FINDINGS

It again works... The study found that the ERP5 (modified) portfolios were able to <u>massively outperform</u> (see Chart/Table below) the FBM100 Index, which is the benchmark used for the top 100 companies. On this score, we can safely conclude that the ERP5 (modified) portfolios among Malaysian top 100 listed equities also exhibit superior characteristics as mentioned in the result of similar studies conducted in other markets.

10 Years Returns Performance - ERP5 (M) Quintile 1 vs FBM100

FBM100 - 10 Yrs Back Test

Mths Price Momen- tum	Mths Holding Period	10 Years Compounded												
		2008 - 2017												
		Returns			CAGR		Return to Risk Volatility		Sharpe Ratio		IR	TE	No. Periods Out Perform		
		Portfolio	FBM100	Out/Under Perfor- mance	Portfolio	FBM100	Portfolio	FBM100	Portfolio	FBM100			Total Periods	Out Perform Periods	% Out Perform- ance
3	3	317.43%	28.28%	289.15%	15.78%	2.59%	30.10	3.79	29.73	3.26	1.48	9.19%	39	33	85%
6	3	297.35%	28.28%	269.07%	15.20%	2.59%	30.06	3.79	29.66	3.26	1.56	8.35%	39	31	79%
12	3	258.97%	28.28%	230.69%	14.01%	2.59%	26.23	3.79	25.83	3.26	1.37	8.63%	39	29	74%
3	6	203.62%	28.28%	175.35%	12.07%	2.59%	14.16	2.51	13.88	2.16	1.18	7.82%	20	16	80%
6	6	236.06%	28.28%	207.79%	13.24%	2.59%	16.38	2.51	16.10	2.16	1.21	8.54%	20	15	75%
12	6	180.91%	28.28%	152.63%	11.17%	2.59%	12.57	2.51	12.29	2.16	0.90	9.31%	20	15	75%
3	12	207.82%	28.28%	179.54%	12.22%	2.59%	9.66	1.32	9.48	1.14	3.75	2.50%	10	10	100%
6	12	255.10%	28.28%	226.82%	13.88%	2.59%	11.32	1.32	11.15	1.14	3.79	2.90%	10	10	100%
12	12	209.08%	28.28%	180.80%	12.27%	2.59%	8.97	1.32	8.80	1.14	2.24	4.20%	10	10	100%
										Total			207	169	82%

...thus confirms the predictive power of historical accounting ratios... It again confirms the study by Lev and Thiagarajan (1993) which examined the predictive power of fundamental financial ratios used, as the results are overwhelming with the test shows superior excess returns over the FBM100 Index.

...and reaffirms Graham's portfolio focus. More importantly, the results in this study provide an affirmative answer to the question on whether a portfolio (e.g. of 20 stocks) based on a few simple criteria (e.g. ERP5-modified),

focusing on the results of the group instead of individual stocks, as advocated by Benjamin Graham, could outperform the broader market (e.g. FBM100 Index).

Tables of numerical results. Please refer to OVERALL FINDINGS on pages 12-14.

Conclusions. Please refer to CONCLUSIONS on page 15.

RECOMMENDATIONS

Recommended portfolio of stocks based on ERP5 (modified)

Stock Name	Price 4-Dec (RM)	MIDFR Target Price (RM)	MIDFR Recommendation
AIRASIA	3.21	4.02	BUY
ALLIANCE BANK MALAYSIA	3.80	4.60	BUY
ANN JOO RESOURCES	3.67	-	N.R.
CAHYA MATA SARAWAK	3.89	4.62	BUY
ECO WORLD INTERNATIONAL	1.02	-	N.R.
ECONPILE HOLDINGS	3.21	-	N.R.
GEORGE KENT	3.41	-	N.R.
HIBISCUS PETROLEUM	0.72	-	N.R.
HENGYUAN REFINING	11.42	-	N.R.
KSL HOLDINGS	1.19	-	N.R.
LOTTE CHEMICAL TITAN	4.77	-	N.R.
MALAYSIA BUILDING SOCIETY	1.08	1.50	BUY
PADINI HOLDINGS	5.11	4.77	NEUTRAL
PETRON MALAYSIA	11.24	-	N.R.
POS MALAYSIA	5.28	-	N.R.
SERBA DINAMIK HOLDINGS	3.165	-	N.R.
SIME DARBY PLANTATION	4.85	5.60	NEUTRAL
SIME DARBY PROPERTY	1.12	-	N.R.
SKP RESOURCES	2.03	-	N.R.
TA ENTERPRISE	0.62	-	N.R.

Source: MIDFR, Bloomberg;   Note: N.R. –Not Rated (not under MIDFR coverage)

Based on our latest ERP5 (modified) screenings as at 4 December 2017, an equal-weighted portfolio of 20 stocks listed in table above is likely to outperform the broader FBM100 Index in most or all of the upcoming 3-, 6- & 12-month holding periods.

Macro Strategy	:	**Stock Selection** using **Quantitative Selection Strategy**
Strategy Types	:	Value & Momentum Play Investing - (Benjamin Gram's Net Current Asset Value, Joseph Piotroski's F-Score, Joel Greenblatt's MF Rank, and MFIE Capital's ERP5 Score)
This Strategy	:	ERP5 (modified) Score
Strategy Concept	:	**Value investing is one of the best known stock-picking methods**. In the 1930s, Benjamin Graham and David Dodd, finance professors at Columbia University, laid out what many consider to be the framework for value investing. The concept is actually very simple: **find companies trading below their inherent worth**.

The value investor looks for stocks with strong fundamentals – by way of earnings, dividends, book value, cash flow, etc. – that are selling at a bargain price, given their quality. The **value investor seeks companies that seem to be incorrectly valued (mispriced) by the market** and therefore have the potential to increase in share price when the market corrects its error in valuation. This report examines which **financial ratios** have the highest probability of consistently outperforming the market by adopting one of the many value investing strategies available called ERP5 (modified). Considerable research has documented the **use of individual ratios** or **combinations to create portfolios that outperform the market**.

For example, one factor that received a lot of attention in the past is the **Price-to-Book Value** investment strategy. Studies by Lakonishok, Shleifer and Vishny (1994), and Fama and French (1992) have demonstrated that buying a portfolio of low price-to-book value companies' results in market outperformance. Other authors focused on different measures. Joel Greenblatt focused on **Earnings Yield & Return On Invested Capital (called Magic Formula)**, and found that scoring US companies based on these measures and investing in them on an equal-weighted and on a consistent basis in the top companies filtered resulted in an outperformance of 23% compared with the benchmark.

In his book, 'The Big Secret for the Small Investor', Joel Greenblatt wrote that the **best performing stock mutual fund of the last decade earned more than 18% annually**. This is impressive since the market, as measured by the S&P 500, was actually down close to 1% per year between 2000 and 2009. **Yet the average investor, in the same fund, managed to lose 11% per year over those 10 years.** How is that possible? The **problem is our emotions and they influence our investments returns**. After every period in which the fund did poorly, investors ran for the exits, and after every period in which the fund did well, investors piled in. Thus, the **average investor managed to lose money in the best performing fund by buying and selling the fund at just the wrong times**.

Emotions are simply a wrong guide to base investment decisions on. Our emotions and behaviour are under the continuous influences of the media, and of course of other people**. Where money is concerned, emotions regularly overcome rationality**. This can is seen in the market as stocks go up and down for no reason other than fear, greed, hope or despair of investors.

In order to **avoid emotions influencing investment decisions**, **invest using a strict standardized process; a proven system which removes emotions from the decision making process**. Think of this system as the process or procedure that a doctor needs to follow when performing an operation. It does not guarantee success, but the **procedure has proven its reliability over time** and has a **high probability of success**.

The **need to focus on the investment process with the highest probability of success, rather than the outcome, is critical when investing**. This is because investment outcomes

are probability based, and even if they have a high probability of success there is still a chance that they will be negative. However, **if only invest using a system with a high probability of market beating returns over the long term do you have a high probability of being a successful investor**.

This is exactly what this report would like to do. With so many quant strategies out there, this report suggests one of the quant strategies available based on **Value** and some **Momentum** called **ERP5 (modified)**. The evidence suggests that a value and momentum investing system, which combines both value and momentum into a single portfolio, may **prevent a value-only investor or a momentum-only investor from suffering through extended, long-term stretches of poor performance**. Of course, not all pains can be erased, and investors must always be aware that they should expect to endure sustained stretches of volatility and relative underperformance, even with a globally diversified value and momentum equity portfolio.

This study only uses **historical accounting data** and **no forecasts**. The reason being is that there is **ample evidence that forecasts, on average, cannot be relied on**. For example, in his excellent book, '**The New Contrarian Investment Strategy**', David Dreman mentioned a study that used a sample of 67,375 analysts' quarterly estimates for companies listed on US stock exchanges. The **study found** that the **average analysts' error was 40%,** and that the **estimates were misleading two-third of the time!**

Factors used were based on historical accounting/financial data to gauge how effective each factor is in generating market outperformance. It should be noted that a **less important but not insignificant factor is that historical accounting data is also cheaper**.

This **ERP5** is a **4-factor based Value investment strategy** developed by two friends, Philip Vanstraceele and Luc Allaeys, who devised it as a strategy to outperform the **Magic Formula** as described in the book by **Joel Greenblatt** called **"The Little Book that Beats the Market"**. Greenblatt Magic Formula was tested in the US and Eurozone Stock market and it was concluded that the strategy is able to generate higher returns than the market on average. Thus, the duo devised a way of combining a few great ideas into one method. They combined Greenblatt's **Earning Yield & Return on Invested Capital** with another 2 factors, **Price-to-Book Value** (one of most important indicators for Value Investing based on studies by Rosenberg, Reid, and Lanstein 1984; Fama and French 1992; Lakonishok, Shleifer, and Vishny 1994) and the **5-year trailing Return on Invested Capital**. The two extra factors were added by Vanstraceele and Allaeys as a strategy that aims **to pick high quality companies at bargain prices**. Thus, the strategy finds undervalued/mispriced companies based on the following **four accounting ratios**:

- **E**arnings Yield

- **R**eturn on invested capital (ROIC)

- **P**rice to Book, and

- **5**-year average ROIC

Hence, the strategy is named ERP5, based on the initials of the 4 factors. The duo found that the ERP5 value strategy also worked on the Finnish market they tested. In a later study, to improve the returns further, it was suggested in another paper by Philip Vanstraceele and Tim Du Toit called "Quantitative Value Investing in Europe: What works for achieving Alpha", a **fifth factor (Price Momentum)** was added.

Thus, incorporating the fifth factor, the study strategy is deemed ERP5 (modified). The Stocks are then scored based on these 5 factors. **To get the ERP5 (modified) score, all companies in the universe are scored on each of the five factors.** These score are then added together to5

give the ERP5 (modified) score of the company. **Companies with the lowest score are the most attractive** investment ideas.

Strategy Studies : Value investing have a long tradition in finance and can be traced back at least to **Graham and Dodd (1934),** when the two gentlemen laid the foundation of value investing by proposing that a disciplined investor can evaluate a rough value for a company from its financial statements, therefore, buying when the market inevitably undervalues some stocks at some point and earn a decent profit. However, soon after the efficient market hypothesis by Fama (1970) was published, **Graham (1976) stopped advocating** the use of **such techniques** in **selecting individual stocks** as the **costs of preparing fundamental analysis often exceed the benefits of earning a value premium.** In its place**, Graham SUGGESTED** that an investor should rather **FORM A DIVERSIFIED PORTFOLIO BASED ON A FEW SIMPLE CRITERIA FOCUSING ON THE RESULTS OF THE GROUP INSTEAD OF INDIVIDUAL STOCKS**.

This brings to the question that has puzzled researchers and investors ever since Fama (1970): **How efficient are the markets** and **if they are inefficient, how should one invest in order to take advantage of the value premium?** From previous research, it seems evident that the **value premium exists** (e.g. Abarbenell and Bushee, 1998 or Piotroski, 2000). Thus, this study is to test whether the value premium can be exploited using the approach suggested by Graham (1976) above: **WHETHER A DIVERSIFIED PORTFOLIO FORMED USING VALUE STRATEGIES BASED ON A FEW SIMPLE ACCOUNTING RATIOS CAN OUTPERFORM THE MARKET INDEX**.

It should be noted that the relationship between various ratios and future returns has been a subject of continuous research. Indeed, previous research on different ratios and accounting based investment strategies is ample. Research shows that in addition to being **useful in evaluating the past performance** of a company, **ratios can be useful in predicting future earnings and equity returns**. In a classic study, **Ou and Penman (1989)** found that ratios generated from accounting data were **useful in forecasting future earnings and stock returns**. Ou and Penman examined as much as 68 different accounting metrics and found that these variables could be reduced to a shorter list and **combined in a statistical model that was particularly useful for selecting investments.**

Lev and Thiagarajan (1993) examined the predictive power of fundamental financial ratios used by analysts to assess whether they are useful in security valuation. They **found that fundamental factors add about 70 percent to the explanatory power of earnings alone in predicting excess returns**. Abarbenell and Bushee (1998) devised an investment strategy using these variables and found that they can generate excess returns under this strategy.

In this ERP5 (modified) strategy context, the first ratio **Earnings Yield** has always raised researchers' interest as it is a reciprocal **Price-to-Earnings (P/E)** ratio. **Basu (1977)** studied the performance of stocks relative to their P/E ratios and found that when stocks are sorted based on the P/E ratio, **future returns are higher for low P/E stocks than predicted by the capital asset pricing model (CAPM)**, and interpreted it **as evidence of market inefficiency.**

Later, Basu (1983) studied the relationship between **high earnings yield** (low P/E ratio), firm size and future returns and showed that **companies with high earnings yield generate, on average, higher risk-adjusted returns than companies with low earnings yield even when firm size is controlled**. The usefulness of the other ratios are mentioned further down below.

Another important concept in the context of this report is the **trade-off between risk and return** which is a logical outcome of market efficiency. The risk-return trade-off suggests that

since price movements are unpredictable, an investor cannot consistently outperform the market when adjusted for risk, and consequently, in order to achieve higher returns, an investor must be willing to take more risk. The **return and risk** as **measured by Return to Volatility Ratio** and **Sharpe Ratio** in this report was very encouraging as **in all the test period the Value portfolios created gave better returns with less volatility compared to the FBM100**.

In terms of investment **holding period**, earlier research shows that a holding period of less than 12 months may not be optimal as returns can be increased by extending the holding period. However, **12 months should be sufficient for the value premium to realize**. Leivo and Pätäri (2009) found that an investor employing value strategies can extend the holding period up to 5 years without a decrease in returns.

Bird and Whitaker (2003) examined different holding periods from one to 48 months and found that **portfolios were adding value for three years when the portfolios were formed based on four ratios (P/B, dividend yield, earnings yield and P/S, i.e. price-to-sales)**. Using P/E ratio as the scoring criteria, Rousseau and van Rensburg (2003) found that both returns and the reliability of the returns increased when holding period was extended beyond 12 months. They also noticed that the **portfolios should be formed based on 12-month old scorings rather than the most recent ones, implying it takes time from the value stocks to build price momentum.** The **modified ERP5 strategy of adding stock price momentum as a fifth factor** (as advocated by Philip Vanstraceele and Tim Du Toit in their research paper "Quantitative Value Investing in Europe: What works for achieving Alpha"), **use 1-year holding period and 6-month price momentum.**

However, the study here uses **SHORTER HOLDING PERIODS** and **DIFFERENT PRICE MOMENTUM** to gauge **if superior returns can be generated** to allow for Malaysian fund managers who wish to use this strategy for their various time-sensitive portfolio return mandates which necessitate holding periods of less than one year.

What will happen if everybody starts using this strategy? To quote from **"Quantitative Value Investing in Europe: What works for achieving Alpha"**, surely the strategy will stop working if everybody uses it as investors pile in and push up prices to where these companies would not be undervalued anymore. But as Joel Greenblatt in his book, 'The Little Book That Still Beats the Market' mentioned, **the reason everybody will not follow the strategy is because when it doesn't work sometimes in a certain year, emotions creep in**. This is evidenced in this study as it does not work in 2 out of the 9.7 years back tested. Therefore, as soon as it intermittently stops working, investors will abandon it like they abandoned the top performing investment fund mentioned above. Most likely at exactly the wrong time; just before the strategy would substantially starts outperforming the market once again. In one of the last years, or one of the other years that the strategy didn't outperform the market, it would most likely have been exactly the time when investors abandoned the strategy.

Having said the above, it is worth mentioning that do not for a minute think that it is easy to follow these strategies. If any fund manager is biased with emotion towards a stock or sector, and sees different companies that the ERP5 have selected, the fund manager may immediately start analysing them and might conclude that **there's no way I am investing in that industry or company at the current time.** On this score, a fund manager that follows this strategy must remember Graham (1976), the master of value investing, which advocates the **FORMING OF A DIVERSIFIED PORTFOLIO** BASED ON A FEW SIMPLE CRITERIA **FOCUSING ON THE RESULTS** OF **THE GROUP INSTEAD** OF **INDIVIDUAL STOCKS**.

Thus, a strategy must be followed to the letter if it is to work and not modified to emotions. That is also the reason why it is suggested that a fund manager depending on investment value need to invest in between of 20 - 30 companies. This means that even if some companies do not perform, the others will do extremely well and your overall performance will still be outstanding as per the value test portfolios results.

This Study Rationale : The objective of this study is to gauge whether a famous Value Strategy called ERP5 (modified), using simple accounting ratios plus a price momentum factor, on various Holding Period strategy will work on the Malaysian equities. This study is limited to the 100 largest companies listed on the Bursa Malaysia.

Fund managers who wish to adopt this rule should, firstly, **choose stocks that meet the liquidity criteria** out of the 900 plus stocks on the Bursa Malaysia. This is to ensure an expeditious portfolio rebalancing process. Furthermore, the fund managers may also **filter the listed stocks based on market capitalization** (small-, mid- and large-caps) while strictly observing the liquidity rule. This is done to avoid the bias of a bid-ask bounce which refers to the situation in which the spread between the buying bid and asking price is considerably wide.

The test period covered for Malaysian equities spans Jan 2008 to August 2017. Data for this study are sourced from Bloomberg. The following selection criteria are used in study:

1) The company's shares are traded on the Bursa for last 9.7 years;

2) The FBM100 components were used. However, number of stocks covered was 47 and not 100 as some stocks appears on different time frames due to being included in and excluded from the index pursuant to the June and December reviews each year by FTSE Russell, the index provider; and

3) The company reported fundamental data must be reported in every year (2008 – 2017) in Bloomberg.

The **original study** for Europe and USA advocated **1-year holding period** with **6-month price momentum**. However, it was suggested by Head of Research that the **1-year time frame may be too long for some Malaysian fund managers**, thus, this study uses **SHORTER HOLDING PERIODS** and **DIFFERENT PRICE MOMENTUM** to see if superior returns can be generated to allow for Malaysian fund managers who wish to use this strategy for their various time-sensitive portfolio return mandates which necessitate holding periods of less than one year.

So, for this study, **3-, 6- & 12-month holding periods** were used. All the back test portfolios were tested based from beginning of the year. The annual returns for back test portfolios were calculated based on the 3-, 6- & 12-month holding periods. **Any dividend received during respective holding period is considered as an extra to the total returns**. This means each year, the return of the portfolio (dividends excluded) would be reinvested (equally weighted) in the strategy the following year.

Furthermore, instead of just 6-month momentum as in the original paper, the stock momentum used for the testing was **3-, 6- and 12-month momentum.** This was also to gauge if these different time frame price momentum gave better returns in the Malaysian context.

In addition, the portfolios were all constructed on an **equal-weighted basis.** Thus, this 3 aspects of Holding Period, Price Momentum and 9.7 years of back testing gave rise all together 9 back testing simulations.

Table 1 : 9 Back-Test Scenarios based on Holding Period and Price momentum		
Holding Period	**Price Momentum**	**Jan 2008 - Sep 2017**
3	3	1
3	6	2
3	12	3
6	3	4
6	6	5
6	12	6
12	3	7
12	6	8
12	12	9

In order to test the effectiveness of each strategy according to the factors tested, the stocks selected in the universe of 100 stocks were then divided into five equal groups (quintiles) based on sum of factors scoring. The best 20% of companies with lowest sum of factors score were put in the first quintile (Q1), the next in the second 20%, and so on, with the 20 % of companies with the highest sum of factors score in the fifth quintile (Q5).

A **good factor or strategy** is one where:

1. The **top quintile (Q1) outperforms the bottom quintile (Q5)** over the period back tested,

2. There must be a **linearity of returns** among the quintiles **(Q1 outperforms Q2 which outperforms Q3, and so on, up to Q5)** over the period tested, and

3. The strategy must also consistently outperform the market over time. We defined consistent outperformance when the **Q1 outperforms the market (FBM100) portfolio 60% or more of the time.**

So, in summary, we are looking for factors that increase the probability of positive returns, beat the market. **Using 5 factors**, we tested the following:

1. **Valuation factors**

   a. **Earnings Yield (EY):** EBIT/Enterprise Value. This compares the earnings of a company against its theoretical purchase price (Market Capitalization + Debt). A company with a high EY can be purchased at a relatively low price compared to the earnings it generated during the last 12 months.

   b. **Price-to-Book (P/B) ratio**: The relationship between P/B ratio and **future returns** is one of the most researched topics. In their research, Stattman (1980) and Rosenberg et al. (1985) found that average returns on the US markets are positively correlated with low price-to-book (P/B) ratio. Likewise, Chao et al. (1991) examined and reported the same relationship to be strong in the Japanese markets. Capaul et al. (1993) extended the analysis to international markets and reported and found that companies with low P/B earned excess return in every market included in the study between the 1981-1992 periods. Another research shows that buying companies with a low P/B value generates superior returns (e.g. Rosenberg, Reid, and Lanstein 1984; Fama and French 1992; and Lakonishok, Shleifer, and Vishny 1994). Moreover, the **P/B value was a favorite tool of**

Benjamin Graham and other earlier value investors. In spite of some of its shortcomings, P/B is a strong factor in generating market outperformance.

2. **Fundamental factors**

   a. **Return on Invested Capital (ROIC)**: EBIT / (Net Working Capital + Net Fixed Assets). A company with a high ROIC demonstrates that it is lean, i.e. able to generate high earnings compared to the money invested. ROIC is used to assess a company's efficiency at allocating the capital under its control to profitable investments. The ratio gives a sense of how well a company is using its money to generate returns. It gives the clearest picture of exactly how efficiently a company is using its capital, and whether or not its competitive positioning allows it to generate solid returns from that capital. Improvements in ROIC are seen in companies able to achieve higher margins, stronger cash flow, and low cost of capital.

   b. **5-year ROIC**: Average ROIC during the last 5 years. Has the company demonstrated that it has been able to generate relatively high returns in a consistent manner in the past?

3. **Momentum factor** (Stock price Momentum). The 3-, 6- and 12-month were used. Momentum measures the rate of the rise or fall in stock prices. From the standpoint of trending, momentum is a very useful indicator of strength or weakness of the stock price. It should be noted that history has shown that momentum is far more useful during rising markets and capturing stock upwards rise.

The stocks in the universe have been compiled in a database diligently prior to screening. The stocks are **screened one day before purchase** and **sold at end of designated holding period.** All stocks purchased are **equal-weighted** as advocated by the studies mentioned above.

A study cited below compares the performance of equal-, value-, and price-weighted portfolios of stocks in the major U.S. equity indices over the last four decades. **The study found that the equal-weighted portfolio with monthly rebalancing outperforms the value- and price-weighted portfolios in terms of total mean return, four-factor alpha, Sharpe ratio, and certainty-equivalent return, even though the equal-weighted portfolio has greater portfolio risk.**

The total return of the equal-weighted portfolio exceeds that of the value- and price-weighted because the **equal-weighted portfolio has both a higher return for bearing systematic risk and a higher alpha measured using the four-factor model**. The nonparametric monotonicity relation test indicates that the differences in the total return of the equal-weighted portfolio and the value- and price-weighted portfolios is monotonically related to size, price, liquidity and idiosyncratic volatility. The higher systematic return of the equal-weighted portfolio arises from its higher exposure to the market, size, and value factors. **The higher alpha of the equal-weighted portfolio arises from the monthly rebalancing required to maintain equal weights, which is a contrarian strategy that exploits reversal and idiosyncratic volatility of the stock returns; thus, alpha depends only on the monthly rebalancing and not on the choice of initial weights.**

According to Greenblatt, market cap-weighted indexes suffer from a systematic flaw – they increase the amount owned of a particular company as that company's stock price increases, and vice versa. Thus, it results in systematically **invest too much in stocks when they are overpriced and too little in stocks when they are priced at bargain levels**. The equal weight index corrects this systematic flaw to a degree (the small correction is still worth 2.7 percent per year in additional performance).

Study:

1. **Why Does an Equal-Weighted Portfolio Outperform Value- and Price-Weighted Portfolios** - March 2012: Yuliya Plyakha - Goethe University Frankfurt, Raman Uppal - EDHEC Business School, Grigory Vilkov - Goethe University Frankfurt - EDHEC-Risk Institute.

   http://docs.edhec-risk.com/mrk/000000/Press/EDHEC_Working%20Paper_Equal Weighted_Portfolio.pdf

2. **Why Does an Equal-Weighted Portfolio Outperform Market Capitalization- and Price-Weighted Portfolios?** May 17, 2012 by Tobias Carlisle

   https://greenbackd.com/2012/05/17/why-does-an-equal-weighted-portfolio-outperform-market-capitalization-and-price-weighted-portfolios/

   The Return and Risk of the portfolios were also tested using Daily Return to Volatility Ratio and Sharpe Ratio. This is to examine whether the value strategies using ERP5 and Price Momentum include more risk than the general market Index, the volatilities of the quartile portfolios are compared to those of the benchmark index.

Findings Overview   :   The objective of ERP5 plus various Price Momentum and Holding Period strategy is to tests the **approach suggested by Graham (1976)** which recommended that an investor should rather **form a diversified portfolio** (based on a few **simple criteria** focusing on the **results of the group** instead of individual stocks) **to outperform** the benchmark index. The **Value strategy** adopted for this study was ERP5, a **4-factor based Value investment strategy** developed by two friends, Philip Vanstraceele and Luc Allaeys. This strategy is **enhanced by adopting the price momentum factor** as advocated by Philip Vanstraceele and Tim Du Toit in their research paper mentioned above, i.e. "Quantitative Value Investing in Europe: What works for achieving Alpha". **This hybrid value strategy is called ERP5 (modified).**

Portfolio Rebalanced	:	3-, 6-, and 12-Month Holding Period
Portfolio Price Momentum	:	3-, 6-, and 12-Month Momentum
Back Test Period	:	9.75 Years
Back-test Scenario	:	9 Simulations (based on all 3 combination mentioned above, i.e. Price Momentum, Holding Period and 9.7 Years)
Results Tabled	:	9 simulations gave 207 periods based on 9.75 Years data
Period Start	:	01-Jan-2008
Period End	:	30-September-2017
Index Observed	:	1 – FBM100
Stocks Observed	:	181 (9.75 Years span)
No. of observations	:	289,080
Ave. observation/stock	:	2,891

<u>**OVERALL FINDINGS**</u> : Malaysian stocks also exhibit similar characteristics as mentioned in the result of studies conducted in other markets. The results in this study provide an affirmative answer to the question on whether **a portfolio based on a few simple criteria focusing on the results of the group instead of individual stocks, as advocated by Graham, could outperform the broader market**. It also confirms the study by Lev and Thiagarajan (1993) which examined the predictive power of fundamental financial ratios used as the results are overwhelming as the test shows superior excess returns over the FBM100 for all strategies adopted. It is observed that from the tables below that:-

1. **Summary of Number of Periods ERP5 Q1 Portfolio Outperformance versus FBM100**

    From the table below it is observed that **Quintiles 1**, out of the 9 simulations in 309 periods, the Q1 ERP5 Value Portfolios **outperformed** the FBM100 in 216 periods or **69.9%** of the time.

    Table 2: All Quintiles Value Portfolios vs FBM100

Out/Under Performance	No. Periods	% Of
Out Performed	**169**	81.6%
Under Performed	38	18.4%
Total	**207**	**100.0%**

2. **Summary of ERP5 Q1 Portfolio Return Performance versus the FBM100 Jan 2008 to Sep 2017**

    The **Quintile 1** Value Portfolios selected using the ERP5 (modified) as suggested in this study **outperformed** the FBM100 in terms of returns and risk for different holding periods with different price momentum for the periods back tested.

    Table 3: Summary of ERP5 Q1 Returns Performance versus the FBM100

Range	Overall Returns			CAGR		Sharpe Ratio		IR	TE
	Portfolio	FBM100	Out/Under Performance	Portfolio	FBM100	Portfolio	FBM100	Portfolio	FBM100
Max	317.43%	28.28%	289.15%	15.78%	2.59%	29.73	3.26	3.79	9.31%
Min	180.91%	28.28%	152.63%	11.17%	2.59%	8.80	1.14	0.90	2.50%

    From Jan **2008 to Sep 2017, Quintile 1** Value Portfolios returns **outperformed** the FBM100 for the periods back tested. Depending on the simulations, the **Quintile 1 Portfolios returns were superior ranging from 317.43% to 180.91%**. This is high when compared to the **FBM100 benchmark returns** which registered only **28.28%** for the same period. A **hefty** of at least **152.63% outperformance on the minimum**.

    In terms of **CAGR** for the 9.75 years, the ERP5 Q1 CAGR was overwhelmingly good ranging **15.78% to 11.17%** compared to **FBM100 meagre 2.59%.**

    Risk wise, the **Tracking Error (TE) ranged from 9.31%** with a **healthy Information Ratio 3.79 on the high side** and **a TE of 2.50% with IR of 0.90 at the minimum.**

    The **Quintile 1 Sharpe Ratio is also healthy at the minimum being 8.80 vs the FBM100 Index 1.14.**

3. **Breakdown of ERP5 Quintile 1 performance versus FBM100 Index for all different periods and momentum**

The **detailed breakdown by 3-, 6- & 12-month holding periods** based on 3-, 6- & 12-month price momentum are as follows:-

Table 4: 3-Month Holding Period Returns Performance Jan 2008 – Sept 2017

FBM100 - 10 Yrs Back Test													
		10 Years Compounded											
		2008 - 2017											
		Returns			**CAGR**		**Sharpe Ratio**				**No. Periods Out Perform**		
Mths Holding Period	**Mths Price Momen-tum**	Portfolio	FBM100	Out/Under Perfor-mance	Portfolio	FBM100	Portfolio	FBM100	**IR**	**TE**	Total Periods	Out Perform Periods	% Out Perform-ance
3	3	317.43%	28.28%	289.15%	15.78%	2.59%	29.73	3.26	1.48	9.19%	39	33	85%
3	6	297.35%	28.28%	269.07%	15.20%	2.59%	29.66	3.26	1.56	8.35%	39	31	79%
3	12	258.97%	28.28%	230.69%	14.01%	2.59%	25.83	3.26	1.37	8.63%	39	29	74%
										Total	117	93	79%

a) From the table above, it is observed that for the **3-month** holding period irrespective of the momentum period used, the **returns were above 100%** region **which surpassed the FBM100 returns of 28.28%** by a wide margin. The **outperformance margin of 230.69**% is more than **8 times** the **FBM100 performance** at the minimum.

b) In **terms of CAGR** for the 9.75 years, the **ERP5 Q1** CAGR was overwhelmingly good registering **14.01%** at the minimum compared to the **FBM100 meagre 2.59%.**

c) **Risk wise**,

 i. the **Sharpe Ratio** risk adjusted return also outperformed the index by a wide margin **registering 25.83 at the minimum** versus the **FBM100 Index 3.26,**

 ii. **Tracking Error (TE)** ranged from **9.19%** with a **healthy Information Ratio 1.48** on the **high side** and a **TE of 8.35%** with **IR of 1.37** at the **minimum**.

d) The Quant strategy performed in 93 periods or **79% of the time** out of the 117 periods reviewed.

Table 5: 6-Month Holding Period Returns Performance Jan 2008 – Sept 2017

FBM100 - 10 Yrs Back Test													
		10 Years Compounded											
		2008 - 2017											
		Returns			**CAGR**		**Sharpe Ratio**				**No. Periods Out Perform**		
Mths Holding Period	**Mths Price Momen-tum**	Portfolio	FBM100	Out/Under Perfor-mance	Portfolio	FBM100	Portfolio	FBM100	**IR**	**TE**	Total Periods	Out Perform Periods	% Out Perform-ance
6	3	203.62%	28.28%	175.35%	12.07%	2.59%	13.88	2.16	1.18	7.82%	20	16	80%
6	6	236.06%	28.28%	207.79%	13.24%	2.59%	16.10	2.16	1.21	8.54%	20	15	75%
6	12	180.91%	28.28%	152.63%	11.17%	2.59%	12.29	2.16	0.90	9.31%	20	15	75%
										Total	60	46	77%

a) From the table above, it is observed that for the **6-month** holding period irrespective of the momentum period used, the **returns were also above 100%** region **which surpassed the FBM100 returns of 28.28%** by a

wide margin. The **outperformance margin of 152.63%** is **more than 5 times** the **FBM100 performance** of **28.28%** at the minimum.

b) In **terms of CAGR** for the 9.75 years, the **ERP5 Q1** CAGR was overwhelmingly good at **11.17%** at the minimum compared to **FBM100** of **2.59%.**

c) **Risk wise**,

    i. the **Sharpe Ratio** risk adjusted return also **outperformed the index by a wide margin registering 12.29** versus the **FBM100 Index 2.16**,

    ii. **Tracking Error (TE)** ranged from **9.31%** with an **Information Ratio of 0.90** on the **high side** and a **TE of 7.82%** with **IR of 1.18** at the **minimum**.

    iii. The Quant strategy performed in 46 periods or **77% of the time** out of the 60 periods reviewed.

Table 6:   12-Month Holding Period Returns Performance Jan 2008 – Sep 2017

FBM100 - 10 Yrs Back Test													
		10 Years Compounded											
		2008 - 2017											
		Returns			CAGR		Sharpe Ratio				No. Periods Out Perform		
Mths Holding Period	Mths Price Momen-tum	Portfolio	FBM100	Out/Under Perfor-mance	Portfolio	FBM100	Portfolio	FBM100	IR	TE	Total Periods	Out Perform Periods	% Out Perform-ance
12	3	207.82%	28.28%	179.54%	12.22%	2.59%	9.48	1.14	3.75	2.50%	10	10	100%
12	6	255.10%	28.28%	226.82%	13.88%	2.59%	11.15	1.14	3.79	2.90%	10	10	100%
12	12	209.08%	28.28%	180.80%	12.27%	2.59%	8.80	1.14	2.24	4.20%	10	10	100%
										Total	30	30	100%

a) From the table above, it is observed that for the **12-month** holding period irrespective of the momentum period used, the **returns were also above the 100%** region **which surpassed the FBM100 returns of 28.28%** by a wide margin. The **outperformance margin of 179.54%** is more than **6 times** the **FBM100 performance** at the minimum.

b) In **terms of CAGR** for the 9.75 years, the **ERP5 Q1** CAGR was good ranging **12.22% to 13.88%** compared to **FBM100 meagre performance** of **2.59%.**

c) **Risk wise**,

    a. the **Sharpe Ratio** risk adjusted return also outperformed the index also by a **comfortable margin ranging 8.80 to 11.15** versus the **FBM100 Index 1.14**,

    b. **Tracking Error (TE)** ranged from **4.20%** with a **Information Ratio of 2.24** on the **high side** and a **TE of 2.50%** with **IR** of **3.75** at the **minimum**.

d) The Quant strategy performed in all periods or **100% of the time** out of the 30 periods reviewed.

CONCLUSIONS

1. Detailed results shows that just like the **previous ERP5 (Modified) Report dated 4th October 2017**, the **ERP5 (modified) strategy is also able to generate results exceeding the return** of the **FBM100 81.6% of the time** in the periods reviewed. It is observed from the above tables, that for the period 2008 to 2017 tested, the ERP5 (modified) Quintile 1 portfolio strategy **works against another benchmark besides the FBMKLC Index in the earlier report**. We reckon it should work better if longer periods are used as advocated by the practitioners.

2. For the periods 2008 to 2017 tested, it appears that using **ERP5 (modified) to screen stocks can indeed not only result in higher returns BUT also lower volatility as exhibited by the INFORMATION RATIO, Sharpe Ratio** and **TRACKING ERROR**. Thus, this confirms that the ERP5 (modified) **value strategy** can be used to **separate not only the winners but the losers as well**. The findings are in line with the results reported by Topias Kukkasniemi in his study and further supports Vanstraceele and Allaeys, Joesl Greenblatt and Philip Vanstraceele and Tim Du Toit conclusions that the **strategy can work using simple factors based company historical fundamental data and a second factor in the form of momentum to improve stock returns**.

3. This **supports the MIDF earlier report** and **implies that the ERP5 (modified) value strategy, indeed, possesses stock picking power that can be used to construct portfolios that generate excess returns in the medium** to **long-term**. The results are similar to (i) those reported by Vanstraceele and Allaeys (2008a) who tested the ERP5 strategy in the **Danish market,** and (ii) paper by Philip Vanstraceele and Tim Du Toit called **"Quantitative Value Investing in Europe: What works for achieving Alpha".**

4. To the **question whether the value strategies include more risk than the Index, the answer is no**, as from the tables related to risk and return it is **observed that the volatilities of the Value portfolios in the Quintile 1 are lower compared to those of the benchmark index** using the measurement **INFORMATION RATIO**, **TRACKING ERROR**, and the **Sharpe Ratio** and **Return to Volatility Ratio** and as advocated in the original study. Thus, the lower volatility of the ERP5 (modified) value portfolios is in line with the earlier research by Pätäri and Leivo, 2009 and others.

5. These results also answers in the Malaysian context the question "WHETHER A DIVERSIFIED PORTFOLIO FORMED USING **VALUE STRATEGIES BASED** ON A **FEW SIMPLE ACCOUNTING RATIOS CAN OUTPERFORM THE MARKET INDEX**. This iterates literature mentioned above that **ample research** shows **financial ratios** can be **useful in predicting future earnings and equity returns**. Thus, the results support the classic study of **Ou and Penman (1989)** who found that ratios generated from accounting data were **useful in forecasting future earnings and stock returns.** The results also support **Lev and Thiagarajan (1993)** study that **examined the predictive power of fundamental financial ratios** when they concluded that **fundamental factors add about 70 percent to the explanatory power of earnings alone in predicting excess returns**. Abarbenell and Bushee (1998) devised an investment strategy using these variables and found that they can generate excess returns under this strategy.

6. The results also proves that the strategy advocated by **Columbia University Professor Benjamin Graham** (known as **"the father of value investing"** and the **"Dean of Wall Street," Ben Graham (1894-1976)** that "investors should FORM A **DIVERSIFIED PORTFOLIO** BASED ON A FEW SIMPLE CRITERIA FOCUSING ON THE RESULTS OF THE **GROUP INSTEAD** OF **INDIVIDUAL STOCKS"** also **applicable in the Malaysian context**.

7. Extract from the paper by Philip Vanstraceele and Tim Du Toit called **"Quantitative Value Investing in Europe: What works for achieving Alpha"** is appendix 2

APPENDIX 1

Summary of Jan 2008 to Sep 2017 ERP5 Quintile Value Portfolios Returns Outperformance Vs FBM100

FBM100 - 10 Yrs Back Test														
		10 Years Compounded												
		2008 - 2017												
		Returns			**CAGR**		**Sharpe Ratio**				**No. Periods Out Perform**		
Mths Price Momen - tum	**Mths Holding Period**	Portfolio	FBM100	Out/Under Perfor- mance	Portfolio	FBM100	Portfolio	FBM100	**IR**	**TE**	Total Periods	Out Perform Periods	% Out Perform- ance
3	3	317.43%	28.28%	289.15%	15.78%	2.59%	29.73	3.26	1.48	9.19%	39	33	85%
6	3	297.35%	28.28%	269.07%	15.20%	2.59%	29.66	3.26	1.56	8.35%	39	31	79%
12	3	258.97%	28.28%	230.69%	14.01%	2.59%	25.83	3.26	1.37	8.63%	39	29	74%
3	6	203.62%	28.28%	175.35%	12.07%	2.59%	13.88	2.16	1.18	7.82%	20	16	80%
6	6	236.06%	28.28%	207.79%	13.24%	2.59%	16.10	2.16	1.21	8.54%	20	15	75%
12	6	180.91%	28.28%	152.63%	11.17%	2.59%	12.29	2.16	0.90	9.31%	20	15	75%
3	12	207.82%	28.28%	179.54%	12.22%	2.59%	9.48	1.14	3.75	2.50%	10	10	100%
6	12	255.10%	28.28%	226.82%	13.88%	2.59%	11.15	1.14	3.79	2.90%	10	10	100%
12	12	209.08%	28.28%	180.80%	12.27%	2.59%	8.80	1.14	2.24	4.20%	10	10	100%
							Total				207	169	81.6%
	Max	317.43%	28.28%	289.15%	15.78%	2.59%	29.73	3.26	3.79	9.31%	39	33	85%
	Min	180.91%	28.28%	152.63%	11.17%	2.59%	8.80	1.14	0.90	2.50%	10	10	100%

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APPENDIX 2

Extract from the paper by Philip Vanstraceele and Tim Du Toit called "Quantitative Value Investing in Europe: What works for achieving Alpha".

Note: **Last row ERP5** shows **a return of 600.9% using Quintile 1. However,** if ERP5 is combined with another factor the **6 Months Price Momentum, the results is phenomenal yielding 732.1% as** observed in the 3rd Last Row from bottom.

ERP5

With this combination we combined the 20% of companies with the highest ERP5-rank with all the second factors we tested.

SECONDARY FACTOR	TOTAL RETURN 13/06/1999-13/06/2011				
	Q1	Q2	Q3	Q4	Q5
EARNINGS YIELD 12 MONTHS	590.3%	355.9%	248.9%	175.8%	120.6%
EARNINGS YIELD 5 YEARS	404.2%	408.4%	351.7%	216.2%	84.1%
PRICE TO BOOK	680.2%	456.8%	265.2%	200.3%	46.6%
FCF YIELD	555.6%	245.2%	204.0%	223.9%	177.0%
FCF YIELD 5 YEARS	336.4%	311.0%	285.8%	206.1%	179.6%
PRICE TO SALES	402.4%	272.7%	332.7%	220.5%	166.5%
F-SCORE	583.1%	332.5%	190.8%	336.8%	94.7%
NET DEBT ON MARKET VALUE	321.2%	291.7%	314.7%	238.2%	216.0%
ROIC	145.6%	178.8%	383.5%	296.8%	449.2%
ROIC 5 YEARS	114.4%	246.1%	362.7%	236.5%	481.2%
PRICE INDEX 12 MONTHS	696.5%	378.4%	300.8%	195.3%	41.4%
PRICE INDEX 6 MONTHS	732.1%	357.2%	268.2%	192.7%	51.8%
MF RANK	256.3%	319.5%	260.1%	247.8%	309.0%
ERP5	600.9%	249.2%	434.2%	151.1%	113.0%

Show/Hide details

Your average return of combining the ERP5 score with all the second factors would have been 458.5% (median was 479.9%) over 12 years. The average this was the fourth best two-factor strategies we tested.

Similar to what we found with the MF-rank, the best performing strategy was combining the ERP5 score with companies that had the highest 6-month price index. If you did this your returns would have been 732.1%.

The worst return was generated by combining the ERP5 score with companies that had the highest return on investment capital on average over the past five years. This would have only given you a return of 114.4%.

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DISCLOSURES AND DISCLAIMER

MIDF AMANAH INVESTMENT BANK : GUIDE TO RECOMMENDATIONS

STOCK RECOMMENDATIONS

BUY	Total return is expected to be >+10% over the next 12 months.
TRADING BUY	Stock price is expected to *rise* by >+10% within 3-months after a Trading Buy rating has been assigned due to positive newsflow.
NEUTRAL	Total return is expected to be between -10% and +10% over the next 12 months.
SELL	Total return is expected to be <-10% over the next 12 months.
TRADING SELL	Stock price is expected to *fall* by >-10% within 3-months after a Trading Sell rating has been assigned due to negative newsflow.

SECTOR RECOMMENDATIONS

POSITIVE	The sector is expected to outperform the overall market over the next 12 months.
NEUTRAL	The sector is to perform in line with the overall market over the next 12 months.
NEGATIVE	The sector is expected to underperform the overall market over the next 12 months.