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The Use of RONA/WACC as a Proxy for Investment Quality

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Abstract: Proxies for stock investment quality have varied from multi-factor models such as the Piotroski F-Score to simple one-factor return on capital measures. Economic value added, measured as the ratio of return on net assets relative to the weighted average cost of capital, has not been used as a proxy for stock quality. The aim of this study was to demonstrate that economic value added can be used effectively as a proxy for stock quality. Industrial stocks listed on the JSE ALSI between 31 January 2006 and 31 December 2015 comprised the population of this study. Three portfolios (comprising 33% of the population each) were formed monthly and were held for 12 months leading to the creation of 360 portfolios. The portfolios were formed on the basis of the RONA/WACC ratio; stocks with the highest ratios comprised HEV portfolios, stocks with the lowest ratios comprised LEV portfolios and stocks with median ratios comprised MEV portfolios. HEV portfolios earned a mean return of 19.52% relative to 13.09% for MEV portfolios, 16.31% for LEV portfolios and 13.73% for the overall equity market. The maximum cumulative value of R1 invested in HEV portfolios was equal to R5.30 as at the end of the study period. The maximum cumulative value of R1 invested in MEV and LEV portfolios was equal to R4.14 and R4.40 respectively. The maximum corresponding value of R1 invested in the general equity market was, R3.50. The superior returns of HEV portfolios were observed to be more risk efficient relative to both MEV and LEV portfolios and relative to the market portfolio on the basis of higher Sharpe Ratios. The RONA/WACC ratio has thus been shown to have been an effective proxy for stock quality.

Keywords: *Quality, economic value, RONA/WACC, stock, investment*

1. Introduction

Equity investments have historically outperformed other financial asset classes (Dimson, Marsh, & Staunton, 2017). Investors in equities have made use of different investment styles to exploit the superior risked adjusted returns associated with such investments. An investment style refers to the application of a systematic approach to the selection of equity investments based on their particular characteristics (Asness, Illmanen, Israel, & Moskowitz, 2015). Commonly used equity investment styles include passive; growth; momentum; value and quality-based investment styles (Asness, et al., 2015). A passive investment style involves the replication of the performance of the equity market without the desire to outperform this market. An active investment style requires the selection of stocks that are believed to outperform the equity market in the future (Bodie, Kane, & Marcus, 2017). Growth, momentum, value and quality-based investment styles represent examples of active investment styles (Asness, et al., 2015). Growth investment styles require investment in equities that exhibit strong growth in earnings (Phillips, 2018). Momentum investment styles require investment in equities that exhibit strong recent growth in stock price (Zaremba, 2018). Value investment styles seek to invest in equities that are believed to be cheap in relation to a metric that represents value (such as cash flow, earnings, equity value or sales) (Phillips, 2018). The quality investment style selects stocks on the basis of the quality of company earnings or the quality of the business operations (Phillips, 2018).

2. Literature Review

The quality stock investment style is at least as old as the value investment style (considered to be the oldest and most popular stock investment style) (Novey-Marx, 2013). Benjamin Graham, regarded as the founder of the value investment style, created a composite value investment style that was based on 7 different stock criteria. The majority of these criteria (5) were based on quality metrics (Novey-Marx, 2013). The importance of the quality investment style therefore cannot be ignored. Despite its importance, the comparison of the relative performance of different quality-based investment styles has been impaired by the fact that there is no consensus as to how to define quality (Phillips, 2018). Proxies for quality have ranged from simple one-factor measures to complex multi-factor models. The Piotroski F-Score is an example of a multi-factor model commonly employed as a proxy for quality that is based on the analysis of financial statements. The F-Score comprises 9 financial statement variables: cash flow from operations; change in asset turnover; change in the current ratio; change in financial leverage; change in gross profit margin; change in net income.

The extent of the company's accruals; the extent of external capital raised and the return on assets (Van der Merwe, 2012). A stock that was awarded 1 point for each variable indicated that it was of high quality. High F-Score stocks (scores above 5) outperformed those stocks with low F-Scores (scores below 5) (Piotroski, 2000), especially when applied to stocks with cheap value metrics (high book-to-market ratios) in the American equity markets (Piotroski & So, 2012). The superiority of high F-Score stocks over low F-Score stocks was observed in China (between 2006 and 2014) (Deng, 2016), India (between 2009 and 2015) (Tripathy & Bani, 2017), Japan (between 1986 and 2001) (Noma, 2010) and Spain (between 1996 and 2013) (Forner & Veira, 2018). High F-Score stocks were observed to outperform both low F-Score stocks and the overall equity market in South Africa (Van der Merwe, 2012). Returns on capital and returns on equity have been traditionally used as proxies for quality. Greenblatt (2005) developed an equity investment strategy that combined cheap earnings (low price to earnings ratios) with high returns on capital in the American equity market. A higher quality stock that is those with cheap earnings and high returns on capital, outperformed lower quality stocks (those with expensive earnings and low returns on capital). Elze (2010) conducted a similar study to Greenblatt's and applied this to American stocks between 1994 and 2009. This population was sorted according to the BMR and then it was independently sorted using the return on the capital measure. Three portfolios were formed from each sort representing the top 30%, middle 40% and bottom 30% of the population. Using interceptions of both sets of portfolios, 9 groups of portfolios were formed.

Portfolios of cheap stocks (based on the book-to-market ratio) with high return on capital measures formed part the 'consistent earner strategy' and represented high-quality investments. The consistent earner strategy outperformed lower quality stocks as well as the overall American equity market. Research by Novey-Marx (2013) investigated the effectiveness of different proxies for quality in the American market between 1963 and 2012. The proxies used included the Piotroski F-Score, the Greenblatt model and gross profitability (relative to total assets). High-quality stocks outperformed low-quality stocks based on each model. Quality proxies based on gross profitability provided the best result when applied to cheap stocks based on the book-to-market ratio. In the South African context, Muller and Ward (2013) investigated different proxies for quality investments on the JSE between 1985 and 2011. The proxies included return on capital and return on equity. Five equally weighted portfolios were created each quarter and their total holding return was tracked. High-quality stocks (those with high returns on capital) outperformed the JSE ALSI index as well as stocks with low returns on capital. Return on equity was a weaker proxy for quality relative to return on capital; however, stocks with a low return on equity values yielded the weakest results. A review of both international and local research into proxies for quality has revealed that economic value added-based proxies for quality have not been used. Economic value refers to the returns generated by a company in excess of the company's cost of capital (McGregor BFA, 2014).

Standardisation of the returns on capital is an advantage of economic value added measures of proxy over simple return-based proxies. A stock with a lower return on capital (in excess of its economic cost) is favourable relative to a stock with a higher return on capital (but in deficient of its economic cost). The ratio of the return on the net assets of a company relative to its weighted average cost of capital represents a model that demonstrates the relative extent of economic value added by that company (RONA/WACC) (McGregor BFA, 2014). Net assets refer to the tangible assets of a company after deductible its operating liabilities. The WACC represents the weighted average of a company's cost of equity and debt funding. The cost of equity funding was determined using the Capital Asset Pricing Model, which is the most popular method in deriving this information (PwC Corporate Finance, 2015; McGregor BFA, 2014). A RONA/WACC ratio greater than 1 indicates that returns are sufficient to generate economic value for shareholders whereas a ratio of less than 1 indicates that economic value is destroyed (McGregor BFA, 2014). Stocks that generate economic value are sought after by investors and should appreciate in price whereas stocks that destroy value (called value traps) should be avoided and depreciate in price (Bird & Casavecchia, 2007). The RONA/WACC ratio could potentially have been used to screen for stocks that appreciate in value and to screen out stocks that depreciate in value. Despite this observation, little research into using the RONA/WACC as a screen for investment quality has been done and this represents a gap in existing investment research.

Research Aims and Purpose: The purpose of this study was to determine if the RONA/WACC model of economic value could be used as a screen for high-quality stock investments on the JSE. The motivation for this study was to determine if the RONA/WACC model could serve as an effective screen for quality and to create a literature base in the field of proxies for investment quality. This study sought to test the hypothesis that mean returns earned from high-quality stocks (with high RONA/WACC ratios) are superior to the mean returns earned from low-quality stocks (with low RONA/WACC ratios). The null hypothesis is stated below:
H_0: $R_{HQS} < R_{LQS}$, R_{HQS} = Mean returns earned from portfolios of high-quality stocks
R_{LQS} = Mean returns earned from portfolios of low-quality stocks

3. Method

The study population comprised industrial stocks listed on the JSE ALSI at any time between the period 31 January 2006 and 31 December 2015. The JSE ALSI was chosen as the population source to limit the inclusion of non-liquid stocks (Schoeman, 2012). Financial and resource stocks were excluded on the basis that these are subject to different operating risks relative to industrial stocks (Mutooni & Muller, 2007). The period of the study, being 10 years, was sufficient to include a full business cycle (Bosch & Ruch, 2012). All industrial stocks that were listed on the JSE ALSI in the study period were included in the population, irrespective of whether these are now delisted to avoid survivorship bias. The RONA/WACC ratio for each industrial stock was obtained from the IRESS database. This ratio was updated once annually 3 months after the end of the financial year for each respective industrial stock to avoid look ahead bias (Langa, 2016). The population was then sorted in descending order on the basis of the RONA/WACC ratio and was then divided into 3 equally sized portfolios, namely HEV, MEV and LEV (Zuccollo & Correia, 2016). HEV portfolios represent industrial stocks with the highest relative economic value added MEV portfolios represent industrial stocks with moderate levels.

Negative levels of economic value added. Each portfolio was approximately 22 stocks in size and was held for one calendar year. Portfolios were created monthly meaning that 120 portfolios were created between the periods 1 February 2006 to 1 January 2016. Holding period returns were calculated for each of the 12-month periods between 31 January 2007 and 31 December 2016. These returns included dividends (if the last date to trade was found within the respective period) but excluded transaction costs. An average holding period return over 120 observations was then calculated to gauge the aggregated performance of HEV, MEV and LEV portfolios. Segregated mean performance for each month of portfolio formation (January to December) was also derived and was averaged over 10 observations (being 1 for each year in this study). The cumulative value of R1 invested in each portfolio was also calculated to replicate the compound returns earned from the consistent adoption of each investment style (Zuccollo & Correia, 2016). The formulas for the calculation of holding period returns, average holding period returns and cumulative investment values are presented below:

$$Holding\ Period\ Stock\ Return = \frac{(P_t + D) - P_{t-1}}{P_{t-1}} \quad (1)$$

P_{t+1}= stock price 12 months after portfolio formation date
P_t= stock price at portfolio formation date
D= dividends over the holding period for stock

$$Holding\ Period\ Portfolio\ Return = \frac{\sum HR_{ta-z}}{n} \quad (2)$$

HR_{ta-z}= holding period return of stock a to z in portfolio t over holding period t
t = holding period 1 to 120
n = number of stocks in portfolio

$$CWI_{tm} = WI_{0m}(1 + HR_{1m})(1 + HR_{2m}) \ldots\ldots (1 + HR_{10m}) \quad (3)$$

CWI_{tm}= Cumulative Wealth Index for year t for portfolios formed in month m
WI_{0m}= R1 invested in portfolio formed in month m in the first year study of the study
HR_{tm}= Holding period portfolio return in year t for portfolio formed in month m
t= Number of years in this study where $1 \le t \le 10$
m= Month in which portfolio was formed. The mean returns from HEV, MEV and LEV portfolios were also compared to mean returns earned from the JSE TRIX. The TRIX was selected as the market proxy since it includes dividend returns. The risk-adjusted performance of HEV, MEV and LEV were also determined for comparison purposes. The Sharpe ratio is a risk-adjusted performance measure that compares each

portfolio's return in excess of the risk-free rate relative to the portfolio return's standard deviation as shown in formula 4 below:

$$Portfolio\ Sharpe\ Ratio = \frac{HR_p - R_{fp}}{\sigma_p} (4)$$

HR_p = Holding period return for portfolio p
R_{fp} = Risk-free rate of return over the 12-month holding period
p = HEV, MEV, LEV, TRX portfolio number where $1 \leq p \leq 120$
σ_p = Standard deviation of portfolio holding returns for portfolio p

The risk-free rate was proxied using the yield on the3-month Treasury note. The yields on 4 consecutive issues of Treasury notes were geometrically linked to derive an annual equivalent risk-free rate. The overall standard deviation was derived across 120 portfolio observations and the monthly standard deviation was derived across 10 observations. This method of deriving the standard deviation was deemed to be appropriate given the fact that risk-adjusted performance was presented for comparative purposes only. Statistical significance was assessed using the students' one-tailed test and p-values were presented at the 99%, 95% and 90% level of significance on the basis that data were normally distributed. The Sign Test was utilised in the cases where data were not normally distributed. Statistical tests were conducted using the SPSS package, version 25.

4. Results

The results of the study are presented in Table 1 below. HEV portfolios generated an average return of 19.52% per stock relative to 13.09% and 16.31% per stock for MEV and LEV portfolios respectively. The market portfolio yielded an average annual return of 13.73% per stock. HEV portfolios generated a premium ranging from 6.43% per stock (relative to MEV) to 3.22% per stock (relative to LEV). The HEV premia did not occur sporadically. Relative to MEV portfolios, the HEV premium was observed in 97 portfolios out of 120 (81% of all portfolios). The HEV premium was also observed in 71% and 72% of all portfolios relative to LEV and MKT portfolios respectively. All of the premia were statistically significant at the 99% level of confidence with p-values of 0.000.

Table 1: Performance Statistics of Investment Styles

General	Average return	HEV premium	Premium frequency	Sharpe ratio
HEV	19.52%			0.67
MEV	13.09%	6.43% *(0.000)*	97	0.33
LEV	16.31%	3.22% *(0.000)*	85	0.47
TRX	13.73%	5.79% *(0.000)*	86	0.38

The generalised Sharpe ratios for each investment style were also calculated. The HEV investment style showed the highest Sharpe ratio, implying that it generated the highest risk-adjusted returns relative to the competing investment styles. These risk-adjusted returns were twice the magnitude of those observed from the MEV investment style. Both the HEV and LEV investment styles outperformed the risk-adjusted returns of the general equity market. The information presented in Table 1 has been desegregated according to each month of portfolio formation. This was done in order to simulate the actual returns earned by investors over the course of the study's time horizon and this is shown in Table 2 below.

Table 2: Average HEV Premia per Month of Portfolio Formation

	Average return	Sharpe ratio	HEV premium	Premium frequency
January				
HEV	18.76%	0.67	NA	NA
MEV	9.74%	0.16	9.02% *(0.002)*	8
LEV	13.65%	0.35	5.11% *(0.013)*	9
TRX	11.64%	0.28	7.12% *(0.001)*	9
February				
HEV	19.48%	0.68	NA	NA

MEV	13.55%	0.37	5.93% *(0.027)*	8
LEV	18.06%	0.46	1.42% *(0.315)*	8
TRX	13.93%	0.41	5.55% *(0.032)*	8
March				
HEV	19.60%	0.59	NA	NA
MEV	13.92%	0.33	5.68% *(0.041)*	7
LEV	15.80%	0.38	3.80% *(0.009)*	9
TRX	15.84%	0.37	3.76% *(0.148)*	5
April				
HEV	19.01%	0.59	NA	NA
MEV	13.70%	0.35	5.31% *(0.013)*	7
LEV	15.01%	0.40	4.00% *(0.017)*	8
TRX	14.88%	0.38	4.13% *(0.115)*	7
May				
HEV	18.45%	0.61	NA	NA
MEV	12.95%	0.32	5.50% *(0.010)*	9
LEV	17.19%	0.47	1.26% *(0.293)*	7
TRX	14.72%	0.37	3.63% *(0.146)*	7
June				
HEV	19.66%	0.67	NA	NA
MEV	16.82%	0.48	2.84% *(0.022)*	7
LEV	17.35%	0.42	2.31% *(0.186)*	5
TRX	14.85%	0.42	3.81% *(0.146)*	6
July				
HEV	20.54%	0.69	NA	NA
MEV	14.11%	0.35	6.43% *(0.007)*	9
LEV	17.70%	0.50	2.84% *(0.108)*	7
TRX	14.02%	0.38	6.52% *(0.141)*	6
August				
HEV	20.95%	0.78	NA	NA
MEV	14.11%	0.37	6.84% *(0.005)*	7
LEV	17.10%	0.54	3.85% *(0.106)*	7
TRX	13.77%	0.45	7.18% *(0.059)*	7
September				
HEV	19.93%	0.63	NA	NA
MEV	12.34%	0.28	7.59% *(0.016)*	8
LEV	14.79%	0.45	5.14% *(0.063)*	6
TRX	13.00%	0.46	6.93% *(0.071)*	6
October				
HEV	19.50%	0.60	NA	NA
MEV	11.98%	0.27	7.52% *(0.004)*	9
LEV	16.58%	0.52	2.92% *(0.156)*	7
TRX	13.00%	0.37	6.50% *(0.016)*	8
November				
HEV	19.55%	0.60	NA	NA
MEV	13.00%	0.27	6.55% *(0.010)*	9
LEV	16.65%	0.54	2.90% *(0.145)*	6
TRX	12.93%	0.30	6.62% *(0.013)*	8
December				
HEV	18.82%	0.57	NA	NA
MEV	10.87%	0.21	7.95% *(0.018)*	9
LEV	15.83%	0.45	2.99% *(0.174)*	6
TRX	12.19%	0.30	6.63% *(0.034)*	9

For example, HEV portfolios formed in January earned an average return of 18.76% per stock. In comparison, MEV and LEV portfolios yielded annual returns of 9.74% and 13.65% per stock respectively. An HEV premium of 9.02% per stock was observed relative to MEV portfolios with a p-value of 0.002. An HEV premium of 5.11% per stock was observed relative to LEV portfolios with a p-value of 0.013. HEV portfolios outperformed MEV portfolios in 8 observations out of 10 (outperformance of LEV portfolios was observed in 9 instances out of 10). Relative to the general equity market, an HEV premium of 7.12% per stock was observed. This was statistically significant with a p-value of 0.001. An HEV premium over the general equity market was observed in 9 instances out of 10. HEV portfolios outperformed MEV portfolios across all months of portfolio formation. These premia were statistically significant. HEV portfolios outperformed MEV portfolios in 9 instances of 10 across 5 months of portfolio formation (May, July, October, November and December). Outperformance of 80% and 70% were noted across 4 and 3 months of portfolio formation respectively. The strongest average premium was observed in January portfolios (9.02%) whereas the weakest average premium was observed in June portfolios (2.84%). Annual HEV-MEV premia were most commonly observed between 5.00% and 6.00% per stock. HEV portfolios also outperformed LEV portfolios across all months of portfolio formation. Success rates ranged from 50% (June portfolios) to 90% (January and March portfolios).

The most common success rates were observed to be 70% (May, July, August and October portfolios) followed by 60% (September, November and December portfolios). Despite this practically significant outcome, HEV-LEV premia were only statistically significant in 4 months of portfolio formation (January, March, April and September). The maximum average premium was observed in September portfolios (5.14%) whereas the weakest average premium was observed in May portfolios (1.26%). Annual HEV-LEV premia were most commonly observed to be between 2.00% and 3.00% per stock. HEV portfolios outperformed the general equity market across all months of portfolio formation. Approximately 58% of the HEV-TRX premia were statistically significant, with portfolios formed between March and July yielding statistically insignificant premia. Success rates of 60%, 70% and 80% were observed in equal proportions (3 months). Success rates peaked at 90% (January and December portfolios) and waned at 50% (in March portfolios). The maximum premium was observed at 7.18% (August portfolios) whereas the minimum premium was observed at 3.63% (in May portfolios). Annual HEV-TRX premia were most commonly observed to be between 6.00% and 7.00% per stock. The risk-adjusted performance of HEV portfolios ranged from 0.78 in February portfolios to 0.57 in December portfolios. While this is admittedly low, HEV portfolios delivered higher Sharpe ratios relative to MEV portfolios and LEV portfolios across all months of portfolio formation. HEV portfolios also outperformed the market portfolio across all months of portfolio formation.

The Sharpe ratios for HEV portfolios were close to twice the size of the relevant ratios for the market across all months of portfolio formation. The cumulative compound value of R1 invested in each investment style (across each month of portfolio formation) is shown in Table 3 on the following page. As at the end of the investment horizon, the cumulative value of R1 invested in HEV portfolios peaked at R6.10 (August portfolios) and troughed at R4.84 (May and December portfolios). In comparison, the value of R1 invested in MEV (LEV) portfolios peaked at R4.14 (R4.40) and troughed at R2.27 (R3.16) respectively. The cumulative compound values of HEV portfolios exceeded the corresponding MEV (LEV) values across 117 (106) observations out of 120. This was equivalent to success rates of 98% and 88% respectively. HEV portfolios delivered superior cumulative results across all observations in August, September, October and December portfolios. Superior HEV performance was observed across 90% of all observations in January, March, June and July portfolios. In the remaining months of portfolio formation (excluding February), HEV portfolios delivered superior results across 80% of observations. February portfolios revealed HEV weakness, with HEV outperformance only being observed across 20% of portfolio observations. In relation to the general equity market, HEV portfolios delivered superior cumulative returns across 115 portfolios out 120 (yielding a success rate of 96%).

Table 3: Cumulative Value of R1 Invested in each Investment Style

	Cumulative value of R1 invested and rebalanced annually in January									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	1.22	*1.00*	*1.36*	*1.85*	*1.99*	*2.83*	*3.43*	*4.07*	*4.51*	*5.02*
MEV	*1.24*	0.91	1.08	1.34	1.52	1.96	2.14	2.21	2.26	2.27
LEV	1.13	0.88	1.15	1.46	1.49	2.05	2.65	2.99	2.85	3.16
TRX	1.19	0.91	1.21	1.44	1.48	1.87	2.27	2.52	2.65	2.72
	Cumulative value of R1 invested and rebalanced annually in February									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	1.40	1.42	1.25	1.62	2.04	2.36	3.30	3.94	*5.36*	*5.30*
MEV	1.41	1.38	1.21	1.51	1.78	2.19	2.86	3.14	3.50	3.20
LEV	*1.57*	*1.46*	*1.27*	*1.75*	*2.21*	*2.50*	*3.46*	*4.05*	5.05	4.36
TRX	1.32	1.45	1.13	1.51	1.82	2.02	2.49	2.87	3.35	3.32
	Cumulative value of R1 invested and rebalanced annually in March									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.41*	1.53	*1.21*	*1.77*	*2.16*	*2.52*	*3.46*	*4.06*	*5.42*	*5.12*
MEV	1.30	1.33	1.06	1.62	1.83	2.30	2.80	3.04	3.46	3.17
LEV	1.38	1.35	1.04	1.56	1.84	2.13	2.82	3.27	4.10	3.59
TRX	1.39	*1.69*	1.05	1.56	1.93	2.12	2.53	3.11	3.61	3.45
	Cumulative value of R1 invested and rebalanced annually in April									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	1.38	1.33	*1.17*	*1.79*	*2.09*	*2.53*	*3.39*	*4.02*	*5.03*	*4.99*
MEV	1.24	1.22	0.96	1.41	1.57	1.96	2.49	2.68	3.10	3.18
LEV	*1.38*	1.29	1.13	1.65	1.83	2.31	2.94	3.22	3.64	3.56
TRX	1.38	*1.53*	1.09	1.58	1.81	1.95	2.39	2.95	3.32	3.43
	Cumulative value of R1 invested and rebalanced annually in May									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	1.44	1.35	*1.21*	*1.68*	*2.02*	2.43	*3.15*	*3.82*	*4.83*	*4.84*
MEV	1.33	1.22	0.97	1.28	1.52	1.95	2.42	2.64	3.05	2.98
LEV	*1.48*	1.30	1.15	1.65	1.87	*2.47*	3.11	3.73	4.22	4.20
TRX	1.37	*1.53*	1.07	1.51	1.78	1.92	2.23	2.91	3.34	3.34
	Cumulative value of R1 invested and rebalanced annually in June									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	1.53	1.39	*1.35*	*1.80*	*2.16*	*2.70*	*3.56*	*4.25*	*5.21*	*5.39*
MEV	1.53	1.35	1.21	1.51	1.84	2.27	3.03	3.58	4.09	4.14
LEV	*1.59*	1.29	1.17	1.59	1.81	2.27	3.21	3.83	4.05	4.09
TRX	1.43	*1.63*	1.21	1.47	1.81	1.91	2.49	3.03	3.29	3.50
	Cumulative value of R1 invested and rebalanced annually in July									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.58*	1.36	*1.45*	*1.93*	*2.25*	*2.96*	*3.76*	*4.46*	*5.55*	*5.75*
MEV	1.50	1.23	1.20	1.42	1.76	2.30	2.84	3.06	3.38	3.27
LEV	1.57	1.27	1.25	1.62	1.84	2.29	3.10	3.84	4.21	4.40
TRX	1.37	*1.51*	1.13	1.38	1.72	1.88	2.27	3.02	3.16	3.28
	Cumulative value of R1 invested and rebalanced annually in August									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.56*	*1.46*	*1.67*	*2.20*	*2.44*	*3.28*	*4.09*	*4.65*	*5.84*	*6.10*
MEV	1.49	1.25	1.26	1.44	1.61	2.18	2.72	3.00	3.36	3.32
LEV	1.49	1.21	1.35	1.73	1.91	2.38	3.10	3.84	4.02	4.31
TRX	1.40	1.40	1.27	1.51	1.71	1.96	2.41	3.09	3.22	3.37
	Cumulative value of R1 invested and rebalanced annually in September									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.66*	*1.56*	*1.59*	*2.04*	*2.23*	*2.99*	*3.72*	*4.25*	*5.09*	*5.47*
MEV	1.42	1.25	1.20	1.32	1.50	2.13	2.51	2.81	3.00	2.86
LEV	1.38	1.17	1.13	1.37	1.45	1.97	2.46	2.99	3.25	3.58
TRX	1.34	1.33	1.24	1.38	1.62	1.91	2.34	2.92	2.95	3.20

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Cumulative value of R1 invested and rebalanced annually in October									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.51*	*1.27*	*1.47*	*2.02*	*2.07*	*2.90*	*3.85*	*4.12*	*4.81*	*5.18*
MEV	1.44	1.19	1.25	1.45	1.55	2.10	2.48	2.51	2.75	2.78
LEV	1.40	1.12	1.21	1.48	1.67	2.29	3.07	3.59	3.85	4.12
TRX	1.37	1.13	1.21	1.47	1.52	1.89	2.41	2.78	2.91	3.10
	Cumulative value of R1 invested and rebalanced annually in November									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.44*	1.14	1.52	*2.02*	*2.11*	*2.96*	*3.87*	*4.25*	*5.03*	*5.14*
MEV	1.43	1.00	1.21	1.45	1.64	2.13	2.69	2.58	3.05	2.83
LEV	1.40	*1.19*	*1.53*	1.84	2.04	2.68	3.54	4.13	4.22	4.19
TRX	1.38	0.95	1.23	1.46	1.59	1.89	2.38	2.68	2.99	2.89
	Cumulative value of R1 invested and rebalanced annually in December									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HEV	*1.30*	*1.01*	*1.38*	*1.93*	*1.96*	*2.75*	*3.47*	*4.06*	*4.78*	*4.84*
MEV	1.29	0.93	1.19	1.35	1.57	1.99	2.35	2.52	2.65	2.46
LEV	1.26	0.99	1.31	1.67	1.66	2.25	3.01	3.59	3.40	3.77
TRX	1.30	0.94	1.22	1.41	1.58	1.89	2.30	2.63	2.80	2.80

5. Conclusion

These results therefore show that industrial stocks with high RONA/WACC ratios outperformed those stocks with weaker economic value and also outperformed the general equity market over the period 2006 to 2016. The extent of this outperformance ranged from 6.43% per stock to 3.22% per stock. This outperformance was consistent rather than sporadic, having been demonstrated across a majority of the monthly observations. The null hypothesis has thus been rejected. Portfolios which comprised high RONA/WACC stocks outperformed portfolios which comprised lower RONA/WACC stocks. HEV portfolios also outperformed the general equity market on a consistent basis. The final cumulative value of R1 invested in HEV portfolios ranged from R5.30 to R4.84. This dominated the results from MEV, LEV and TRX portfolios across each month of portfolio formation respectively. HEV portfolios also outperformed MEV, LEV and TRX portfolios on a risk-adjusted basis across all months of portfolio formation. The RONA/WACC ratio can therefore be used to create portfolios that outperform both the general equity market and portfolios that are created using stocks with lower RONA/WACC ratios. The RONA/WACC ratio has been demonstrated to be a good proxy for quality. Future avenues for research based on this study include a comparison of the RONA/WACC proxy relative to other proxies for quality (such as return on capital) and the application of this research to financial and resource stocks respectively.

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