



The Efficient Market Hypothesis, Price Multiples, and the Austrian Stock Market

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ABSTRACT

One of the great exercises of financial research is to examine the efficiency of the stock markets. There are many reasons for this endeavor. One is due to the importance efficiency has on the allocation of capital and the impact on economic activity. Others center on the desire to find an exploitable anomaly for active investment management. This paper sought to do both. The paper explores the Austrian stock market over a five year period ending December 31, 2007. The objective was to examine the value of price multiples in developing portfolios that would not only question the efficient market hypothesis for the market but provide an investment tool to achieve above market risk adjusted returns for an active investment style. The paper explored this by creating portfolios of (1) top ranked (low) price multiples and (2) bottom ranked (high) price multiples. Three multiples were chosen. These were (1) Price to Book (PBK); (2) Price to Current Earnings (PEC), and (3) Price to Normalized Earnings (PER). The hypotheses were low price multiples would outperform, on a risk-adjusted basis, high price multiples, and hedged (long/short) would likewise outperform the market on a risk-adjusted basis. Support for either of these hypotheses questions the efficiency of the markets and could provide a pragmatic investment strategy. The results of the study suggest not only that the efficiency of the Austrian stock market can be questioned but that a workable investment strategy involving price multiples could be implemented. The results noted that low price multiples outperformed high price multiples in all cases but not on a risk adjusted basis. Hedged portfolios likewise outperformed the universe and population on a risk adjusted basis. Hedged PBK had an Adjusted Sharpe Ratio of 0.20; the Hedged PEC had an Adjusted Sharpe Ratio of 0.72; and the Hedged PER had an Adjusted Sharpe Ratio of 1.12. These should be compared against an Adjusted Sharpe Ratio for the market of 0. Finally, an equally-weighted Hedged position of PBK, PEC, and PER had an Adjusted Sharpe Ratio of 0.74.

Introduction

The concept of an efficient market is paramount in investment theory. Eugene Fama (1970) noted that in an efficient market any new information would be immediately and fully reflected in equity prices. Consequently, a financial market quickly, if not instantaneously, discounts all available information. Therefore, in an efficient market, investors should expect an asset price to reflect its true fundamental value at all times. Bruno Solnik (1996) has noted that since the true fundamental value is unknown, the only way to test for market efficiency is to detect whether some specific news is not yet incorporated in the asset price and could therefore be used to make some abnormal profit.

Capital Market Theory

The variables employed in an attempt to achieve abnormal profits have been numerous. Those variables employed come from one or both subsets of capital market theory. These two subsets of capital market theory are (1) the Capital Asset Pricing Model (CAPM) and (2) the Arbitrage Pricing Theory (APT).

Many researchers prefer the Arbitrage Pricing Theory approach since it requires less stringent assumptions than CAPM and many believe it provides similar results. Richard C. Grinold and Ronald N. Kahn (1995) of BARRA noted that "this makes it sound like the APT is a dominant theory. The difficulty is that the APT says it is possible to forecast expected stock returns. But it does not tell you how. It has been called arbitrary pricing theory for just this reason. The



CAPM, in contrast, comes with a “user’s manual.”

This “lack of a user’s manual” makes APT a far more complex theory. The APT states that each stock’s expected excess return is determined by the stock’s factor exposures. The theory doesn’t say what the factors are or whether it provides the weighting of the factors. Many, such as Grinold and Kahn, have noted that this is where science steps out and art steps in.

Multi-factor models are in reality three types. Fundamentally, they all must deal with common factors which influence many stocks rather than being specific to a single stock. The three multi-factor models are (1) the Statistical Factor Model; (2) the Macroeconomic Factor Model; and (3) the Firm’s Attribute Factor Model.

It is the third multi-factor model, the Firm’s Attribute Factor Model, which is of particular interest in this investigation. There are, in general, four subsets. These sub-sets are (1) Economic Factors; (2) Earnings Momentum Factors; (3) Price Momentum Factors; and (4) Valuation Factors.

Valuation Factors

It is the latter subset, Valuation Factors, which is the focus of this paper on the Austrian Stock Market. Valuation factors have become increasingly popular due to publicity given to Warren Buffett and others engaged in so-called intrinsic valuation investing. Hence, there are multiple models for valuation measurement.

This paper chose to use three valuation measurements. These were (1) Price to Book (PBK); (2) Price to Current Earnings (PEC); and (3) Price to Normalized Earnings (PER). The first two price multiples are well known. The third is actively used as well but not as common. Price to Normalized Earnings can be best noted by taking an eight year regression of time and earnings per share. The regressed or eighth year earnings per share become the “normalized earnings” to apply against the price. This allows for a company currently unprofitable (and not included in any PEC listing) to be included in a study.

Valuation and Efficient Markets

Valuation is the most important aspect of active portfolio management. Active managers, in order to justify their roles and compensation, must believe their assessment of value is better than the market or consensus assessment by providing a risk-adjusted return greater than a buy and hold strategy. The modern theory of valuation connects stock values to risk-adjusted expected total returns. This theory of valuation is closely related to the theory of option pricing and is consistent with CAPM and APT. Further, valuation, or perhaps, more importantly mis-valuation, is clearly connected to expected returns.

Assume that in any domestic APT model, some form of the firm’s attributes will be incorporated. In this context, the domestic APT model proposed by Grinold and Kahn (1994) of BARRA notes the importance of valuation fundamentals in its construction. In general, it is an attempt to measure whether the stock is expensive compared to the current fundamentals. Valuation anomalies fall into the traditional empirical test of the semi-strong form of the Efficient Market Hypothesis. Some studies suggest stock selection based on fundamental security analysis will not outperform the market due to analysis competition. Other studies suggest pockets of price inefficiency exist and produce statistically significant positive abnormal returns.

The valuation parameter of the price earnings multiple is one example (Basu, Levy and Leron). The legendary Benjamin Graham’s (and his research assistant, Warren Buffett) investment strategy favored low PE, higher-quality companies with more stable future earnings and, therefore, stock prices favorable for positive abnormal returns. A study spanning 1956-1975 by Oppenheimer and Schlarbaum (1981) provided further validation to the Graham approach. Other valuation parameters have been the focus of other studies (Fama and French (1992); Chan, Harnao and Lakonishok (1991); and Ferson and Harvey (1991)).



Research Hypotheses

The foregoing demonstrates there is research to support the predictive capabilities of valuation rules, at least, in the U.S. markets. This avenue of research is now being expanded to analyze the Austrian stock market.

The first hypothesis herein tested is the classical Benjamin Graham thesis against a selection of Austrian equities: low valuation outperforms high valuation as well as a buy and hold market strategy (the index). The valuation proxies utilized in the study as previously noted were (1) price to book (PBK); price to current earnings (PEC), and (3) price to normalized earnings. If the results are in the predicted direction and high enough on a risk-adjusted basis, the Austrian stock market efficiency can be questioned.

The second hypothesis herein tested is that the hedged portfolios (going long the low price multiples and short the high price multiples) of the above valuation proxies will be positive on a risk-adjusted basis. This likewise calls into question the Austrian stock market efficiency but also will allow investors to achieve a riskless return.

The hypothesis of this paper is that stocks with high price momentum will outperform stocks with low price momentum on a risk-adjusted total return basis. If this be the case, the efficiency of the Austrian stock market could be subject to question.

Data and Methods

This paper will explore the total return behavior, risk-adjusted, of Austrian equities se-

lected by the above noted hypothesis. The data source is First Call World Equities. The study will involve a five year period ending December 31, 2007. The initial study year contains 129 stocks decreasing to 96 in the last year. The data is so constructed that the three most common biases are eliminated. There is no look ahead bias, no restatement bias, nor any survivorship bias to the data. Ford Equity Research provided their estimate of normalized earnings. Mergent provided their estimate of the financial strength of the company on a nine point scale 1 (best) to 9 (worse), A- priori, it was decided only to use stocks six or better (B- or better) in the study. This resulted in the size of the population being reduced to about 39.18% on average. This later reduction requires that the investment portfolios will have overlapping equities. This could present a bias in the study. The stocks will be selected into the top twenty and bottom twenty for a five-year analysis. This requires a small overlapping of stocks in both portfolios. The stocks will be re-balanced on a yearly basis. All results will be expressed in local currency on a total return basis. An estimate of turnover and transaction costs will be made in order to allow the use of the methodology in pragmatic investment management. Output variables noted were (1) Capitalization (expressed in millions of local currency); (2) earnings variability (the standard error as a percent of normalized eight year earnings as regressed); (3) current to normalized earnings; (4) the estimated growth rate; (5) dividend yield; (6) quality; and (7) debt to assets.

Data Results

A summary of the results of the study can be found on the following pages.



AUSTRIAN PRICE MULTIPLE STUDY							
SUMMARY 2003-2007							
Item	PBK	PEC	PER	B-or Better	Austrian Stock Market		
(I) PORTFOLIO RETURNS AND STATISTICS							
Indexed Top 20 CAGR	28.76%	31.72%	30.49%	26.03%	31.94%		
Indexed Bottom 20 CAGR	25.21%	24.99%	22.92%	26.03%	31.94%		
Hedged CAGR	2.55%	6.73%	7.57%	0.00%	0.00%		
Equally-Weighted Hedged--Avg.				0.00%	0.00%	5.57%	
Indexed Top Adj. Sharpe Ratio	1.77	1.98	2.47	2.28	1.87		
Indexed Bottom Adj. Sharpe	2.79	2.12	2.32	2.28	1.87		
Hedged Adj. Sharpe Ratio	0.2	0.72	1.13	0	0		
Equally-Weighted Hedged ASR				0	0	0.74	
Average Annual Turnover Top	31.25%	35.00%	31.25%				
Average Annual Turnover Bottom	32.50%	30.00%	28.75%				
Average Universe N(B- or Better)				38			
Average Stock Market N					97		
Average Percentage in Study						39.18%	
(II) TOP 20 PRICE MULTIPLE STATISTICS							
Mean	1.279	13.36	14.22				
Median	1.271	12.96	14.3				
Mean STD	0.358	4.316	4.998				
Minimum	0.495	3.655	4.9				
Maximum	2.049	25.2	28.8				
N	120	120	120				
(III) BOTTOM 20 PRICE MULTIPLE STATISTICS							
Mean	4.503	50.7	45.26				
Median	2.73	29.55	34.8				
Mean STD	5.79	62.3	32.15				
Minimum	1.308	13.9	11.6				
Maximum	49.13	380.6	221.4				
N	120	120	120				
(IV) UNIVERSE PRICE MULTIPLE STATISTICS							
Mean	2.856	3.71	29.22				
Median	1.89	17.1	20.6				
Mean STD	4.281	47.86	27.68				
Minimum	0.495	3.655	4.9				
Maximum	49.13	380.6	221.4				
N	253	241	249				



Item	PBK	PEC	PER	Universe B-or Better	Austrian Stock Market
(V) AUSTRIAN STOCK MARKET PRICE MULTIPLE STATISTICS					
Mean	2.463	42.01	28.71		
Median	1.35	16.9	16.1		
Mean STD	5.547	112.4	42.74		
Minimum	0.007	0.403	1		
Maximum	99.99	999.9	403.6		
N	564	449	553		
(VI) OTHER TOP 20 DESCRIPTIVE STATISTICS					
Capitalization					
Mean	1471	1865	1672	2098	989.4
Median	254.7	709	618.5	669	148
Mean STD	2755	3281	3143	3609	2596
Minimum	65	68	68	65	0
Maximum	20733	20733	20733	20733	20733
N	117	118	118	241	549
Earnings Variability					
Mean	42.42	37.76	34.58	40.04	204.5
Median	36	31.5	29.5	32	60
Mean STD	34.9	29.27	22.47	35.26	301.7
Minum	8	7	5	5	5
Maximum	261	150	111	287	999
N	117	118	118	241	549
Current to Normal Earnings					
Mean	1.348	1.487	0.977	1.252	-1.49
Median	1	1	1	1	1
Mean STD	1.319	1.257	0.409	0.98	26.8
Minimu	-0.55	0.46	-0.17	-0.16	-610
Maximum	10.08	10.08	2.25	10.08	18.75
N	117	118	118	241	549
Estimated Growth					
Mean	10.63	11.69	10.72	11.03	9.993
Median	10	12	10	10	10
Mean STD	4.725	4.32	4.322	5.36	5.95
Minimum	0	4	3	0	0
Maximum	25	25	24	25	25
N	117	118	118	241	549



Item	PBK	PEC	PER	B-or Better	Austrian Stock Market
Current to Normal Earnings					
Mean	0.929	1.04	1.278	1252	-1.49
Median	1	1	1	1	1
Mean STD	1.886	0.507	2.224	0.98	26.8
Minimum	-18	0.03	-18	-0.16	-610
Maximum	3.07	3.07	10.08	10.08	18.75
N	114	119	119	241	549
Estimated Growth					
Mean	11.37	10.65	11.11	11.03	9.993
Median	10	10	10	10	10
Mean STD	6.16	6.036	6.292	5.36	5.95
Minimum	0	0	0	0	0
Maximum	25	25	25	25	25
N	114	119	119	241	549
Dividend Yield					
Mean	1.539	1.416	1.372	1.888	1.67
Median	1.5	1.3	1.3	1.7	1.3
Mean STD	11.126	1.168	1.056	1.547	2.16
Minimum	0	0	0	0	0
Maximum	6.6	6.6	4.5	12.8	20
N	114	119	119	241	549
Quality					
Mean	4.956	5.143	5.118	5	6.643
Median	5	5	5	5	7
Mean STD	0.944	0.895	0.875	0.975	1.73
Minimum	2	2	2	2	2
Maximum	6	6	6	6	9
N	114	119	119	241	549
Debt to Assets					
Mean	0.62	0.632	0.621	0.612	0.568
Median	0.65	0.62	0.62	0.6	0.58
Mean STD	0.2746	0.2546	0.2625	0.23	0.2595
Minimum	0	0	0	0	0
Maximum	0.98	0.98	0.98	0.98	1
N	119	119	119	252	550



Item	PBK	PEC	PER	B-or Better	Austrian Stock Market
Dividend Yield					
Mean	2.08	2.462	2.441	1.888	1.67
Mean	1.8	2.2	2.2	1.7	1.3
Mean STD	1.881	1.762	1.791	1.547	2.16
Minimum	0	0	0	0	0
Maximum	12.3	12.8	12.8	12.8	20
N	117	118	118	241	549
Quality					
Mean	5.256	4.975	5.059	5	6.643
Median	5	5	5	5	7
Mean STD	0.863	0.982	0.972	0.975	1.73
Minimum	2	2	2	2	2
Maximum	6	6	6	6	9
N	117	118	118	241	549
Debt to Assets					
Mean	0.603	0.629	0.63	0.612	0.568
Median	0.575	0.59	0.6	0.6	0.58
Mean STD	0.1958	0.1837	0.18	0.23	0.2595
Minimum	0	0.26	0.21	0	0
Maximum	0.98	0.98	0.98	0.98	1
N	120	117	117	252	550
(VII) OTHER BOTTOM 20 DESCPTIVE STATISTICS					
Capitalization					
Mean	3575	2089	2124	2098	989.4
Median	729	606	682	669	148
Mean STD	4018	3555	3441	3609	2596
Minimum	72	72	72	65	0
Maximum	17604	16480	16408	20733	20733
N	114	119	119	241	549
Earnings Variability					
Mean	53.38	4346	56.49	40.04	204.5
Median	32	33	34	32	60
Mean STD	100.9	40.98	99.61	35.26	301.7
Minum	5	6	6	5	5
Maximum	999	287	999	287	999
N	114	119	119	241	549



(VIII) HEDGED STATISTICS							
Year	(A) PBK Hedged			(B) PEC Hedged			
	Top	Bottom	Combined	Top	Bottom	Combined	
	31.789	19.052	12.737	25.448	27.017	-1.569	
2004	43.258	29.855	13.403	53.785	31.576	22.209	
2005	31.634	34.318	-2.684	37.08	37.494	-0.414	
2006	29.947	31.411	-1.464	37.078	25.644	11.434	
2007	1.326	12.802	-11.476	9.392	5.664	3.728	
				Universe	Austrian		
	PBK		Year	B- Better	Stock Market		PEC
Mean	2.1032		2003	25.925	42.718		Mean 7.0776
Standard E	4.8		2004	36.556	56.56		Standard E 4.416136
Median	-1.464		2005	32.579	29.962		Median 3.728
Mode	#N/A		2006	30.244	24.667		Mode #N/A
Standard D	10.73313		2007	7.071	10.439		Standard D 9.874779
Sample Va	115.2						Sample Va 97.51127
Kurtosis	-1.99269		Mean	26.475	32.8692		Kurtosis 0.104363
Skewness	-0.00464		Median	30.244	29.962		Skewness 1.056986
Range	24.879		Mean STD	11.5099	17.5862		Range 23.778
Minimum	-11.476		Minimum	7.071	10.439		Minimum -1.569
Maximum	13.403		Maximum	36.556	56.56		Maximum 22.209
Sum	10.516		N	5	5		Sum 35.388
Count	5						Count 5
Year	(C) PER Hedged			(D) EQ.-WTD. Hedged			
	Top	Bottom	Combined	Top	Bottom	Combined	
2003	29.28	26.051	3.229	28.839	24.04	4.799	
2004	45.684	26.428	19.256	47.57567	29.286333	18.28933	
2005	36.019	31.42	4.599	34.911	34.410667	0.500333	
2006	30.732	26.631	4.101	32.58567	27.895333	4.690333	
2007	12.219	5.796	6.423	7.645667	8.0873333	-0.441667	
	PER						EQ.-WTD
Mean	7.5216						Mean 5.567467
Standard E	2.979694						Standard E 3.354037
Median	4.599						Median 4.690333
Mode	#N/A						Mode #N/A
Standard D	6.662799						Standard D 7.499855
Sample Va	44.39289						Sample Va 56.24783
Kurtosis	4.375546						Kurtosis 3.125082
Skewness	2.071313						Skewness 1.68974
Range	16.027						Range 18.731
Minimum	3.229						Minimum -0.44167
Maximum	19.256						Maximum 18.28933
Sum	37.608						Sum 27.83733
Count	5						Count 5



Data Analysis

An analysis of the data was favorable to the hypotheses. Each of the price multiple subsets presented the following conclusions.

- (1) **Price to Book.** The low price to book portfolio outperformed the high price to book portfolio at 28.76% compared to the high price to book portfolio at 25.21% a difference of 2.55%. The low price to book portfolio outperformed the universe (B- or better) at 26.03% but not the population at 31.94%. The low price to book portfolio did not, however, outperform on a risk adjusted basis. The Adjusted Sharpe Ratio (Mean/Standard Deviation) stood at 1.77 compared to 2.28 for the universe and 1.87 for the population. Turnover averaged 31.25%
- (2) **Price to Current Earnings.** The low price to current earnings portfolio outperformed the high price to current earnings portfolio at 31.72% compared to 24.99%. The portfolio outperformed the universe but not the population. On an Adjusted Sharpe Ratio it did not produce a higher score at 1.98 compared to 2.28 for the universe but outperformed the population at 1.87. Turnover averaged 35.00%
- (3) **Price to Normalized Earnings.** The low price to normalized earnings outperformed the high price to normalized earnings at 30.49% compared to 22.92%. This 30.49% outperformed the universe at 26.03% but not the population at 31.94%. The Adjusted Sharpe Ratio at 2.47 was superior to the universe at 2.28 and the population at 1.87. Turnover averaged 31.25%.
- (4) **Hedged Price to Book.** The hedged portfolio (going long on the low 20 stocks and shorting the high 20 stocks) resulted in a favorable Adjusted Sharpe Ratio of 0.20 with a mean return of 2.55%. This compares to an Adjusted Sharpe Ratio of 0 for both the universe and population. Turnover averaged

31.25% for the long and 32.50% for the short.

- (5) **Hedged Price to Current Earnings.** The hedged portfolio resulted in a favorable Adjusted Sharpe Ratio of 0.72 compared to 0 for both the universe and the population. Turnover for the long averaged 35.00% and 30.00% for the short.
- (6) **Hedged Price to Normalized Earnings.** The hedged portfolio had an Adjusted Sharpe Ratio of 1.13 with a mean return of 7.57%. Turnover for the long stood at 31.25% while the short stood at 28.75%.
- (7) **Hedged Equally-Weighted.** The hedged equally-weighted portfolio takes into account all three of the hedged portfolios. It showed a clear advantage with an Adjusted Sharpe Ratio of 0.74 and a risk-free return averaging 5.57%. Transaction costs would be substantial as six portfolios (noted above) are utilized.

Conclusions

The results of the study are in line with others clearly indicating the superior performance of low price multiple investing for wealth maximization. All three (PBK, PEC, and PER) provided superior returns to the universe but not against the population. It is quite possible that any of the three could outperform the universe after transaction costs (commissions, bid-ask spreads, and slippage) but not signally. Unfortunately, only one, PER, had superior Adjusted Sharpe Ratios. All three of the low price multiples outperformed high price multiples (PBK, PEC and PER) only in terms of returns but not Adjusted Sharpe Ratios except PER. In an efficient market, this should not occur.

The hedged portfolios likewise clearly dominated both the universe and the population. While not overly pragmatic for investment management due to transaction costs (except PER), they clearly show the inefficiency of the Austrian stock market.



The Efficient Market Hypothesis remains one of the cornerstones of investment theory. The fact that low price multiple strategies continue to achieve superior performance however remains a paradox. It is well known and should therefore not exist either in the United States or as demonstrated by this paper in Austria. Both are developed markets with signal informational knowledge. This demonstrated inefficiency should not exist.

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