Residual Income Model and abnormal returns: a comparison to factor styles and sell-side analysts

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We investigate the return forecasting ability of a residual income model based on analysts' estimates and time-varying risk-free rates, equity risk premiums and terminal value growths, in US and Europe, along the period 1995-2018. While the academic literature acknowledged the reliability of the model, practitioners and especially market operators paid scarce attention to it. Therefore, in a framework where market inefficiencies are admitted, a valuation model that shows superior predicting power for returns, at least compared to main market multiples and analysts' recommendations, should be considered in providing better empirical estimates of intrinsic value. We display three major results: a) RIM-based V/P portfolios yield statistically significant alphas relative to market indexes; b) outperform portfolios built through other factors, reporting higher Sharpe ratios and information ratios; c) remarkably beat analysts' buy-sell recommendations. Furthermore, two facts stand out: RIM proves to be extremely effective in signaling overvalued stocks and producing substantial long-short returns; the simpler RIM model studied generates better outcomes than the more complex one.

1. Introduction

The performance of the residual income model as a valuation tool and as a return estimator has been extensively studied in the financial and accounting literature, in particular in the period 1995-2006. Nevertheless, it emerged from recent surveys that the model is still not favored by practitioners in performing valuations, especially among sell-side analysts. This work traces the history of the relevant literature first and then analyzes the return forecasting potential of RIM using a monthly equally-weighted asset allocation, both long-only and long-short (as in standard factor testing) for the period 1995-2018. The models we used to implement a full valuation of stocks in US and Europe and generate portfolio rankings according to a RIM-based V/P, are based on analysts' forward estimates on earnings per share (EPS) and dividends per share (DPS). The structures studied have been essentially two: one with a truncation at the third year of analysts' estimates, one with additional growth of 5 years through sustainable growth. We estimated the cost of capital through CAPM while considering both time-varying risk-free rates, equity risk premiums and terminal growths. Even if our purpose is not to speculate about the efficiency of the market, we simply do not rule out the possibility of obtaining abnormal returns, expecting a long-term convergence between price and value as showed by Lee et al. (1999)[1] like in a co-integrated system. Therefore, if it is possible to exploit abnormal returns with a residual income model, we infer that the model is a good tool for intrinsic value evaluation. First of all, our RIM-based V/P multiple allocation outperformed main market indexes both in US and Europe. In the period 1995-2018, considering yearly compounded returns, long-only top ranked portfolios outperformed the S&P 500 by 4% and 6.5% in US, while outperformed the STOXX 600 by 4.5% and 7.4% in Europe (depending on the type of V/P considered). The monthly alphas produced by RIM-based allocation, against our benchmarks, came in between 0.34% and 0.57% in US and between 0.47% and 0.63% in Europe, with a statistical significance above 95% (details of t-stat for all portfolios at APPENDIX A, Table - A2 and APPENDIX B, Table - B2). Besides, long-short portfolios produced a yearly compounded self-financing return between 7.6% and 12.6% in United States and between 4.1%

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[1] Lee C. M. C., Myers J., Swaminathan B. (1999). What is the intrinsic value of the Dow? *Journal of Finance, 54(5), pp. 1693-1741.*

and 4.6% in Europe. As a second main point we compared the results of RIM-based V/P to other main factors (both trailing and forward) traditionally used as signals of "Value Premium": P/E, P/BV, PEG, ROE, EV/EBITDA, Size. It can be shown that V/P produced consistent higher risk-adjusted returns (Sharpe ratios and information ratios) compared to the majority of other multiples, with the exception of $ROE^{(forward)}$ and EV/EBITDA multiple in Europe, which produced risk adjusted returns (in long-only portfolios) in line with the RIM-based valuation. It is worth to underline that the RIM-based V/P produced the highest differential returns compared to other factors in long-short portfolios. It can be inferred that the model has been extremely good in signaling overvalued stocks. Finally, we studied the performance of analysts' recommendations (through the TP/P multiple) since we used their estimates as inputs of the model. In line with the academic literature on analysts' biases, we identified the multiple TP/P as the worst return predictor and we did not find any significant correlation with other valuation multiples both for US and Europe. While TP/P multiple produced the worst strategy in our sample for the full period (1995-2018) it is important to notice that in the last sub-period (2010-2018) analysts signaled differential target price forecasting ability, especially in Europe. Even though analysts did not produce value through their recommendations in general, they produced financial estimates that enabled us to obtain abnormal returns with RIM. Again, this finding is consistent with one side of academic literature which concludes that analysts' estimates are a better proxy for expected earnings than those from time-series models. Finally, it is worth pointing out that the use of a residual income model-based valuation could remarkably improve the analysts' price target quality. The article is structured in 5 chapters. Chapter 2 illustrates the theory behind the residual income model and its different consideration among academics and practitioners. Chapter 3 traces the three main areas of financial literature that get through this paper: the market efficiency, the factor theory and the relevance of sell-side analysts forecasts. Chapter 4 outlines the method used to collect data and to construct equally-weighted monthly portfolios. Finally, Chapter 5 summarizes the results obtained through our RIM-based V/P multiple across US and Europe. In particular the performances of monthly constructed portfolios (both long-only and long-short) against main market indexes, other factors styles and sell-side analysts' recommendations.

2. Equity valuation with residual income model

The valuation model we employed to estimate the equity value of firms (per share) is the residual income model (RIM), sometimes specified also as "Ohlson model" (OM). While RIM has been extensively studied in the financial and accounting academic literature e.g. on the value-relevance (Barth, Beaver and Landsman, 2001), on the relation between accounting and cash flow based valuations (Penman and Sougiannis, 1998; Courteau, Kao and Richardson, 1999; Penman, 2001), on discrepancy between values and prices (Lee, Myers and Swaminathan, 1999; Ali, Hwang and Trombley, 2003), on the cost of capital and ERP estimates (Gebhardt, Lee and Swaminathan, 2001) and on the relation between risk and return (Penman and Reggiani, 2013) it did not receive the same attention among financial practitioners, at least in the equity research sector, where has been possible to verify its application in equity reports[2]. Looking at a previous study on the matter, by Hand, Coyne, Green and Zhang (2017), it emerges that, among US sell-side equity research analysts, RIM was employed just 1/20 as often as DCF (1/17 in non-US countries) and 1/8 as often as multiples (1/6 in non-US countries). The same research highlights that, among brokerage houses, only Morgan Stanley was a frequent user in equity research reports, which confirms its historical acknowledgement of residual income model as a valuable tool[3-4]. Another research, conducted by Richardson S., Tuna I. and Wysocki P. (2010), highlights that RIM is less frequently used by practitioners compared to academics. According to their survey only 16% of practitioners use RIM frequently, whereas 71% of academics use it frequently. On the other side, 74% of practitioners use earnings multiples frequently, compared to 54% of academics[5].

The main advantages of RIM can be summarized in the following points: it usually implies a lower weight of terminal value on net present value, compared to other valuation models; it can be applied to companies that do not pay dividends or that do not have positive free cash flow in the short term; it safeguards from the risk of overvaluation determined by profits produced

[2] Hand J. R. M., Coyne J., Green J., Zhang X. F. (2017). The use of Residual Income valuation methods by U.S. sell-side equity analysts, *Journal of Financial Reporting*, Spring, 2(1), pp. 1-29.

[3] Harris T.S., Estridge J., Nissim D. (2008). Morgan Stanley ModelWare's approach to intrinsic value: Focusing on risk-reward trade-offs, in *Equity valuation: Models from leading investment banks, Chichester: John Wiley & Sons*.

[4] Giuliani S. (2005). *Valore d'impresa: rischio e allocazione del capitale, Roma: Aracne, pag. 177*.

[5] Richardson S., Tuna I. and Wysocki P. (2010). Accounting anomalies and fundamental analysis: A review of recent research advances, *Journal of Accounting and Economics, 50(2-3), pp. 410-454, "Table 1 Q6"*.

by bigger investments; it is neutral to some earnings management, like cost capitalization; it captures the sources of value not represented in the balance sheet, like intangibles. On the other side the underpinned drawbacks are: it is based on accounting numbers that could be manipulated by management; it assumes that the cost of debt is properly reflected by passive interests, since it uses net profit as an input; it is based on the "clean surplus accounting" relationship [$BVPS_{(t+1)} = BVPS_{(t)} + EPS_{(t+1)} - DPS_{(t+1)}$], which is violated in the case of shares transactions, currency translation, pension adjustments and certain changes in fair value (all changes that refer to "other comprehensive income")[6]. Even though every valuation model with infinite forecasting horizon (and fully consistent assumptions) should provide the same results, we share the view of Penman (1998), who shows how accrual earnings techniques dominate cashflow models in managing the "truncation problem" in valuations with finite horizons[7]. De facto, in our valuations we kept into account analysts estimates up to 3 years of forecasts considering that they are more frequent and usually more followed by market participants, even if sometimes it is possible to find estimates till 5 years.

We tested RIM, as a full valuation model, against factor models (which are usually implemented through multiples), also as we consider it to be one of the most conservative valuation technologies and one of the easiest to implement, using analysts per share estimates as an input. While analysts' estimates frequency on operating accounting data (e.g. EBIT, EBITDA, EBITA, EBITAR) can vary among sectors and companies, since one metric could be more relevant in one industry compared to another, estimates about EPS are available for every company covered by a broker research. Conversely estimates on cash flow items are less accurate than earnings forecasts[8] and are seldom recorded in a consistent way by data providers, especially collecting backwards observations. Finally, we attributed importance to EPS estimates being aware of the research of Fried and Givoly (1982)[9] and Brown et al. (1987)[10], who supported the academic conclusion that analysts' estimates are a better proxy for expected earnings than those from time-series models, and in accordance with the research of Lee et al. (1999)[11]. On the other side Bradshaw et al. (2012) found that only for large, mature and stable firms, over relatively short horizons, analysts' forecasts consistently outperform forecasts from time-series models[12]. Aware of its potential limits, we advocate the importance of a simple technology - for a factor model that determines a full valuation - to have the highest possible control on the input variables and to limit the errors stemming from extrapolation. We cannot but totally agree with the suggestion of Penman (2010): "In valuation, as with most technologies, there is always a tradeoff between simple approaches that ignore some pertinent features and more elaborate techniques that accommodate complexities"[13], and with the thought of Greenwald (2001): "Adding inaccurate to accurate information produces inaccurate information"[14].

The residual income model describes the fundamental value as the sum of two components: book value and discounted residual earnings. Residual earnings are simply the sum of future net income less a charge for shareholders' opportunity cost borne to generate that income, identified by the cost of equity (coe).

$$V_t = BV_t + \sum_{i=1}^{\infty} \left(\frac{RI_{t+i}}{(1+coe_t)^{\,i}} \right), \; RI_{t+i} = E_t \left[NI_{t+i} - (coe_t \times BV_{t+i-1}) \right], \; coe = r_f + \beta \, (ERP)$$

Alternatively, residual incomes can be expressed as the present value of extra-returns on shareholder capital (expressed by the book value), over the return expected by the investor.

$$V_t = BV_t + \sum_{i=1}^{\infty} \left(\frac{E_t \left[(ROE_{t+i} - coe_t) \times BV_{t+i-1} \right]}{(1+coe_t)^{\,i}} \right)$$

As a further clarification, the residual income model represents the "equity side" variant of the probably

[6] Pinto J. E., Henry E., Robinson T. R., Stowe J. D. (2015). *Equity asset valuation. 3rd edition. Hoboken: Wiley.*

[7] Penman S. H., Sougiannis T. (1998). A comparison of dividend, cash flow and earnings approaches to equity valuation, *Contemporary accounting research, 15(3), pp. 343-383.*

[8] Givoly D., Hayn C., Lehavy R. (2009). The Quality of Analysts' Cash Flow Forecasts, *The Accounting Review, 84(6), pp. 1877-1911.*

[9] Fried, D., D. Givoly (1982). Financial analysts' forecasts of earnings: a better surrogate for market expectations, *Journal of Accounting and Economics, 4(2), pp. 85-107.*

[10] Brown L. D., Richardson G. D., Schwager S. J. (1987). An information interpretation of financial analyst superiority in forecasting earnings, *Journal of Accounting Research*, Spring, 25(1), pp. 49-67.

[11] Lee C. M. C., Myers J., Swaminathan B. (1999). What is the intrinsic value of the Dow? *Journal of Finance, 54(5), pp. 1693-1741.*

[12] Bradshaw M. T., Drake M., Myers J., Myers L. (2012). A Re-examination of Analysts' Superiority over Time-Series Forecasts, *Review of Accounting Studies*, 17(4), pp. 944-968.

[13] Penman, S. H. (2010). *Financial Statement Analysis and Security Valuation, Boston: McGraw-Hill Irwin.*

[14] Greenwald B. C. N., Kahn J., Sonkin P. D., van Biema M. (2001). *Value investing: from Graham to Buffett and beyond, Hoboken: Wiley.*

better-known model Economic Value Added® [15]. The EVA® measures the excess operating return compared to the expected return on the capital invested in the business, identified by the weighted average cost of capital (wacc) [16].

$$EV_t = IC_t + \sum_{i=1}^{\infty} \left(\frac{EVA^{®}_{t+i}}{(1+wacc_t)^{\,i}} \right), \quad EVA^{®}_{t+i} = E_t \left[NOPAT_{t+i} - (wacc_t \times IC_{t+i-1}) \right],$$

$$EV_t = IC_t + \sum_{i=1}^{\infty} \left(\frac{(ROIC_{t+i} - wacc_t) \times IC_{t+i-1}}{(1+wacc_t)^{\,i}} \right)$$

3. Historical literature context

An earnings-based valuation technique may not seem the best choice on a global level considering that accounting standards differ internationally but, as showed by Frankel and Lee (1998), a simple residual income model without any adjustment accounted for 70% of the cross sectional-variation of stock prices among 20 countries, predicting abnormal returns [17]. As previously recalled, extensive studies have been done on the residual income model as a relevant valuation tool, but fewer have tested it as a basis for asset allocation, especially in the last 10 years notwithstanding the attention that has been paid to several factors that could explain persistent return anomalies. The present work passes through three main areas of financial literature; the market efficiency, the factor theory and the relevance of sell-side analysts forecasts.

The classical notion of market efficiency (weak, semi-strong and strong) initiated by Fama (1970) has been overcome by the notion of near-efficiency presented by Grossman and Stiglitz (1980), which is consistent with the multifactor approach (APT) [18] developed by Ross (1976) [19]. In their framework factors depict the risks that investors cannot eliminate through arbitrage and therefore require a compensation. However, the rational explanation of factors extra-return (a compensation for losses during bad times) is not the only one, since behavioral alternatives have been extensively provided by Shiller (1981), Barberis, Huang (2001) and Thaler, Barberis (2002).

We simply do not rule out the existence of inefficiencies in the market and remain confident in the good sense of investing time and appraisal effort to exploit them. Even if we do not see the price as the best estimate of value all the times, we expect a long-term convergence (as in a co-integrated system) [20]. Besides, in such an environment, a good valuation model should provide better estimates of intrinsic value and give to the user the possibility to earn abnormal returns. If markets are not strictly efficient then it is possible to earn returns that may not be explained by added risks and if it is possible to exploit such anomalies with a residual income model, we infer that the model is a good tool for intrinsic value evaluation. In the present study we will not investigate the source of return of a RIM-based portfolio allocation and we will leave open the question if these returns depend on other specific risk factors or on market inefficiencies determined by investors biases.

For the time being, we will just compare the return of portfolios constructed with RIM with the returns and volatilities of other main factor styles, within a full set of other statistical data. According to Ang (2004) factors are investment styles which deliver high returns over the long run but do not come for free because can underperform in the short run (during "bad times"). Several factors risk premiums have been taken into consideration in academics and among practitioners like the "Value Premium", "Momentum Premium", "Illiquidity Premium", "Volatility premium", "Profitability Premium", but we will focus only on the first one in this study. It is worth pointing out that, while traditional factors have been constructed through market multiples and accounting ratios, the asset management industry is increasingly focusing on quantitative strategies that are much more "data intense" and driven by sophisticated algorithms (artifi-

[15] Economic Value Added® (EVA®) is a service mark of Stern Value Management, formerly Stern Stewart & Co.

[16] BV (book value), RI (residual Income), NI (net income), COE (cost of equity), R_f (risk free rate), ERP (equity risk premium), ROE (return on equity), NOPAT = EBIT * (1-Tax %), IC (invested capital), WACC (weighted average cost of capital), ROIC (return on invested capital).

$$\beta = Beta = \frac{Cov\,(r_i, r_{mkt})}{\sigma^2_{mkt}} = \frac{\sigma_i * \sigma_{mkt} * \rho_{i,mkt}}{\sigma^2_{mkt}} = \frac{\sigma_i}{\sigma_{mkt}} * \rho_{i,mkt}$$

[17] Frankel R., Lee C. M. C. (1998). Accounting valuation, market expectation, and cross-sectional stock returns, *Journal of Accounting and Economics*, 25(3), pp. 283-319.

[18] $r_i = b_{i0} + b_{i1}F_1 + b_{i2}F_2 + \cdots + b_{ik}F_k + \varepsilon_i \qquad r_i = \alpha_i + b_i^T \bar{F} + \varepsilon_i$

[19] Ang A. (2014). *Asset management: a systematic approach to factor investing, Oxford: Oxford University Press, pp. 209-211.*

[20] Lee C. M. C., Myers J., and Swaminathan B. (1999). What is the intrinsic value of the Dow? *Journal of Finance, 54(5), pp. 1693-1741.*

cially intelligence based). The definition of factors is constantly changing and some of them still lack a commonly accepted definition, e.g. the "quality factor" as outlined in a recent paper by Hsu, Kalesnik and Kose (2019)[21].

The "Value Premium" has been historically studied with stock market multiples and despite the recent advances in factors' studies, the same approach is employed in the majority of institutional asset allocation strategies. Our idea is to test if the RIM can be a better tool to identify the value factor. According to Fama and French (1998) value stocks outperformed growth stocks in the period 1975-1995 and beat the return of the MSCI index by 3% to 5% yearly depending on the multiple used for the screening. In particular, stocks selection based on value produced a yearly extra-return of 5.09% through BV/P multiple, 4.07% through E/P multiple, 3.92% through C/P multiple and 3.09% through D/P[22]. Nevertheless, Fama and French do not clear the reasons why value deliver a premium, they just show that so it happens. One of the most relevant explanation (on the rationalist side) has been given by Zhang (2005), who addresses the production technology as the justification of a premium. Supposing that value stocks hold a capital that is less productive than growth stocks, their ability to adjust the stock of capital to an external shock is consequently lower[23]. Besides it remains open the interpretation of the behavioral side which explains the value premium as a pure mispricing or, differently said, a valuation mistake of the market. Ali, Hwang and Trombley (2003) e.g. show that risk factors are not responsible for abnormal returns earned by a V/P based on a residual income valuation and that the outperformance seems consistent with the mispricing explanation[24]. We are not trying to answer to any of these hard dilemmas but, aware that a value premium exists, we want to see if a full valuation model can deliver a better performance compared to market multiples. Therefore, we will look if a spread in a portfolio - with stocks ranked through RIM - will produce higher returns and lower volatilities compared to standard factor testing through multiples. Value portfolios are constructed ranking multiples from the lowest, if e.g. we consider P/E (the cheapest), or from the highest, if e.g. we consider the reciprocal E/P (still the cheapest), although we are aware that this is a simplification of reality. It worked in the past, but we know that buying companies with low multiples can expose to a "value trap" as a low P/E could be justified either by a low growth, either by a growth that is risky[25].

$$\frac{P_t}{E_{t+1}} = \frac{payout_t}{coe_t - g_t} = \frac{1}{coe_t} + \frac{(ROE_t - coe_t)}{coe_t} \times \frac{(1 - payout_t)}{(coe_t - g_t)}, \quad g_t = ROE_t \times (1 - payout_t)$$

In the explicit equation, the first term represents the value of the company without growth, the second the return over the cost of capital, the third the present value of all reinvestments. It seems clear that a company with a return inferior to its cost of capital, with low growth, with low value of reinvestment or with high perception of risk on future earnings, or future growth, deserves a low P/E without signaling a mispricing. We find easier to spot such mispricing using a RIM valuation since the relation between input variables and output looks clearer than a P/E valuation.

Finally, since we use analysts estimates as an input of our RIM, it is worth recalling the literature around the relevance of sell-side estimates. While there is some agreement in academics on the relevance of analyst estimates that refer to earnings compared to time-series models, there is more opacity on the relevance of analysts' recommendations. The majority of the studies suggest that there is not a straight relationship between the quality of income estimates and the valuations leading to target prices formation. Bradshaw et al. (2013) say analysts have few incentives to set accurate price targets, which would presumably exhibit little or no predictive ability for future stock returns[26]. Lee et al. (2004) show that analysts generally prefer "glamour" stocks to "value" stocks. They find that stocks receiving more favorable recommendations tend to show positive price momentum, higher trading volume (turnover), higher past and projected growth, more positive accounting accruals and more aggressive capital expenditures[27]. Several studies underline also that valuation heuristics (e.g. multiples heuristic and rela-

[21] Hsu J., Kalesnik V., Kose E. (2019). What Is quality? *Financial Analyst Journal, 75(2), pp. 44-61.*

[22] Fama E. F., French K. R. (1998). Value versus growth: the international evidence, *Journal of finance, 53(6), pp. 1975-1999.*

[23] Zhang L. (2005). The value premium, *Journal of Finance*, 60(1), pp. 67-103.

[24] Ali A., Hwang L., Trombley M. (2003). Residual-Income-Based Valuation Predicts Future Stock Returns: Evidence on Mispricing versus Risk Explanations, *The Accounting Review*, 78(2), pp. 377-396.

[25] Penman S. H., Reggiani F. (2018). Fundamentals of Value versus Growth Investing and an Explanation for the Value Trap, *Financial Analysts Journal*, 74(4), pp. 103-119.

[26] Bradshaw M. T., Brown L. D., Huang K. (2013). Do Sell-Side Analysts Exhibit Differential Target Price Forecasting Ability? *Review of Accounting Studies*, 18(4), pp. 930-955.

[27] Jegadeesh N., Kim J., Krische S., Lee C. M. C. (2004). Analyzing

tive valuations) are often preferred to formal valuation technique, because the communication from the analysts to the traders/investors can be easier. Damodaran (2005) described analysts' use of multiples as "a story telling experience", where analysts with better and more believable stories are given credit for better valuations. Two other studies, Bradshaw (2004) and Gleason et al. (2012), come to the conclusion that the investment value of analysts' recommendations is reduced substantially when those price targets are formed through valuation heuristic. In particular Bradshaw (2004) concludes that investors would earn higher returns over a one-year holding period by relying on formal DCF/RIM models, that incorporate analysts' consensus earnings forecasts, rather than on analysts' consensus Buy/Sell recommendations alone[28] and Gleason et al. (2012) document that substantial improvements in price target quality occur when analysts appear to be using a residual-income valuation technique rather than a PEG valuation heuristic[29].

4. Data and Portfolio construction

The period considered in our analysis starts on 29 December 1995 and terminates on 29 December 2018, with a dataset that comprises the first 600 companies by market capitalization in United States (US) and Western Europe (not limited to the Eurozone). We opted for this number of companies to compare our results to the main domestic indexes that will represent our benchmarks for market return: the S&P 500 for US and the STOXX 600 for Europe. The period 1995-2018 has been chosen because analysts' estimates are less numerous before 1995 and in order to compare different sub-periods that included major market corrections and bull markets. All periods start and end on 29 December and in addition we checked 4 sub-periods: 1995-2005, which includes the "dot.com" bubble; 2000-2010, which includes the financial crisis of 2007-2009; 2007-2010, to test factors response during full market downturn; 2010-2018, which represents one of the longest bull market in history.

The study required a wide range of financial data, collected from FactSet Research Systems and Bocconi University databases, and in particular analysts' estimates, used both for the implementation of our RIM model and for market multiples. Since forecasts are essential to our study, we applied a window of 60 days on analysts' estimates data to exclude form our sample older and virtually not updated estimates. Regarding financial reporting data we applied a time lag of 90 days to avoid the "look-ahead bias" and to use only information available at the time of the trade. The assumptions on which our RIM model is based (underlying the V/P ratio) will be discussed in detail in the next paragraph and we are now quickly specifying the market multiples used as factors: analysts' target price/price (TP/P), represents the average target price of analysts (within a 60 days consensus window), at the time of the monthly valuation, divided by the price of the stock (the price refers to the rebalancing day, so at the end of every month); $ROE^{(trailing)}$ represents the 5 year average of net $income_{(t)}$ divided by average book value $[(BV_{(t)}+BV_{(t-1)})/2]$; $ROE^{(forward)}$ represents the $EPS_{(t+1)}$ estimated by analysts (first unreported fiscal year) divided by $BV_{(t)}$ (last reported year); $P/E^{(trailing)}$ represents the price divided by the last reported EPS (with 90 days' time-lag); $P/E^{(forward)}$ represents the price divided by the $EPS_{(t+1)}$ estimated by analysts; $PEG^{(trailing)}$ represents the $P/E^{(trailing)}$ divided by average expected growth from t+1 to t+3; $P/E^{(forward)}$ represents the $P/E^{(forward)}$ divided by average expected growth from t+1 to t+3; $P/BV^{(trailing)}$ represents the price divided by the last reported book value per share (with 90 days' time-lag); $P/BV^{(forward)}$ represents the price divided by the $BV_{(t+1)}$ obtained through the "clean surplus accounting" relationship $[BVPS_{(t+1)} = BVPS_{(t)} + EPS_{(t+1)} - DPS_{(t+1)}]$; $EV/EBITDA^{(historical)}$ represents the enterprise value (with 90 days' time-lag) divided by the last reported EBITDA; $EV/EBITDA^{(forward)}$ represents the enterprise value divided by the $EBITDA_{(t+1)}$ estimated by analysts, Size represents the market value of the company.

Afterwards we used FactSet's integrated tools for quantitative research (Alpha Testing application)[30] to test the ability of our RIM model and other factors to forecast future returns. Both for the full period and the sub-periods we constructed equally-weighted monthly portfolios according to factors rank, expecting a higher return in the highest part of the ranking. The ranking follows a descending order or an increasing order depending on the type of multiple: descending in case of V/P, TP/P and ROE (the higher the multiple the higher the expected return); increasing in case of P/E, PEG, P/B, EV/EBITDA and Size (the lower the multiple the higher the expected return). We divided the universe of available securities in quintiles according to the factor rankings and we added two further

the analysts: When do recommendations add value? *Journal of Finance*, 59(3), 1083-1124.

[28] Bradshaw M. T. (2004). How Do Analysts Use Their Earnings Forecasts in Generating Stock Recommendations? *The Accounting Review*, 79(1), pp. 25-50.

[29] Gleason C. A., Johnson W., Li H. (2012). The Earnings Forecast Accuracy, Valuation Model Use and Price Target Performance of Sell-Side Equity Analysts, *Contemporary Accounting Research*, 30(1), pp. 80-115.

[30] The Alpha Testing application in FactSet is used to build models specifying the factors to test and customizing fractile assignments.

scenarios only for the RIM valuation (V/P ratio): "top 20/bottom 20" and "top 30/bottom 30" stocks. The portfolios are rebalanced every month if any changes in ranking occur and the following data are analyzed for all factors: spread yearly returns (long "1 quintile" – short "5 quintile", or long "top 20 or 30" – short "bottom 20 or 30"), yearly returns, cumulative returns, Sharpe ratios[31], information ratios[32], alphas[33], betas[34], information coefficients[35], portfolios turnover, maximum drawdowns and spread return correlations[36]. Among the listed metrics we want to clarify just the relevance of the information coefficients in our analysis. The IC represents the correlation between the actual values of a forecasted variable and its predicted returns, namely an IC equal to one indicates perfect forecasting skill whereas an IC equal to zero indicates no forecasting skill. The IC represents a Spearman's rank correlation coefficient[37] that is a nonparametric test which measures the strength and direction of association between two variables that are measured on an ordinal or continuous scale. The Spearman rank IC is essentially the Pearson correlation coefficient between the ranked factor scores and ranked forward returns and it is a useful test when Pearson's correlation cannot be run due to violations of normality, a non-linear relationship or when ordinal variables are being used. To establish the forecasting skills of our selected metrics we investigate if the contribution to alpha really comes from the ranking within every factor's portfolio. Grinold's (1989) fundamental law of active management states that $IR \approx IC \times \sqrt{BR}$ where IR is the information ratio, IC the information coefficient and BR is the breadth of the strategy[38]. A strong assumption implied in the previous formula is the absence of constraints on portfolio construction, with positions that can be long or short and of any size. Clarke, de Silva and Thorley (2002) introduced a scaling factor called "transfer coefficient" (TC < 1) so that $IR \approx IC \times TC \times \sqrt{BR}$, underling the potential value lost due to constraints on portfolio size and turnover. For simplicity, in the following example we overlooked the impact of TC. When hundreds of stocks can be traded (high breadth) even a low IC can generate profitable strategies; as an example, if 200 independent trades are executed in one year it is possible to generate an IR of 0.50 with an IC of 3.5% $(0.5 \approx 0.035\ x\ \sqrt{200})$. It is worth to note that a crucial assumption is the independence of forecasts and therefore it may be hard to correctly define breadth, as investment decisions tend to be correlated. If we are buying 100 stocks for 100 different reasons, we are making 100 different bets, while if we are buying 100 stock because they all have a low multiple, we are making one big bet on a specific factor, not 100. According to Grinold and Kahn (2000)[39], if information ratios have a normal distribution, a "good" investment strategy can be identified within the top quartile of the population. Therefore, a "good" IR can be assumed to be greater or equal to 0.5. This implies that if we made 12 forecasts in one year (one per month, considering high correlations between stocks traded within the same month) we would need an information coefficient (IC) of 14% to obtain a "good" performance. As a rule of the thumb, portfolio managers would view an IC of 5% as "good", an IC between 10% and 20% as "very good" and one above 20% as "extremely good".

4.1. RIM-based V/P multiple methodology

The structures of the model we used to implement a full valuation of stocks in US and Europe and generate portfolio rankings according to a RIM-based V/P, have been essentially two, one with a truncation at the third year of analysts' estimates and one with additional growth of 5 years. The first model relies on analysts' estimates till year 3, as previously stated, because after that date we lack enough observations.

$$V_t = BVPS_{y_0} + \frac{EPS_{y_1} - (coe_t \times BVPS_{y_0})}{(1+coe_t)^{\frac{(y_1-t)}{(30\times12)}}} + \frac{EPS_{y_2} - (coe_t \times BVPS_{y_1})}{(1+coe_t)^{\frac{(y_2-t)}{(30\times12)}}} + \frac{EPS_{y_3} - (coe_t \times BVPS_{y_2})}{(1+coe_t)^{\frac{(y_3-t)}{(30\times12)}} \times (coe_t - g_t)}$$

[31] $Sharpe\ ratio = \frac{R_p - R_f}{\sigma_p}$

[32] $Information\ ratio = IR = \frac{\alpha}{\bar{\sigma}} = \frac{R_p - R_{bmk}}{\sqrt{var(R_p - R_{bmk})}}$

[33] $\alpha_p = R_p - \beta_p(R_{bmk})$

[34] $\beta = Beta = \frac{Cov\,(r_p, r_{bmk})}{\sigma^2_{bmk}} = \frac{\sigma_p \times \sigma_{bmk} \times \rho_{p,bmk}}{\sigma^2_{bmk}} = \frac{\sigma_p}{\sigma_{bmk}} \times \rho_{p,bmk}$

[35] $IC \approx \frac{IR}{\sqrt{BR}}$, $IC\ (information\ coefficient) = correlation\ of\ the\ manager's\ forecast\ with\ the\ actual\ returns, BR = strategy's\ breadth$

[36] $F_1 - F_n\ return\ correlation = \frac{Cov\,(spread_i, spread_j)}{\sigma_{spread_i} \times \sigma_{spread_j}}, s.t. spread_i = F_1^i - F_n^i, spread_j = F_1^j - F_n^j, = \frac{Cov\,(F_1^i - F_n^i, F_1^j - F_n^j)}{\sigma_{F_1^i - F_n^i} \times \sigma_{F_1^j - F_n^j}}$

[37] $r_s = \rho_{rg_X, rg_Y} = \frac{\mathrm{cov}\,(rg_X, rg_Y)}{\sigma_{rg_X} \times \sigma_{rg_Y}}, where\ X_i, Y_i\ are\ converted\ to\ ranks\ rgX_i, rgY_i$

[38] Ang A. (2014). *Asset management: a systematic approach to factor investing*, Oxford: Oxford University Press, pp. 310-311.

[39] Grinold R. C., Kahn R. N. (2000). *Active Portfolio Management*, New York: McCraw-Hill.

The EPS_{y1} represents the analysts' estimate for the first unreported fiscal year, not the 12-month forward estimate from the date of backtest/valuation. Therefore, if the date of valuation occurs in September $year_t$ and the EPS_{y1} estimate pertains to the EPS published in March $year_{t+1}$, the interest used for discounting will be converted to a semi-annual rate. We took into account all these timing differences through an appropriate discounting, proportional to the months of distance between the date of backtest and the date of reference of the analysts' estimate. Besides, as further clarification, if the company reports its full year results in March $year_t$, the EPS_{y1} at February $year_t$ still refers to the fiscal $year_{t-1}$ and we convert the discount factor to a monthly rate. We assumed for simplicity that the "clean surplus relationship" held in our period of analysis, even if shares transactions (e.g. buybacks) or certain changes in fair value could have had an impact on the overall results, especially in the last years. While these issues could necessitate a further and deeper analysis in a future research, the approach to tackle them should be slightly different from the present one. Considering that it will not be easy to find analysts' estimates related to items included in the comprehensive income, a forecasting function based on historical data should be embedded in pairs with analysts' estimates to obtain the expected BVPS. The forward $BVPS_{y1}$ has been calculated through the "clean surplus accounting" relationship ($BVPS_{y1} = BVPS_{y0} + EPS_{y1} - DPS_{y1}$) using analysts' estimates on earnings and dividends. When estimates on EPS and DPS - for the three fundamental years to implement the model - were missing in our databases, we made some common sense adjustments. If an estimate for EPS_{y1} is missing the company will be rejected and will go into "n/a" portfolio, if EPS_{y2} is missing we will consider it to be equal to EPS_{y1} (considering no growth for the second forward fiscal year), if EPS_{y3} is missing we will multiply EPS_{y2} for the EPS growth of the previous year reduced by 1/3. Furthermore, in case any DPS estimate miss we will replace it with the last 5 years reported payout ratio multiplied by the estimated forward EPS. Regarding the discounting process, we estimated the cost of equity capital through CAPM (with time-varying risk-free rate and equity risk premium), contrary to the majority of previous studies which employed the Fama-French industry cost of capital or fixed rates (as showed in table 1). Abarbanell and Bernard (1995) and Frankel and Lee (1998) found that the choice of r_e had a small impact on their cross-sectional analyses, while it was important to incorporate time-varying rates[40].

Table 1 – Cost of equity capital estimates in previous studies employing RIM-based valuations

	Frankel, Lee (1998)	Dechow et al. (1999)	Lee et al. (1999)	Gode, Mohanram (2001)	Ali et al. (2003)	Bradshaw (2004)	Gleason et al. (2012)
Discount Rate	Fama-French 3 factors, by industry	12%	Time-varying riskless rate; Fama-French 1 and 3 factors risk premia, by industry	Fama-French 3 factors, by industry	Time-varying riskless rate; Fama-French 3 factors risk premia, by industry	Time-varying riskless rate; Fama-French 3 factors risk premia, by industry	Industry disc. rates; Fixed at 8%, 12%, 16%; CAPM

Source: Cited papers in bibliography, in particular: Ali A., Hwang L., Trombley M. (2003). Residual-Income-Based Valuation Predicts Future Stock Returns: Evidence on Mispricing versus Risk Explanations, *The Accounting Review*, 78(2), pp. 377-396.

The CAPM has been criticized both on its theoretical foundations and due to various empirical anomalies (e.g. Fama-French three-factor and five-factor model). However, it is still conventionally considered the model of reference to estimate the cost of equity by the business valuer community[41]. Although the simplicity of the model has overshadowed its inaccuracies, it should be acknowledged for incorporating the two main risks faced by a company: operating leverage and financial leverage. First of all, in our monthly CAPM estimate [$coe = r_f + \beta\ (ERP)$], we calculated the risk-free rate as the five-year average yield of 10-year bonds and we did not take into account the yield prevailing at the date of valuation/backtest; in particular the 10-Y T-Bond for United States and the 10-Y German T-Bund for Europe. While the decision for US was an obvious choice, regarding Europe we had to choose between a formally more correct method but longer to implement (selecting for every country its domestic financial metrics) and one less precise but easier to implement and to test (identifying one general metric for all European markets; Germany as a proxy of risk-free rate and EU broad market index to calculate betas and ERPs). We opted for the second option regarded

[40] Lee C. M. C., Myers J., and Swaminathan B. (1999). What is the intrinsic value of the Dow? *Journal of Finance, 54(5), pp. 1693-1741.*

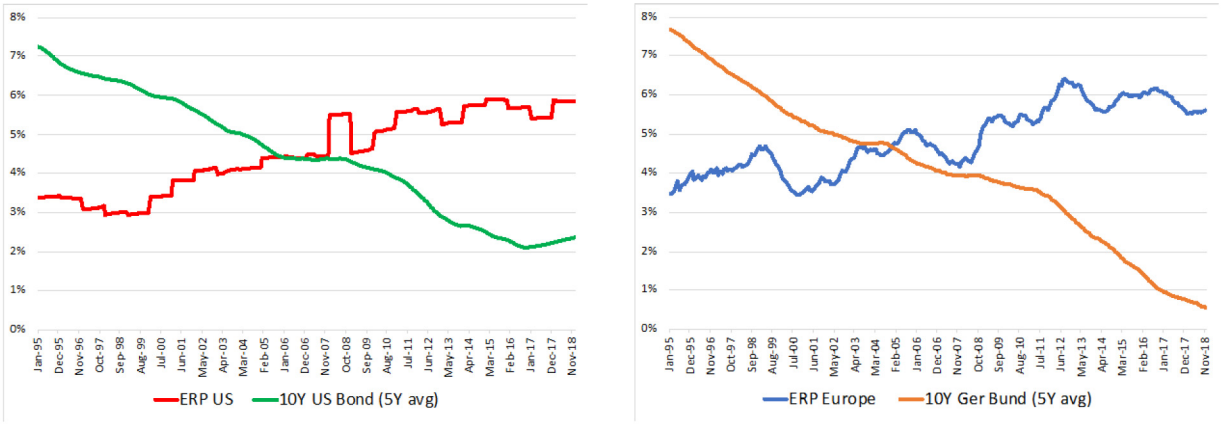
[41] Bini M. (2018). Implied cost of capital: how to calculate it and how to use it, *Business Valuation OIV Journal*, Fall, 0(0), pp. 5-32.

as a good balance between costs and benefits, especially in estimating betas and equity risk premiums. By applying a German riskless rate and a European equity risk premium to the valuation of some European countries, we are not considering every specific country risk directly, but this hidden risk is expected to be recovered through higher betas, explained by higher volatilities with respect to a European market index. We calculated monthly betas between companies and market indexes (the S&P 500 for US and the STOXX 600 for Europe) using 5 years of weekly price returns. Afterwards we adjusted the betas stemming from regressions through the Blume technique [*Beta adjusted* = 2/3 *Raw* β + 1/3 x *Mkt* β]. Lastly, we calculated the equity risk premiums for US and Europe considering both the implied ERP and an inverse relationship between the ERP and the 10-Y Bond. Basically, we obtained the ERPs through an average of two time-series: the first one formed by the implied ERPs and the second one by ERPs that grows in reverse to a decrease in government bond rates weighted by 50%.

$$ERP_t = 0.5 \times \{Implied\ ERP_t + [ERP_{t-1} \times 0.5 \times (-\Delta\ 10Y\ Bond_{t-1,t})]\}$$

The first ERP_{t-1}, at the time of the first valuation in 1995, has been calculated by making an average of the previous 5 years implied ERP, which came in at 3.5% both in US and Europe. Besides, we calculated the implied ERP by using yearly data provided by Damodaran for US (obtained through FCFE) and we calculated on ourselves data for Europe through a dividend discount model. As an input of the DDM to calculate the implied ERP in Europe we used aggregate dividend estimates on the European stocks, the 10-Y German T-Bund and the expected European long-term GDP growth. The results obtained are showed in graph 1.

Graph 1 – (1995-2018) Sx: US ERP, 10Y US Bond (5Y avg); Dx: EU ERP, 10Y Ger Bund (5Y avg)



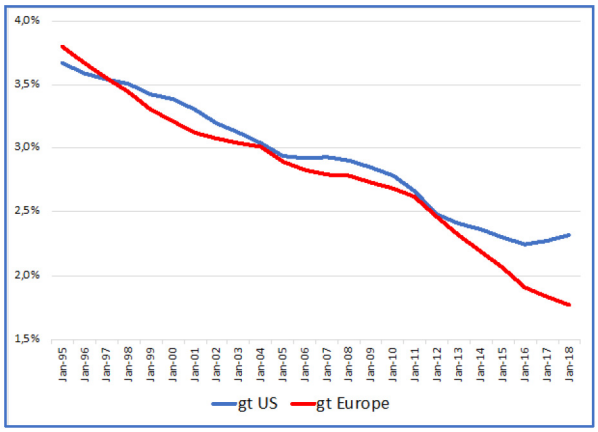
Source: FactSet Research Systems, Damodaran A. "Equity Risk Premiums (ERP)" for US, Bocconi University databases, our estimates

Finally, we calculated the long-term growth for both US and Europe looking at the compounded GDP growth (constant prices) for developed economies between 1980 and 2017 (resulted in 2.3%) and the 10-Y respective government yield at the date of monthly backtest, applying the following proportion:

$$\boldsymbol{g_t = 0.7 \times (g_{long\ term}) + 0.3 \times (10Y\ Bond)},$$
$$\boldsymbol{where\ g_{long\ term} = US\ GDP(constant\ prices)_{1980-2017} = 2.3\%}$$

The long-term growth (g_t) implied in the terminal value calculation (TV) has been the same for every stock as in the long term every company should grow in line with the general economy. The results obtained for US and European g_t are shown in graph 2:

Graph 2 – (1995-2018) Long-term growth estimated for TV calculation in US and Europe



Source: FactSet Research Systems, Bocconi University databases our estimates

The second model of RIM studied uses the same inputs of the first one but implies a further forecasting horizon of 5 years, for a total of 8 years of estimates. We did not use analyst estimates for the further 5 years but the sustainable growth [g_s = (1-payout) x ROE] calculated as the last 5 years reported average. In order to calculate the book values after the first forecasting period we used the 5 years average dividends payout ratio.

$$V_t = BVPS_{y_0} + \frac{Residual\ EPS_{y_1}}{(1+coe_t)^{\frac{(y_1-t)}{(30\times12)}}} + \frac{Residual\ EPS_{y_2}}{(1+coe_t)^{\frac{(y_2-t)}{(30\times12)}}} + \frac{Residual\ EPS_{y_3}}{(1+coe_t)^{\frac{(y_3-t)}{(30\times12)}}} + \frac{[EPS_{y_3}\times(1+g_s)^1]-(coe_t\times BVPS_{y_3})}{(1+coe_t)^{\frac{(y_4-t)}{(30\times12)}}} + \frac{[EPS_{y_3}\times(1+g_s)^2]-(coe_t\times BVPS_{y_4})}{(1+coe_t)^{\frac{(y_5-t)}{(30\times12)}}} + \frac{[EPS_{y_3}\times(1+g_s)^3]-(coe_t\times BVPS_{y_5})}{(1+coe_t)^{\frac{(y_6-t)}{(30\times12)}}} + \frac{[EPS_{y_3}\times(1+g_s)^4]-(coe_t\times BVPS_{y_6})}{(1+coe_t)^{\frac{(y_7-t)}{(30\times12)}}} + \frac{[EPS_{y_3}\times(1+g_s)^5]-(coe_t\times BVPS_{y_7})}{(1+coe_t)^{\frac{(y_8-t)}{(30\times12)}}\times(coe_t-g_t)},$$

5. Results and performance of RIM

Our research highlights that a RIM-based V/P ratio, based on previous assumptions, forecasts abnormal returns. In particular we show its ability to outperform main market indexes (both in US and Europe), other factor styles and analysts' recommendations by using their own estimates of financial reporting data. It is worth remembering that all returns presented in the following sections includes dividends (i.e. total return) and are gross of financial transactions costs and taxes on capital gains. Nevertheless, taking into account the turnover of our top quintiles portfolios that ranged from a minimum of 6% and a maximum of 40% monthly turnover (looking at US and Europe together), we estimated that the yearly cost for brokerage fees can range between 0.2% and 0.7% yearly (through various combinations of discount brokers and institutional brokers fees structures). These additional costs do not diminish the results of the study, even though it is consistent to account them for portfolios showing high turnover. With respect to taxes the analysis proves to be more complicated as we should apply a financial tax once the capital gain is realized, at the end of each fiscal year or potentially every month, depending on the domicile and the structure of the investor. Furthermore, we do not take into account the liquidity issue as we do not consider the implicit cost determined by the price movement against a trade with significant volume (price impact). A recent paper by Li, Chow, Pickard and Garg (2019) shed light on the matter, pointing out the potential impact of transaction costs on factor-investing strategies[42]. They show that the price impact is predictable because it is directly related to the security's liquidity and the size of the trade. In particular, they explain that a fund incurs approximately 30 bps of trading costs as a result of market impact for every 10% of a stock's average daily volume traded in ag-

[42] Li F., Chow T-M., Pickard A., CFA, Garg Y., CFA (2019). Transaction Costs of Factor-Investing Strategies, *Financial Analysts Journal*, 75(2), pp. 62-78.

gregate by the funds tracking a factor-investing index. Considering several US factor-investing strategies from 1968 to 2016, they show that with $10 billion in AUM the annual market impact cost can range from 0.10% to 2.7% and in detail, that the "fundamental value" strategy endures an annual market impact cost of 0.28% within an average 25% portfolio turnover. Since our aim is not to propose a trading strategy but to test the soundness of RIM as a valuation tool and potentially as a risk indicator, we will not speculate on the impact of trading costs (both explicit and implicit) and taxes. We believe that all these costs do not undermine the soundness of our analysis concerning the potential of RIM in producing better empirical estimates of value. Again, it is just worth noticing that factoring in all costs associated to an investment strategy makes always extremely hard to beat the market in real life since markets are nearly efficient.

5.1. Forecasting excess return

As we are going to summarize, all RIM-based V/P top ranked portfolios outperformed local markets' indexes, producing statistically significant alphas, both in US and Europe.

5.1.1. United States

We start the analysis introducing the results obtained in the US market where the model has been extensively studied in financial history. It is worth to point that, from now on, the expression V/P will be furtherly specified as "V/P" and "V/P (+5Y)", to better outline the two versions of the model developed in chapter 4.1. Both the RIM-based V/P with truncation at the third year of estimates "V/P" and the RIM-based V/P with further 5 years of estimates "V/P (+5Y)" top portfolios outperformed the main US market index. As shown in Table 2 all first ranked portfolios (the ones with the higher V/P) outperformed the index, posting a yearly extra-return between 4% and 6.5%, depending on the type of multiple considered, in the period 1995-2018. The monthly alphas produced by RIM-based allocation came in between 0.34% and 0.57%, with a statistical significance above 95% (details of t-stat for all portfolios at APPENDIX A, Table - A2). It can be noticed at first glance that the more complex model "V/P (+5Y)" does not beat the simpler model "V/P", which takes into account very few assumptions and data and just uses three years of analysts' forecasts. Additionally, the simpler model should be more conservative a priori: in "V/P (+5Y)" we are extrapolating the company's past 5 years sustainable growth and projecting it into the future while this growth should be greater than the growth of the economy used in terminal value calculation. First note: a simpler and more conservative model seems to perform better. Long-short portfolios yearly returns enrich the first analysis as the "V/P" produces yearly self-financing returns ranging from +7.6% to +12.6%. This fact signals an extremely good model at detecting not only undervalued companies but especially overvalued ones, placing them in the last quintile of the ranking. Nevertheless, it is essential to check if these returns are driven by higher volatilities and/or higher betas. As shown with all details in APPENDIX A (Table - A1, A2, A3), the RIM-based V/P reported a Sharpe ratio ranging from 0.75 to 0.84 (S&P 500 Sharpe 0.58), an information ratio ranging from 0.43 to 0.54, a beta lower than the market ranging from 0.91 to 0.98 (calculated with monthly portfolio returns). We checked the correlation between the actual values of the forecasted returns and their predicted values through IC coefficients (APPENDIX A, Table - A5), noticing that, while the simpler "V/P" shows always a positive and significant correlation, the "V/P (+5Y)" shows a positive (but low) correlation and only for portfolios organized through quintiles and not for "Top20" and "Top30"stocks.

The "V/P" shows instead an IC of 5% even with a forecasting horizon of one month and the information coefficient grows from 12% to 20% as the forecasting horizon is moved ahead. As explained in the first part of this study, an IC between 10% and 20% is considered as "very good" by the investment community and we already obtained such values with a forecasting horizon from six (IC range 12%-14%) to twelve months (IC range 15%-16%). Having shown the forecasting skills of our selected metrics we can infer that the contribution to alpha really comes from the ranking within "V/P" factor's portfolios. Finally, we observed the performance of our metrics in the sub-periods within 1995-2018 (details in APPENDIX C): both "V/P" and "V/P (+5Y)" top ranked long-only portfolios outperformed the market index across periods 1995-2005, 2000-2010 and 2010-2018 and slightly underperformed during the crisis 2007-2010. Surprisingly, "V/P" based long-short portfolios registered a positive performance across all times, with two minor exceptions (details in APPENDIX C). It is worth to pay further attention to the most recent period, known as one of the longest bull markets in history. Even in the period 2010-2018 the RIM-based valuation has been able to produce returns higher than the market, in particular the long only "V/P" portfolios beat the S&P500 by around 3% and the long-short "V/P" portfolios posted returns between 1.7% and 3.8%. The last results are surprising regarding to the fact that the last years were considered to be negative for value portfolios, constantly outperformed by growth portfolios. For

the time being we can just signal that this depends also on how we define a value portfolio, as low multiples are not always a good proxy of value.

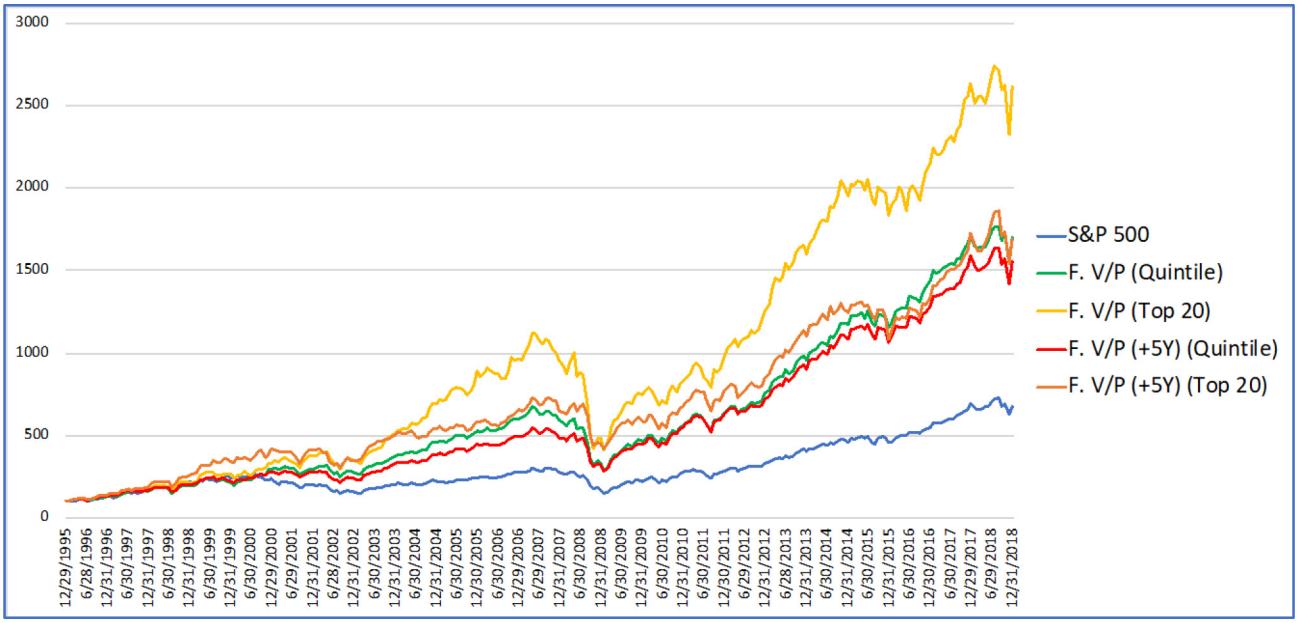
Table 2 – (1995-2018) US - Yearly compounded returns of monthly rebalanced portfolios: long-short strategy (F1-FN), long only strategy (quintiles, top/bottom 20, top/bottom 30), S&P 500

	Long-short yearly spread	Universe yearly return					Benchmark yearly return
Factor	F1-FN	1	2	3	4	5	S&P 500
F. V/P (Quintile)	7,65	13,05	12,18	12,38	7,63	2,89	8,66
F. V/P (Top 20)	12,61	15,18	10,09	-0,79			8,66
F. V/P (Top 30)	9,47	15,11	10,02	2,44			8,66
F. V/P (+5Y) (Quintile)	5,43	12,62	11,93	12,06	7,44	4,50	8,66
F. V/P (+5Y) (Top 20)	6,86	13,02	10,07	3,06			8,66
F. V/P (+5Y) (Top 30)	5,83	12,57	10,22	3,52			8,66

Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

Before passing to the next chapter we show below the graph of the cumulative returns of a selection of RIM-based V/P factors compared to the market index. It can be noticed that long-only strategies are not immune to market deep correction, indeed the maximum drawdown suffered by our V/P portfolios ranged from -43% to -64%. In most of the real-world portfolio management processes, a big absolute loss in a certain unit of time would be considered as unacceptable, limiting the employment of our approach. Consistently with our research purpose (testing the soundness of RIM over a long period of time without constraint) we did not assume a reaction function of the strategy to the absolute losses. On the other side, it is worth pointing out that, in monthly portfolio rebalancing, we only considered relative valuations among companies without placing a threshold to the V/P multiple. There are times in our dataset in which the estimated value is lower than the price (V/P multiple below 1) for most companies, signaling an overvaluation of the broad equity market. We could have included a timing function to rotate from equity to bonds once a certain threshold of V/P is broken. As interesting as it is both on the asset management side and the fundamental valuation side, we limited our analysis to the easiest long-only feasibility.

Graph 3 – (1995-2018) US - Cumulative returns of monthly rebalanced portfolios: Long only V/P, S&P 500



Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

5.1.2. Europe

We now present the results obtained in the European market where companies of different countries have been valued with the same assumptions, the same risk-free rate (identified in the German 10Y Bund), the same equity risk premium and betas calculated in comparison to the main market index (STOXX 600). Both the RIM-based V/P with truncation at the third year of estimates "V/P" and the RIM-based V/P with further 5 years of estimates "V/P (+5Y)" top portfolios outperformed the STOXX 600. As shown in Table 3 all first ranked portfolios (the one with the higher V/P) outperformed the index, posting a yearly extra-return between 4.5% and 7.4% depending on the type of multiple considered, in the period 1995-2018. The monthly alphas produced by RIM-based allocation came in between 0.47% and 0.63%, with a statistical significance above 95% (details of t-stat for all portfolios at APPENDIX B, Table - B2). Like in US, it can be noticed at first glance that the more complex model "V/P (+5Y)" does not beat the simpler model "V/P", which takes into account very few assumptions and data, just using three years of analysts' forecasts. We specify again how the simpler model should be more conservative than the "V/P (+5Y)" ratio as we are extrapolating the company's past 5 years sustainable growth and projecting it into the future. Again, a simpler and more conservative model seems to perform better. Long-short portfolios yearly returns enrich the analysis as the "V/P" produces yearly self-financing returns ranging from +4.1% to +4.6%. RIM confirms its ability not only in signaling undervalued companies, but also in detecting overvalued ones, placing them in the last quintile of the ranking. Nevertheless, it is essential to check if these returns are driven by higher volatilities and/or higher betas. As shown in detail in APPENDIX B (Table - B1, B2, B3), the RIM-based V/P reported a Sharpe ratio ranging from 0.55 to 0.71 (STOXX 600 Sharpe of 0.27), an information ratio ranging from 0.45 to 0.82, a beta lower than the market ranging from 0.90 to 0.95 (calculated with monthly portfolio returns). Checking the correlation between the actual values of the forecasted returns and its predicted values through IC coefficients (APPENDIX B, Table - B5) we found a different picture compared to US. It has to be noticed that ICs signal a positive and significant correlation between forecasts and returns only with a time horizon of 3 years (IC ranging from 3% to 9% depending on the RIM-based V/P considered). Such a time horizon would be considered as an eternity by the investment industry in a long-only strategy, but at the same time the long-short strategy reported positive and significant results also in Europe. Finally, we observe the performance of our metrics in the sub-periods within 1995-2018 (details in APPENDIX D): both "V/P" and "V/P (+5Y)" top ranked long-only portfolios outperformed the market index across periods 1995-2005, 2000-2010 and 2010-2018 and slightly underperformed during the crisis 2007-2010. It is necessary to pay further attention, also in Europe, to the most recent period, known as one of the longest bull markets in history. Even in the period 2010-2018 the RIM-based valuation has been able to produce returns higher than the market, in particular the long only V/P portfolios beat the STOXX 600 by around 6% and the long-short V/P portfolio posted returns between 1% and 3.4%.

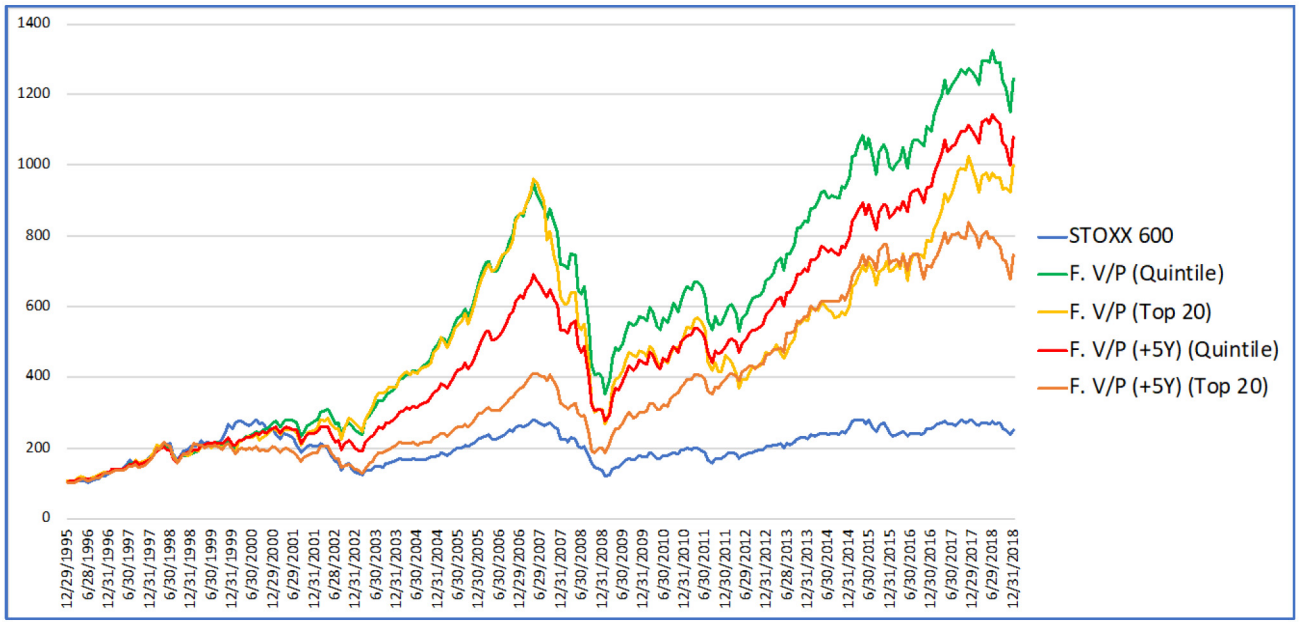
Table 3 – (1995-2018) Europe - Yearly compounded returns of monthly rebalanced portfolios: long-short strategy (F1-FN), long only strategy (quintiles, top/bottom 20, top/bottom 30), STOXX 600

	Long-short yearly spread	Universe yearly return					Benchmark yearly return
Factor	F1-FN	1	2	3	4	5	STOXX 600
F. V/P (Quintile)	4,55	11,54	9,95	8,93	7,66	5,18	4,11
F. V/P (Top 20)	4,59	10,49	8,89	3,60			4,11
F. V/P (Top 30)	4,14	10,64	8,91	4,21			4,11
F. V/P (+5Y) (Quintile)	3,23	10,85	9,87	9,03	7,84	6,09	4,11
F. V/P (+5Y) (Top 20)	2,23	9,10	8,99	4,35			4,11
F. V/P (+5Y) (Top 30)	3,06	9,38	9,09	4,33			4,11

Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

We end this paragraph by showing in graph 4 the cumulative returns of a selection of RIM-based V/P factors compared to the STOXX 600. It can be noticed that, as previously underlined in US, also in Europe long-only strategies are not immune to market deep corrections, indeed the maximum drawdown suffered by our V/P portfolios ranged from -55% to -70%.

Graph 4 – (1995-2018) Europe - Cumulative returns of monthly rebalanced portfolios: Long only RIM-based V/P, S&P 500



Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

5.2. RIM compared to other factors

The majority of RIM-based V/P top ranked portfolios outperformed other factors considering long-short portfolios and produced higher Sharpe ratios and information ratios, considering long-only portfolios. The other factors that produced the best adjusted returns, taking into account Sharpe ratios and information ratios have been ROE (forward) in United States and ROE (forward) and EV/EBITDA in Europe.

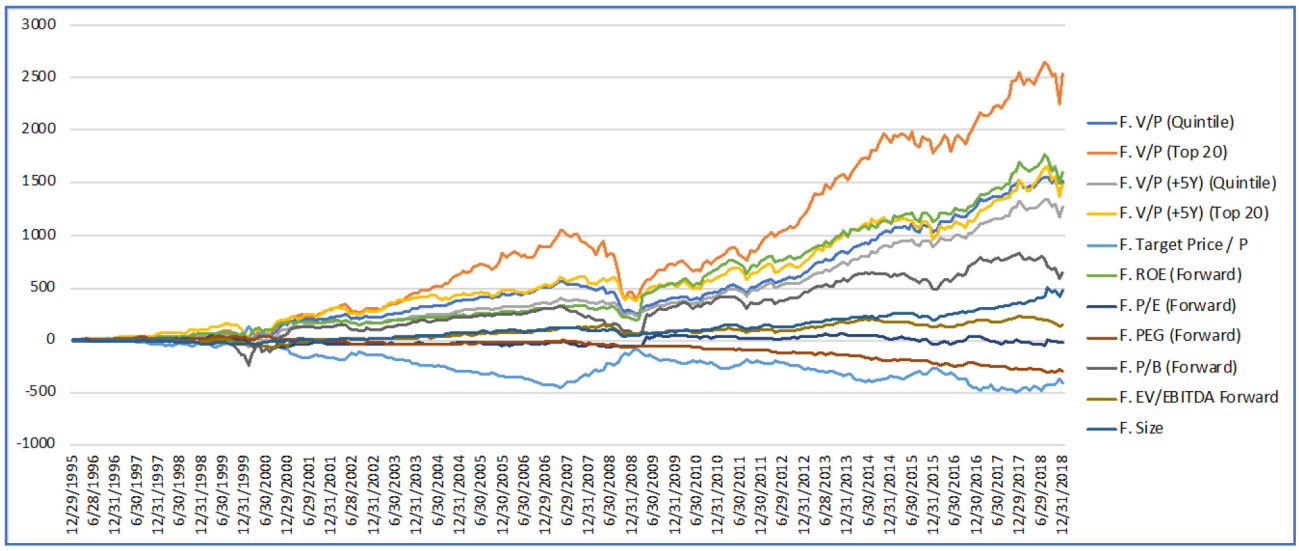
5.2.1. United States

We are now going to observe the results delivered by all factors taken into account. In United States, during the full period of analysis (1995-2018), the top long-only portfolios based on V/P multiples outperformed the majority of other factors considered (TP/P, P/E, PEG, P/B, EV/EBITDA and Size) with the only exception of ROE (Forward), which posted similar returns. Besides, all RIM-based V/P top ranked portfolios reported Sharpe ratios and information ratios higher than other factors, in particular Sharpe ratios ranging from 0.75 to 0.84 and information ratio ranging from 0.43 to 0.54. As previously stated, the best performance among other factors has been shown by ROE (Forward) with a Sharpe ratio of 0.59 and an information ratio of 0.31.

It is interesting to notice that all V/P top ranked portfolios registered a lower beta (ranging from 0.92 to 0.98) compared to the other factors (ranging from 1.03 to 1.47). Moreover, looking at IC coefficients (APPENDIX A, Table - A5), it can be inferred that V/P is the best return forecaster among all factors, posting the highest values either at 6 months, 12 months and 36 months.

We will not focus on all yearly returns' differences (details in APPENDIX A), rather we want to stress the superior returns obtained through a long-short strategy, which is self-financing. Graph 5 shows the cumulative long-short portfolios' performances of all factors (that use forward estimates) analyzed in the period 1995-2018.

Graph 5 – (1995-2018) US - Cumulative returns of monthly rebalanced portfolios: Long-short RIM-based V/P, long-short multiple's factors



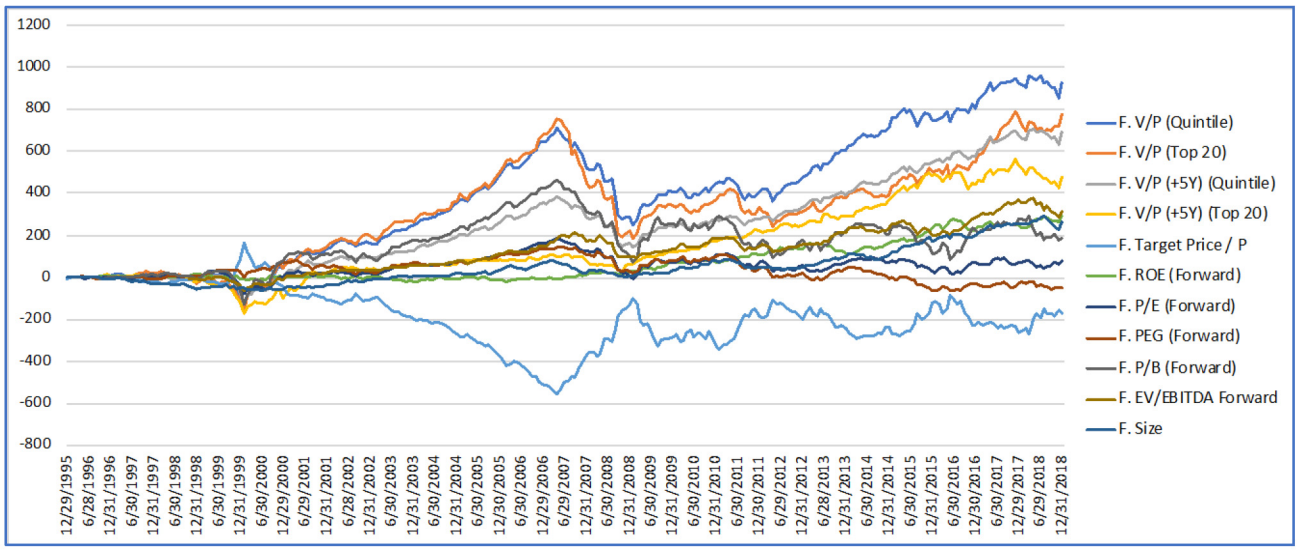
Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

At first glance it is surprising to see a significant spread between long-short performances of the V/P (Top 20) multiple compared to the TP/P multiple, which represents analyst recommendations. Since we based our model on analysts' estimates of EPS and DPS we did not expect such a difference, that instead appears consistent with the academic literature on analysts' biases presented in chapter 3. Furthermore, long-short spread returns coming from analysts' recommendations did not show any significant correlation with other valuation models across the full period 1995-2018 (details APPENDIX A, Table - A7, F1-FN return correlations). Analysts did not exhibit differential target price forecasting ability as both the last two quintile portfolios (the least recommended stocks) outperformed the first two quintile portfolios (the most recommended stocks) and through their target prices produced a negative yearly compounded long-short return of - 3.5%. While TP/P multiple produces the worst strategy in our sample for the full period (1995-2018) it is worth to notice that in the last sub-period (2010-2018) it added some value producing a yearly spread long-short return of 2.6%. Nevertheless, we also notice that in the last years almost all factors, among all ranked portfolios, showed positive returns with increased correlations among them. This may be due to the high level of liquidity in financial markets driven by central banks, which may have contributed to the alteration of historical risk premiums among different factors.

5.2.2. Europe

Moving to Europe and considering yearly compounded returns (both long-only and long-short) during the full period of analysis (1995-2018), the top ranked portfolios based on V/P multiples outperformed some of the factors considered [$ROE^{(trailing)}$, $PEG^{(forward)}$,TP/P, P/E, P/B and Size] while producing similar results compared with $ROE^{(forward)}$, $PEG^{(trailing)}$ and EV/EBITDA (both Historical and Forward). Besides, all RIM-based V/P top ranked portfolios reported Sharpe ratios and information ratios higher than other factors [with the exception of $ROE^{(forward)}$ and EV/EBITDA], recording Sharpe ratios ranging from 0.55 to 0.71 and information ratio ranging from 0.45 to 0.82. As previously stated, the best performance among other factors top ranked portfolios has been shown by ROE (Forward) with a Sharpe ratio of 0.64 and an information ratio of 0.86, by PEG (trailing) with a Sharpe ratio of 0.5 and an information ratio of 0.69, by EV/EBITDA (Historical) with a Sharpe ratio of 0.69 and an information ratio of 1.08. It is relevant to notice that all V/P top ranked portfolios registered a lower beta (ranging from 0.86 to 0.95) compared to the other factors (ranging from 0.89 to 1.38). However, looking at IC coefficients (APPENDIX B, Table - B5), contrary to US it can be inferred that V/P is not the best return forecaster among all factors, posting a statistically significant IC coefficient only with 3 years forecasting horizon (ICs between 3% and 9%). On the other side both PEG and EV/EBITDA showed statistically significant ICs either with 6 months, 12 months and 36 months forecasting horizon (ICs between 5% and 14%). Nevertheless, we will not focus on all yearly returns' differences (details in APPENDIX B), rather we want to stress the superior returns obtained through a long-short strategy, which is self-financing. Graph 6 shows the cumulative long-short portfolios' performances of all factors (that use forward estimates) analyzed in the period 1995-2018.

Graph 6 – (1995-2018) Europe - Cumulative returns of monthly rebalanced portfolios: Long-short RIM-based V/P, long-short multiple's factors



Source: FactSet Research Systems (Alpha Testing), Bocconi University databases, our estimates

At first glance, specular to the US chart, it can be noticed a significant spread between long-short performances of the "V/P (Quintile)" multiple compared to the TP/P multiple, which represents analyst recommendations. As outlined by academic literature, analysts' biases seem to be at work also in Europe, considering that our model - based on analysts' estimates of EPS and DPS - consistently beat analysts' buy/sell recommendations. Furthermore, as in US, analysts' recommendations long-short spread returns did not show any significant correlation with other valuation models across the full period 1995-2018 (details APPENDIX B, Table - B7, F1-FN return correlations). Analysts did not exhibit differential target price forecasting ability as the last quintile portfolio (the least recommended stocks) outperformed the first quintile portfolio (the most recommended stocks) and through their target prices produced a negative yearly compounded long-short return of -2.8%. While TP/P multiple produces the worst strategy in our sample for the full period (1995-2018), it is important to notice that in the last sub-period (2010-2018) it added value producing a yearly spread long-short return of 4.2%, signaling differential target price forecasting ability. Furthermore, in Europe the strategy based on analysts' recommendations was the best performing in the last years (2010-2018) posting also the highest Sharpe ratio among all factors of 1.08 and a very low beta of 0.73.

Contrary to the US, in the last years not all strategies showed positive returns with classical "value signaling factors" (low P/E, PEG, P/B) performing the worst compared to "growth signaling factors" (high P/E, PEG, P/B). It is crucial to point out that the RIM-based V/P continued to show differential forecasting ability also in the period 2010-2018 (details in APPENDIX D), with the top quintile portfolio (high V/P) significantly outperforming the bottom quintile portfolio (low V/P). The results in our sample confirm our previous claim that "value" may not be signaled by low multiples (value trap) while a full valuation model could produce a better estimate. Therefore, RIM could be taken into consideration to study the "value anomaly" or "value factor". We leave open to further studies on stocks returns the possibility to add RIM in a multi-factor model (APT scenario) to the already known risk factors.

6. Conclusions

Our research highlighted the return forecasting ability of a residual income model based on analysts' estimates and time-varying risk-free rates, equity risk premiums and terminal growths, spanning from 1995 to 2018 in US and Europe. Three main results have been unveiled: a) RIM-based V/P portfolios outperformed main market indexes producing statistically significant alphas and low betas; b) they overcame portfolios built through other factors (main market multiples tied to "value premium") reporting higher Sharpe ratios and information ratios, with better evidences in US compared to Europe c) they remarkably beat analysts' buy-sell recommendations. In accordance with previous studies we confirmed the relevance of RIM as a sound valuation technique and stressed the paradox of analysts' forecasting returns inaccuracy as opposed to capability of producing reliable financial estimates. We displayed that the use of a residual income model-based valuation could remarkably improve the ana-

lysts' price target quality. That being said, analysts demonstrated significantly improved target price forecasting ability in the period 2010-2018, especially in Europe. The most surprising outcome has been the ability of RIM-based V/P portfolios to achieve substantial long-short returns, along the total time span and in all the sub-periods excluding few and small exceptions, leading in particular to the identification of the most overvalued stocks. Another noticeable result resides into the superior return forecasting ability shown by the simpler V/P model with a truncation at the third year of analysts' estimates compared with the one with additional growth of 5 years through sustainable growth. At the same time, they leave open the question about why, after all these evidences, the model still enjoys low consideration in the practitioners' community, especially among the markets' operators, which should contribute to market efficiency through their trades. In a framework where market inefficiencies are admitted, a valuation model that shows superior predicting power for returns, at least compared to main market multiples and analysts' recommendations, should be considered in providing better empirical estimates of intrinsic value.

Sources for all the tables: FactSet Research Systems (Alpha Testing), Bocconi University databases.

APPENDIX A – (1995-2018) United States - Full Statistics on monthly equally-weighted rebalanced portfolios

Table – A1 - US. Long-short yearly returns (F1-FN), long-only yearly returns for quintiles and top/bottom 20-30 stocks (only V/P), benchmark yearly return (S&P 500), Sharpe ratios for quintiles and top/bottom 20-30 stocks (only V/P)

		Universe Return						Sharpe Ratio				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5
F. V/P (Quintile)	7,65	13,05	12,18	12,38	7,63	2,89	8,66	0,82	0,85	0,78	0,41	0,14
F. V/P (Top 20)	12,61	15,18	10,09	-0,79			8,66	0,80	0,64	-0,03		
F. V/P (Top 30)	9,47	15,11	10,02	2,44			**8,66**	**0,84**	**0,64**	**0,10**		
F. V/P (+5Y) (Quintile)	5,43	12,62	11,93	12,06	7,44	4,50	8,66	0,84	0,82	0,78	0,43	0,21
F. V/P (+5Y) (Top 20)	6,86	13,02	10,07	3,06			**8,66**	**0,75**	**0,64**	**0,13**		
F. V/P (+5Y) (Top 30)	5,83	12,57	10,22	3,52			8,66	0,75	0,66	0,15		
F. Target Price / P	-3,48	8,49	10,12	11,33	10,74	10,75	**8,66**	**0,46**	**0,60**	**0,68**	**0,63**	**0,57**
F. ROE (Trailing)	-0,24	6,58	10,40	7,80	9,63	7,59	8,66	0,29	0,62	0,46	0,67	0,52
F. ROE (Forward)	6,71	13,56	11,80	10,23	8,49	4,56	**8,66**	**0,59**	**0,76**	**0,66**	**0,56**	**0,20**
F. P/E (Trailing)	-5,61	5,03	9,39	11,20	11,18	11,73	8,66	0,24	0,61	0,72	0,71	0,71
F. P/E (Forward)	0,12	8,43	11,29	11,11	8,67	8,57	**8,66**	**0,30**	**0,72**	**0,76**	**0,58**	**0,43**
F. PEG (Trailing)	-0,77	8,15	10,54	11,44	9,82	7,67	8,66	0,41	0,67	0,80	0,65	0,35
F. PEG (Forward)	-2,09	5,77	10,61	12,51	9,78	8,52	**8,66**	**0,26**	**0,55**	**0,85**	**0,70**	**0,52**
F. P/B (Trailing)	-0,17	6,42	12,67	11,40	9,76	6,77	8,66	0,29	0,69	0,74	0,67	0,41
F. P/B (Forward)	0,88	11,31	10,85	9,48	8,92	7,58	**8,66**	**0,46**	**0,69**	**0,59**	**0,54**	**0,35**
F. EV/EBITDA Historical	0,28	8,11	9,81	8,80	8,60	6,06	8,66	0,44	0,64	0,61	0,56	0,28
F. EV/EBITDA Forward	0,28	8,11	9,81	8,80	8,60	6,06	**8,66**	**0,44**	**0,64**	**0,61**	**0,56**	**0,28**
F. Mkt Value Size	3,37	10,07	12,61	8,81	10,64	6,70	8,66	0,57	0,50	0,54	0,47	0,46

Table – A2 - US. Information ratios, alphas, alphas' t-stat for quintiles and top/bottom 20-30 stocks (only V/P)

	Information Ratio					Alpha					T-Stat Alpha				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	0,46	0,54	0,59	-0,08	-0,43	0,42	0,35	0,30	-0,14	-0,53	2,89	3,70	2,98	-1,15	-2,81
F. V/P (Top 20)	0,50	0,31	-0,52			0,57	0,11	-0,86			2,69	1,40	-3,40		
F. V/P (Top 30)	**0,54**	**0,31**	**-0,36**			**0,56**	**0,10**	**-0,58**			**2,94**	**1,36**	**-2,49**		
F. V/P (+5Y) (Quintile)	0,52	0,47	0,61	-0,14	-0,28	0,38	0,32	0,28	-0,13	-0,41	3,28	3,24	3,16	-1,21	-2,11
F. V/P (+5Y) (Top 20)	**0,44**	**0,30**	**-0,31**			**0,38**	**0,11**	**-0,54**			**2,34**	**1,46**	**-2,30**		
F. V/P (+5Y) (Top 30)	0,43	0,34	-0,29			0,34	0,13	-0,51			2,33	1,72	-2,25		
F. Target Price / P	**-0,01**	**0,26**	**0,40**	**0,23**	**0,22**	**0,01**	**0,08**	**0,20**	**0,19**	**0,15**	**0,06**	**0,85**	**1,79**	**1,31**	**0,88**
F. ROE (Trailing)	0,09	0,72	0,23	0,36	0,14	-0,14	0,21	0,22	0,32	0,13	-0,76	2,42	1,23	2,23	1,06
F. ROE (Forward)	**0,31**	**0,59**	**0,26**	**-0,05**	**-0,24**	**0,34**	**0,25**	**0,15**	**0,04**	**-0,39**	**1,28**	**2,93**	**1,55**	**0,39**	**-1,75**
F. P/E (Trailing)	-0,25	0,09	0,43	0,45	0,46	-0,40	0,10	0,22	0,20	0,24	-2,27	0,96	2,36	2,23	2,17
F. P/E (Forward)	**0,03**	**0,29**	**0,38**	**-0,02**	**0,02**	**-0,11**	**0,27**	**0,25**	**0,03**	**-0,02**	**-0,34**	**2,02**	**2,63**	**0,48**	**-0,12**
F. PEG (Trailing)	-0,00	0,22	0,45	0,22	-0,03	-0,12	0,21	0,28	0,12	-0,14	-0,73	1,62	3,26	1,45	-0,65
F. PEG (Forward)	**-0,17**	**0,26**	**0,59**	**0,11**	**-0,04**	**-0,35**	**0,07**	**0,36**	**0,19**	**0,08**	**-1,92**	**0,52**	**3,68**	**1,85**	**0,52**
F. P/B (Trailing)	-0,12	0,50	0,43	0,11	-0,20	-0,31	0,26	0,25	0,17	-0,03	-1,73	1,92	2,52	1,54	-0,20
F. P/B (Forward)	**0,16**	**0,31**	**0,15**	**0,06**	**-0,05**	**0,19**	**0,21**	**0,06**	**0,01**	**-0,05**	**0,65**	**1,86**	**0,68**	**0,11**	**-0,19**
F. EV/EBITDA Historical	0,24	0,52	0,47	0,51	0,07	0,16	0,34	0,26	0,21	-0,07	0,97	2,70	2,66	2,35	-0,38
F. EV/EBITDA Forward	**0,24**	**0,52**	**0,47**	**0,51**	**0,07**	**0,16**	**0,34**	**0,26**	**0,21**	**-0,07**	**0,97**	**2,70**	**2,66**	**2,35**	**-0,38**
F. Mkt Value Size	0,19	0,22	0,03	0,13	-0,47	0,09	0,28	0,02	0,15	-0,11	0,66	0,89	0,16	0,56	-1,59

Table – A3 - US. Betas, betas' t-stat, R squared for quintiles and top/bottom 20-30 stocks (only V/P)

	Beta					T-Stat Beta					R^2 for Beta				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	0,91	0,89	1,00	1,15	1,21	27,01	40,83	42,39	39,32	27,74	0,73	0,86	0,87	0,85	0,74
F. V/P (Top 20)	0,98	1,02	1,35			19,76	57,46	22,83			0,59	0,92	0,65		
F. V/P (Top 30)	**0,96**	**1,02**	**1,29**			**21,44**	**59,32**	**23,79**			**0,63**	**0,93**	**0,67**		
F. V/P (+5Y) (Quintile)	0,91	0,90	0,98	1,09	1,24	33,98	38,49	47,69	42,61	27,43	0,81	0,84	0,89	0,87	0,73
F. V/P (+5Y) (Top 20)	**0,98**	**1,01**	**1,31**			**26,38**	**56,45**	**23,98**			**0,72**	**0,92**	**0,68**		
F. V/P (+5Y) (Top 30)	0,98	1,00	1,32			28,63	57,12	24,86			0,75	0,92	0,69		
F. Target Price / P	**1,03**	**1,07**	**1,04**	**1,00**	**1,09**	**25,17**	**46,59**	**40,27**	**29,63**	**28,07**	**0,70**	**0,89**	**0,86**	**0,76**	**0,74**
F. ROE (Trailing)	1,47	1,13	0,97	0,88	0,93	44,66	#N/D	24,91	30,27	44,09	0,90	1,01	0,74	0,81	0,90
F. ROE (Forward)	**1,15**	**1,00**	**0,98**	**0,94**	**1,25**	**18,70**	**49,54**	**44,82**	**38,05**	**23,91**	**0,56**	**0,90**	**0,88**	**0,84**	**0,68**
F. P/E (Trailing)	1,27	0,95	0,98	1,00	1,02	31,32	38,15	45,01	46,88	40,02	0,78	0,84	0,88	0,89	0,85
F. P/E (Forward)	**1,37**	**0,93**	**0,92**	**0,96**	**1,11**	**18,01**	**29,52**	**41,49**	**56,26**	**25,27**	**0,54**	**0,76**	**0,86**	**0,92**	**0,70**
F. PEG (Trailing)	1,19	0,94	0,90	0,97	1,22	32,64	31,49	44,42	52,39	24,41	0,79	0,78	0,88	0,91	0,68
F. PEG (Forward)	**1,31**	**1,18**	**0,92**	**0,85**	**0,91**	**30,53**	**35,29**	**40,48**	**35,64**	**24,51**	**0,77**	**0,82**	**0,86**	**0,82**	**0,69**
F. P/B (Trailing)	1,32	1,12	0,96	0,88	0,89	31,61	34,95	41,42	33,44	21,84	0,78	0,82	0,86	0,80	0,63
F. P/B (Forward)	**1,17**	**0,97**	**1,02**	**1,04**	**1,09**	**16,89**	**37,42**	**46,43**	**43,22**	**18,61**	**0,51**	**0,84**	**0,89**	**0,87**	**0,56**
F. EV/EBITDA Historical	1,10	0,94	0,93	1,00	1,34	30,01	35,91	48,96	61,45	33,02	0,79	0,84	0,91	0,94	0,82
F. EV/EBITDA Forward	**1,10**	**0,94**	**0,93**	**1,00**	**1,34**	**30,01**	**35,91**	**48,96**	**61,45**	**33,02**	**0,79**	**0,84**	**0,91**	**0,94**	**0,82**
F. Mkt Value Size	1,08	1,20	1,02	1,11	0,94	34,74	16,51	38,95	17,63	58,20	0,81	0,50	0,85	0,53	0,92

Table – A4 - US. Hit-Rate % (percentage of successful bet), monthly turnover, maximum drawdown over the full period of analysis for quintiles and top/bottom 20-30 stocks (only V/P)

	Hit-Rate % > Bench					Turnover %					Maximum Drawdown (-100)				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	57,76	55,96	58,12	49,10	46,57	22,07	35,99	37,43	32,68	20,46	-57,70	-46,11	-49,76	-63,88	-83,60
F. V/P (Top 20)	59,93	56,32	42,60			36,30	6,56	27,14			-63,59	-52,20	-93,60		
F. V/P (Top 30)	**60,65**	**55,60**	**44,77**			**32,85**	**7,40**	**26,00**			**-58,62**	**-52,17**	**-88,42**		
F. V/P (+5Y) (Quintile)	53,79	53,07	56,68	49,10	47,29	17,36	29,61	32,04	27,67	16,33	-48,16	-51,23	-52,34	-53,56	-80,66
F. V/P (+5Y) (Top 20)	**56,68**	**53,07**	**49,82**			**20,02**	**5,67**	**21,68**			**-42,71**	**-53,04**	**-88,10**		
F. V/P (+5Y) (Top 30)	52,35	55,23	46,57			20,40	6,29	21,26			-49,16	-52,58	-87,06		
F. Target Price / P	**57,40**	**53,43**	**57,04**	**53,43**	**56,32**	**11,49**	**19,44**	**22,18**	**19,96**	**12,11**	**-68,00**	**-48,73**	**-49,39**	**-53,24**	**-70,44**
F. ROE (Trailing)	52,58	58,88	53,42	57,21	54,46	33,23	58,75	60,97	55,82	29,83	-68,09	-50,99	-46,91	-49,67	-54,23
F. ROE (Forward)	**53,79**	**60,29**	**54,87**	**50,90**	**48,74**	**4,04**	**5,71**	**6,93**	**7,49**	**7,30**	**-47,94**	**-48,66**	**-52,95**	**-58,43**	**-81,68**
F. P/E (Trailing)	47,29	47,65	56,32	55,23	58,12	9,16	13,17	14,46	13,15	7,70	-77,39	-53,70	-48,90	-48,01	-51,02
F. P/E (Forward)	**46,21**	**55,60**	**56,32**	**50,90**	**54,15**	**12,28**	**18,00**	**22,13**	**19,33**	**11,58**	**-76,40**	**-55,49**	**-49,53**	**-49,02**	**-66,46**
F. PEG (Trailing)	53,43	54,87	58,84	52,35	50,18	13,88	23,88	26,89	23,02	13,00	-68,38	-53,27	-44,05	-48,11	-74,46
F. PEG (Forward)	**46,21**	**51,62**	**59,57**	**56,68**	**53,07**	**18,87**	**26,95**	**34,01**	**32,36**	**23,44**	**-71,29**	**-60,36**	**-47,26**	**-47,44**	**-57,16**
F. P/B (Trailing)	49,10	57,76	60,29	54,15	47,29	20,23	30,64	34,96	32,49	23,29	-69,80	-55,03	-51,14	-44,36	-64,22
F. P/B (Forward)	**53,79**	**57,76**	**54,15**	**49,46**	**53,07**	**9,85**	**16,85**	**18,69**	**16,18**	**9,27**	**-70,42**	**-51,65**	**-49,50**	**-50,88**	**-77,41**
F. EV/EBITDA Historical	54,36	57,26	55,60	53,53	53,53	12,50	18,52	20,01	18,01	10,88	-57,62	-48,05	-51,51	-46,81	-71,87
F. EV/EBITDA Forward	**54,36**	**57,26**	**55,60**	**53,53**	**53,53**	**12,50**	**18,52**	**20,01**	**18,01**	**10,88**	**-57,62**	**-48,05**	**-51,51**	**-46,81**	**-71,87**
F. Mkt Value Size	54,15	48,38	49,46	48,01	41,88	23,89	19,74	15,03	9,68	3,51	-55,39	-58,98	-54,45	-48,67	-56,61

Table – A5 - US. Information coefficients (ICs) for quintiles and top/bottom 20-30 stocks (only V/P)

	Pooled Information Coefficient																			
	1				2				3				4				5			
Factor	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M
F. V/P (Quintile)	**0,06**	**0,12**	**0,15**	**0,15**	**0,04**	**0,09**	**0,13**	**0,09**	**0,03**	**0,09**	**0,13**	**0,14**	**0,04**	**0,11**	**0,17**	**0,23**	**0,03**	**0,06**	**0,09**	**0,16**
F. V/P (Top 20)	0,05	0,14	0,16	0,14	0,03	0,07	0,09	0,14	0,04	0,05	0,07	0,22								
F. V/P (Top 30)	**0,05**	**0,13**	**0,15**	**0,15**	**0,03**	**0,07**	**0,10**	**0,15**	**0,04**	**0,06**	**0,10**	**0,23**								
F. V/P (+5Y) (Quintile)	0,01	0,03	0,04	0,04	0,04	0,08	0,10	0,07	0,03	0,08	0,11	0,11	0,03	0,10	0,13	0,19	0,02	0,04	0,06	0,10
F. V/P (+5Y) (Top 20)	**-0,03**	**-0,05**	**-0,06**	**-0,06**	**0,02**	**0,06**	**0,08**	**0,11**	**-0,01**	**-0,04**	**-0,06**	**-0,14**								
F. V/P (+5Y) (Top 30)	-0,02	-0,04	-0,05	-0,03	0,02	0,06	0,08	0,11	0,00	-0,02	-0,02	-0,03								
F. Target Price / P	**-0,03**	**-0,07**	**-0,10**	**-0,12**	**-0,07**	**-0,17**	**-0,25**	**-0,33**	**-0,07**	**-0,18**	**-0,27**	**-0,35**	**-0,05**	**-0,14**	**-0,20**	**-0,30**	**-0,03**	**-0,10**	**-0,14**	**-0,22**
F. ROE (Trailing)	-0,01	-0,01	0,00	0,05	-0,00	-0,01	0,00	0,12	0,00	-0,03	-0,01	0,11	0,01	-0,02	0,00	0,11	0,02	0,01	0,02	0,11
F. ROE (Forward)	**-0,01**	**-0,03**	**-0,03**	**-0,00**	**-0,02**	**-0,04**	**-0,05**	**-0,01**	**-0,02**	**-0,05**	**-0,06**	**-0,01**	**-0,03**	**-0,07**	**-0,09**	**-0,10**	**0,01**	**0,03**	**0,04**	**0,08**
F. P/E (Trailing)	-0,01	-0,01	-0,04	-0,04	0,03	0,07	0,10	0,19	0,04	0,09	0,11	0,18	0,03	0,08	0,09	0,15	0,01	0,04	0,06	0,05
F. P/E (Forward)	**-0,03**	**-0,05**	**-0,06**	**-0,05**	**0,05**	**0,12**	**0,18**	**0,24**	**0,05**	**0,12**	**0,15**	**0,25**	**0,05**	**0,12**	**0,15**	**0,26**	**0,02**	**0,05**	**0,10**	**0,20**
F. PEG (Trailing)	0,00	0,02	0,02	0,03	0,06	0,14	0,22	0,28	0,06	0,13	0,20	0,30	0,05	0,11	0,19	0,30	0,03	0,07	0,12	0,20
F. PEG (Forward)	**0,01**	**0,05**	**0,05**	**0,08**	**0,03**	**0,07**	**0,07**	**0,15**	**0,03**	**0,04**	**0,04**	**0,17**	**0,02**	**0,04**	**0,05**	**0,16**	**0,01**	**0,01**	**0,04**	**0,10**
F. P/B (Trailing)	0,01	0,06	0,08	0,10	0,03	0,07	0,10	0,22	0,03	0,05	0,08	0,24	0,03	0,04	0,07	0,22	0,03	0,06	0,08	0,15
F. P/B (Forward)	**0,02**	**0,06**	**0,10**	**0,16**	**0,04**	**0,11**	**0,16**	**0,31**	**0,06**	**0,16**	**0,24**	**0,35**	**0,05**	**0,13**	**0,19**	**0,29**	**0,03**	**0,08**	**0,14**	**0,23**
F. EV/EBITDA Historical	0,03	0,06	0,04	0,01	0,06	0,12	0,15	0,20	0,05	0,13	0,16	0,23	0,06	0,12	0,15	0,28	0,06	0,13	0,16	0,21
F. EV/EBITDA Forward	**0,03**	**0,06**	**0,04**	**0,01**	**0,06**	**0,12**	**0,15**	**0,20**	**0,05**	**0,13**	**0,16**	**0,23**	**0,06**	**0,12**	**0,15**	**0,28**	**0,06**	**0,13**	**0,16**	**0,21**
F. Mkt Value Size	0,02	0,06	0,08	0,09	0,03	0,09	0,11	0,13	0,04	0,10	0,13	0,15	0,03	0,07	0,10	0,10	0,03	0,07	0,08	0,09

Table – A6 - US. Information coefficients' t-stat for quintiles and top/bottom 20-30 stocks (only V/P)

	Pooled IC T-Stat																			
	1				2				3				4				5			
Factor	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M
F. V/P (Quintile)	**9,40**	**18,38**	**22,67**	**21,05**	**6,85**	**14,38**	**19,85**	**12,57**	**5,48**	**14,16**	**19,86**	**20,45**	**6,21**	**18,03**	**25,90**	**32,81**	**4,89**	**10,06**	**13,18**	**21,96**
F. V/P (Top 20)	3,90	10,60	11,43	9,53	9,75	22,37	30,64	43,67	3,05	3,74	5,28	14,60								
F. V/P (Top 30)	**4,44**	**12,16**	**13,16**	**12,39**	**9,47**	**22,59**	**30,86**	**43,03**	**3,66**	**5,56**	**9,13**	**18,59**								
F. V/P (+5Y) (Quintile)	1,92	4,23	5,69	5,49	6,22	13,19	14,93	9,20	5,04	12,27	17,59	15,66	5,09	15,10	20,00	27,57	3,01	5,73	8,90	13,33
F. V/P (+5Y) (Top 20)	**-2,00**	**-3,79**	**-4,62**	**-4,13**	**8,41**	**19,52**	**26,06**	**33,07**	**-0,67**	**-2,93**	**-4,46**	**-9,33**								
F. V/P (+5Y) (Top 30)	-1,98	-3,66	-4,12	-2,79	8,22	18,86	25,45	32,82	0,06	-2,00	-2,01	-2,27								
F. Target Price / P	**-4,09**	**-11,01**	**-15,25**	**-17,96**	**-11,13**	**-26,69**	**-39,79**	**-49,39**	**-11,59**	**-29,07**	**-42,93**	**-52,29**	**-8,18**	**-22,65**	**-32,06**	**-43,85**	**-5,35**	**-16,25**	**-22,56**	**-32,69**
F. ROE (Trailing)	-1,33	-2,01	0,17	6,87	-0,57	-0,92	0,58	17,30	0,38	-4,95	-1,54	15,26	1,73	-3,49	0,29	14,96	3,11	0,89	2,47	15,35
F. ROE (Forward)	**-1,98**	**-4,46**	**-5,57**	**-0,23**	**-2,91**	**-6,34**	**-9,01**	**-2,29**	**-4,29**	**-8,22**	**-10,79**	**-1,05**	**-5,72**	**-12,12**	**-16,45**	**-16,70**	**2,13**	**4,72**	**6,56**	**12,81**
F. P/E (Trailing)	-1,57	-2,55	-6,04	-5,56	4,42	12,46	16,49	29,27	6,21	15,59	18,56	29,14	4,70	14,13	15,15	23,24	2,38	7,62	10,66	7,24
F. P/E (Forward)	**-4,76**	**-8,46**	**-10,79**	**-7,63**	**8,37**	**20,95**	**32,13**	**40,08**	**9,85**	**20,99**	**26,67**	**41,38**	**9,61**	**21,02**	**26,93**	**43,98**	**3,20**	**8,70**	**17,79**	**31,52**
F. PEG (Trailing)	0,08	3,14	3,77	4,21	10,65	23,82	37,68	44,71	10,71	23,28	35,19	50,13	8,13	18,96	32,07	49,60	5,19	12,66	20,61	32,63
F. PEG (Forward)	**2,19**	**7,83**	**7,47**	**10,22**	**4,30**	**10,82**	**11,05**	**20,90**	**4,16**	**5,93**	**6,23**	**23,62**	**2,58**	**5,83**	**6,85**	**22,53**	**0,92**	**1,97**	**5,45**	**12,97**
F. P/B (Trailing)	0,78	9,78	12,38	13,10	5,15	11,41	14,60	31,02	4,70	7,99	12,08	34,14	4,40	6,50	11,17	31,13	3,96	9,44	11,44	20,18
F. P/B (Forward)	**3,69**	**10,90**	**17,54**	**25,66**	**7,99**	**18,81**	**28,41**	**51,56**	**10,47**	**28,37**	**41,85**	**59,93**	**9,48**	**23,42**	**34,05**	**48,38**	**4,63**	**14,01**	**23,58**	**37,03**
F. EV/EBITDA Historical	4,34	8,48	5,99	1,39	8,65	18,16	22,84	27,42	8,29	19,07	23,90	31,45	8,44	18,47	22,01	39,59	8,76	19,25	23,73	29,20
F. EV/EBITDA Forward	**4,34**	**8,48**	**5,99**	**1,39**	**8,65**	**18,16**	**22,84**	**27,42**	**8,29**	**19,07**	**23,90**	**31,45**	**8,44**	**18,47**	**22,01**	**39,59**	**8,76**	**19,25**	**23,73**	**29,20**
F. Mkt Value Size	4,43	11,36	14,93	14,63	6,20	16,24	19,06	21,20	6,74	17,95	22,53	24,01	5,70	13,24	17,14	16,06	5,54	12,27	15,08	14,90

Table – A7 - US. Long-short (F1-FN) spread return correlation for quintiles and top/bottom 20-30 stocks (only V/P)

	F1-FN Return Correlation																		
Factor	V/P (Quintile)	V/P (Top 20)	V/P (Top 30)	V/P (+5Y) (Quintile)	V/P (+5Y) (Top 20)	V/P (+5Y) (Top 30)	Target Price / P	ROE (Trailing)	ROE (Forward)	P/E (Trailing)	P/E (Forward)	PEG (Trailing)	PEG (Forward)	P/B (Trailing)	P/B (Forward)	EV/EBITDA Historical	EV/EBITDA Forward	Mkt Value Size
F. V/P (Quintile)	1,00																	
F. V/P (Top 20)	0,95	1,00																
F. V/P (Top 30)	0,94	0,94	1,00															
F. V/P (+5Y) (Quintile)	0,93	0,88	0,88	1,00														
F. V/P (+5Y) (Top 20)	0,47	0,46	0,42	0,66	1,00													
F. V/P (+5Y) (Top 30)	0,72	0,69	0,72	0,87	0,86	1,00												
F. Target Price / P	-0,20	-0,18	-0,19	-0,23	-0,20	-0,23	1,00											
F. ROE (Trailing)	-0,16	-0,09	-0,04	-0,25	-0,17	-0,23	-0,30	1,00										
F. ROE (Forward)	0,01	0,00	0,03	-0,01	-0,05	-0,01	-0,05	0,16	1,00									
F. P/E (Trailing)	-0,29	-0,30	-0,26	-0,37	-0,34	-0,36	-0,02	0,39	0,45	1,00								
F. P/E (Forward)	0,01	0,04	0,04	0,01	0,03	0,00	-0,03	0,12	0,00	0,01	1,00							
F. PEG (Trailing)	0,37	0,35	0,30	0,45	0,28	0,34	-0,37	0,28	0,04	-0,05	0,08	1,00						
F. PEG (Forward)	-0,01	-0,04	0,01	-0,09	-0,12	-0,10	-0,19	0,55	0,31	0,63	0,04	0,18	1,00					
F. P/B (Trailing)	0,22	0,17	0,23	0,15	-0,01	0,09	-0,25	0,63	0,33	0,34	0,10	0,39	0,71	1,00				
F. P/B (Forward)	0,05	0,08	0,08	0,05	0,04	0,03	-0,04	0,12	0,00	-0,00	1,00	0,09	0,04	0,11	1,00			
F. EV/EBITDA Historical	0,28	0,32	0,25	0,36	0,25	0,28	-0,17	-0,20	-0,05	-0,19	0,04	0,66	0,11	0,24	0,05	1,00		
F. EV/EBITDA Forward	0,28	0,32	0,25	0,36	0,25	0,28	-0,17	-0,20	-0,05	-0,19	0,04	0,66	0,11	0,24	0,05	1,00	1,00	
F. Mkt Value Size	-0,12	-0,10	-0,11	-0,22	-0,15	-0,17	0,08	0,25	0,16	0,33	-0,06	-0,05	0,28	0,26	-0,07	-0,00	-0,00	1,00

APPENDIX B – (1995-2018) Europe - Full Statistics on monthly equally-weighted rebalanced portfolios

Table – B1 - EU. Long-short yearly returns (F1-FN), long-only yearly returns for quintiles and top/bottom 20-30 stocks (only V/P), benchmark yearly return (S&P 500), Sharpe ratios for quintiles and top/bottom 20-30 stocks (only V/P)

		Universe Return						Sharpe Ratio				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5
F. V/P (Quintile)	4,55	11,54	9,95	8,93	7,66	5,18	**4,11**	**0,71**	**0,66**	**0,58**	**0,45**	**0,27**
F. V/P (Top 20)	4,59	10,49	8,89	3,60			4,11	0,55	0,57	0,17		
F. V/P (Top 30)	4,14	10,64	8,91	4,21			**4,11**	**0,59**	**0,57**	**0,20**		
F. V/P (+5Y) (Quintile)	3,23	10,85	9,87	9,03	7,84	6,09	4,11	0,71	0,66	0,59	0,47	0,32
F. V/P (+5Y) (Top 20)	2,23	9,10	8,99	4,35			**4,11**	**0,55**	**0,57**	**0,20**		
F. V/P (+5Y) (Top 30)	3,06	9,38	9,09	4,33			4,11	0,57	0,58	0,21		
F. Target Price / P	-2,81	8,66	8,88	8,46	8,24	9,70	**4,11**	**0,50**	**0,61**	**0,55**	**0,50**	**0,47**
F. ROE (Trailing)	0,19	3,64	6,63	7,81	6,82	3,99	4,11	0,16	0,39	0,52	0,48	0,26
F. ROE (Forward)	1,38	9,43	9,82	9,27	9,30	7,29	**4,11**	**0,64**	**0,64**	**0,61**	**0,58**	**0,42**
F. P/E (Trailing)	-3,71	6,05	8,10	9,41	9,99	10,51	4,11	0,31	0,49	0,60	0,68	0,71
F. P/E (Forward)	0,62	8,41	10,02	9,24	9,18	7,80	**4,11**	**0,42**	**0,63**	**0,65**	**0,66**	**0,47**
F. PEG (Trailing)	3,79	10,20	8,88	9,51	9,26	5,89	4,11	0,50	0,57	0,66	0,65	0,32
F. PEG (Forward)	0,01	7,40	9,59	9,14	9,75	7,81	**4,11**	**0,38**	**0,50**	**0,58**	**0,72**	**0,54**
F. P/B (Trailing)	0,89	7,92	9,94	9,09	9,20	7,54	4,11	0,38	0,53	0,60	0,67	0,54
F. P/B (Forward)	0,59	9,67	8,43	8,58	9,27	8,49	**4,11**	**0,48**	**0,52**	**0,58**	**0,66**	**0,51**
F. EV/EBITDA Historical	4,48	11,35	10,16	10,79	8,83	5,99	4,11	0,69	0,68	0,78	0,62	0,35
F. EV/EBITDA Forward	2,69	9,43	8,82	7,67	5,45	5,72	**4,11**	**0,55**	**0,59**	**0,52**	**0,37**	**0,31**
F. Size	1,62	9,16	9,93	9,74	9,01	7,16	4,11	0,59	0,64	0,63	0,57	0,45

Table – B2 - EU. Information ratios, alphas, Alphas' t-stat for quintiles and top/bottom 20-30 stocks (only V/P)

	Information Ratio					Alpha					T-Stat Alpha				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	**0,82**	**0,89**	**0,82**	**0,65**	**0,15**	**0,63**	**0,50**	**0,41**	**0,29**	**0,08**	**4,38**	**4,82**	**4,39**	**3,03**	**0,57**
F. V/P (Top 20)	0,51	1,06	-0,01			0,57	0,39	-0,00			2,75	5,22	-0,02		
F. V/P (Top 30)	**0,55**	**1,06**	**0,04**			**0,58**	**0,39**	**0,03**			**3,03**	**5,25**	**0,17**		
F. V/P (+5Y) (Quintile)	0,86	0,86	0,92	0,73	0,28	0,58	0,49	0,41	0,30	0,15	4,71	4,78	4,79	3,39	1,12
F. V/P (+5Y) (Top 20)	**0,45**	**1,06**	**0,06**			**0,47**	**0,40**	**0,04**			**2,77**	**5,25**	**0,18**		
F. V/P (+5Y) (Top 30)	0,56	1,08	0,07			0,47	0,41	0,02			3,15	5,38	0,11		
F. Target Price / P	**0,50**	**0,77**	**0,80**	**0,61**	**0,56**	**0,40**	**0,42**	**0,37**	**0,35**	**0,44**	**2,63**	**4,52**	**4,29**	**3,09**	**2,53**
F. ROE (Trailing)	0,38	1,27	1,19	0,90	0,46	0,40	0,56	0,66	0,57	0,34	1,89	5,41	5,24	4,21	2,21
F. ROE (Forward)	**0,86**	**1,02**	**0,93**	**0,94**	**0,51**	**0,46**	**0,47**	**0,44**	**0,42**	**0,26**	**4,85**	**5,29**	**4,99**	**4,62**	**2,38**
F. P/E (Trailing)	0,27	0,72	0,97	1,02	0,96	0,14	0,32	0,44	0,50	0,54	1,04	3,44	4,94	5,61	5,32
F. P/E (Forward)	**0,56**	**0,81**	**0,79**	**0,91**	**0,48**	**0,33**	**0,50**	**0,45**	**0,44**	**0,32**	**2,40**	**4,25**	**4,92**	**5,72**	**2,51**
F. PEG (Trailing)	0,69	0,65	0,86	1,00	0,22	0,46	0,41	0,47	0,44	0,16	3,06	3,59	5,10	5,88	1,09
F. PEG (Forward)	**0,46**	**0,72**	**0,91**	**0,91**	**0,55**	**0,25**	**0,42**	**0,42**	**0,50**	**0,34**	**1,96**	**3,24**	**4,60**	**5,97**	**3,53**
F. P/B (Trailing)	0,46	0,83	0,95	0,82	0,48	0,29	0,45	0,42	0,45	0,32	1,93	3,75	5,03	5,36	3,40
F. P/B (Forward)	**0,62**	**0,66**	**0,77**	**0,83**	**0,44**	**0,43**	**0,37**	**0,39**	**0,46**	**0,40**	**2,77**	**3,42**	**4,36**	**5,22**	**2,56**
F. EV/EBITDA Historical	1,08	0,86	0,99	0,73	0,24	0,58	0,52	0,58	0,42	0,17	5,24	4,80	6,15	4,51	1,30
F. EV/EBITDA Forward	**1,00**	**1,03**	**1,21**	**0,60**	**0,53**	**0,63**	**0,58**	**0,55**	**0,32**	**0,34**	**4,48**	**4,99**	**5,94**	**3,06**	**2,39**
F. Size	0,77	0,87	1,02	1,05	0,86	0,43	0,49	0,47	0,40	0,24	4,08	4,61	5,21	5,11	4,05

Table – B3 - EU. Betas, betas' t-stat, R squared for quintiles and top/bottom 20-30 stocks (only V/P)

	Beta					T-Stat Beta					R^2 for Beta				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	**0,90**	**0,91**	**0,93**	**1,03**	**1,14**	**27,66**	**39,16**	**44,46**	**48,97**	**34,06**	**0,74**	**0,85**	**0,88**	**0,90**	**0,81**
F. V/P (Top 20)	0,95	0,98	1,14			20,35	58,07	23,29			0,60	0,92	0,66		
F. V/P (Top 30)	**0,91**	**0,98**	**1,13**			**21,11**	**58,31**	**25,31**			**0,62**	**0,93**	**0,70**		
F. V/P (+5Y) (Quintile)	0,89	0,89	0,94	1,04	1,14	32,26	38,37	48,89	53,16	37,54	0,79	0,84	0,90	0,91	0,84
F. V/P (+5Y) (Top 20)	**0,86**	**0,98**	**1,20**			**22,53**	**57,37**	**25,68**			**0,65**	**0,92**	**0,71**		
F. V/P (+5Y) (Top 30)	0,90	0,97	1,20			27,02	57,03	30,47			0,73	0,92	0,77		
F. Target Price / P	**0,97**	**0,89**	**0,94**	**0,99**	**1,16**	**28,59**	**42,90**	**48,41**	**38,91**	**29,52**	**0,75**	**0,87**	**0,89**	**0,85**	**0,76**
F. ROE (Trailing)	1,38	1,09	0,91	0,83	0,87	32,32	68,16	38,31	30,80	27,12	0,83	0,96	0,87	0,81	0,77
F. ROE (Forward)	**0,89**	**0,94**	**0,92**	**0,98**	**1,05**	**42,36**	**46,48**	**47,08**	**47,60**	**43,04**	**0,87**	**0,89**	**0,89**	**0,89**	**0,87**
F. P/E (Trailing)	1,17	1,01	0,95	0,90	0,89	37,85	47,83	47,91	45,23	38,56	0,84	0,89	0,89	0,88	0,84
F. P/E (Forward)	**1,18**	**0,93**	**0,85**	**0,85**	**0,98**	**38,65**	**35,22**	**41,02**	**49,09**	**34,17**	**0,84**	**0,82**	**0,86**	**0,90**	**0,81**
F. PEG (Trailing)	1,21	0,92	0,87	0,88	1,05	35,37	35,40	42,04	52,46	32,42	0,82	0,82	0,87	0,91	0,79
F. PEG (Forward)	**1,15**	**1,14**	**0,96**	**0,83**	**0,87**	**40,28**	**39,08**	**47,10**	**44,28**	**40,49**	**0,86**	**0,85**	**0,89**	**0,88**	**0,86**
F. P/B (Trailing)	1,22	1,13	0,93	0,83	0,84	36,87	42,04	50,17	44,00	39,02	0,83	0,87	0,90	0,88	0,85
F. P/B (Forward)	**1,16**	**0,97**	**0,90**	**0,85**	**0,91**	**32,88**	**40,34**	**45,35**	**43,19**	**26,05**	**0,80**	**0,86**	**0,88**	**0,87**	**0,71**
F. EV/EBITDA Historical	0,99	0,89	0,82	0,86	1,01	39,32	36,55	39,07	41,20	33,49	0,85	0,83	0,85	0,86	0,80
F. EV/EBITDA Forward	**1,01**	**0,90**	**0,89**	**0,91**	**1,11**	**35,99**	**39,01**	**42,69**	**47,52**	**40,10**	**0,84**	**0,86**	**0,88**	**0,90**	**0,87**
F. Size	0,94	0,92	0,94	0,99	1,01	39,78	38,36	47,01	56,71	74,60	0,85	0,84	0,89	0,92	0,95

Table – B4 - EU. Hit-Rate % (percentage of successful bet), monthly turnover, maximum drawdown over the full period of analysis for quintiles and top/bottom 20-30 stocks (only V/P)

	Hit-Rate % > Bench					Turnover %					Maximum Drawdown (-100)				
Factor	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	**63,18**	**65,70**	**62,45**	**61,01**	**53,79**	**22,14**	**39,06**	**41,28**	**34,04**	**18,11**	**-62,59**	**-53,25**	**-50,86**	**-58,93**	**-76,27**
F. V/P (Top 20)	56,68	64,62	55,23			37,99	4,57	24,93			-72,31	-53,42	-80,74		
F. V/P (Top 30)	**59,93**	**65,34**	**55,23**			**34,76**	**5,43**	**22,69**			**-70,13**	**-53,04**	**-80,93**		
F. V/P (+5Y) (Quintile)	63,54	66,06	63,54	60,65	57,40	17,41	31,99	35,26	27,46	14,40	-60,24	-53,04	-53,00	-57,96	-70,46
F. V/P (+5Y) (Top 20)	**57,04**	**66,79**	**54,87**			**22,95**	**3,81**	**20,62**			**-54,88**	**-54,45**	**-73,64**		
F. V/P (+5Y) (Top 30)	57,40	65,70	53,43			23,12	4,46	18,83			-57,10	-53,94	-76,82		
F. Target Price / P	**61,01**	**61,37**	**62,45**	**59,93**	**62,45**	**8,40**	**15,44**	**18,31**	**17,69**	**9,90**	**-71,96**	**-49,07**	**-53,61**	**-59,65**	**-68,98**
F. ROE (Trailing)	60,83	70,05	68,75	67,27	59,91	32,91	57,23	59,02	51,55	25,07	-66,39	-58,02	-51,27	-46,78	-56,56
F. ROE (Forward)	**65,70**	**63,18**	**66,43**	**64,98**	**54,51**	**4,25**	**5,92**	**6,38**	**6,45**	**5,42**	**-54,54**	**-54,73**	**-55,60**	**-56,23**	**-55,72**
F. P/E (Trailing)	53,43	58,84	64,26	66,06	68,59	8,31	13,07	13,54	11,90	7,02	-62,82	-58,70	-53,65	-52,40	-47,26
F. P/E (Forward)	**56,68**	**64,98**	**65,70**	**61,73**	**61,73**	**10,65**	**17,56**	**21,26**	**18,75**	**11,58**	**-65,76**	**-56,17**	**-49,70**	**-47,43**	**-67,91**
F. PEG (Trailing)	60,65	63,90	63,18	62,82	54,87	14,22	26,06	28,24	24,05	13,67	-68,87	-56,95	-48,09	-50,19	-74,56
F. PEG (Forward)	**56,32**	**63,90**	**63,54**	**62,82**	**59,93**	**17,78**	**26,38**	**34,48**	**33,49**	**24,81**	**-57,41**	**-64,11**	**-58,25**	**-45,44**	**-58,46**
F. P/B (Trailing)	58,12	61,01	61,73	63,90	58,12	20,05	28,82	34,77	33,24	23,72	-60,93	-62,30	-53,33	-49,53	-51,93
F. P/B (Forward)	**60,65**	**61,73**	**61,73**	**62,82**	**60,65**	**8,95**	**15,78**	**16,44**	**14,16**	**8,04**	**-67,01**	**-58,93**	**-51,59**	**-44,26**	**-71,14**
F. EV/EBITDA Historical	66,06	64,98	66,79	62,09	55,96	6,51	8,88	9,57	8,73	6,34	-50,58	-49,39	-42,38	-49,11	-74,41
F. EV/EBITDA Forward	**66,67**	**63,37**	**65,59**	**57,20**	**60,08**	**9,40**	**15,51**	**16,26**	**15,01**	**9,13**	**-54,27**	**-48,19**	**-46,21**	**-56,82**	**-71,65**
F. Size	60,29	64,26	64,62	66,43	65,34	19,32	15,53	11,86	7,96	3,06	-56,14	-51,14	-52,72	-54,91	-52,33

Table – B5 - EU. Information coefficients (ICs) for quintiles and top/bottom 20-30 stocks (only V/P)

	Pooled Information Coefficient																			
	1				2				3				4				5			
Factor	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M
F. V/P (Quintile)	**-0,02**	**-0,06**	**-0,03**	**0,06**	**-0,05**	**-0,07**	**-0,04**	**0,13**	**-0,04**	**-0,05**	**-0,02**	**0,17**	**-0,03**	**-0,03**	**-0,01**	**0,16**	**0,00**	**0,01**	**0,02**	**0,09**
F. V/P (Top 20)	0,00	-0,02	0,02	0,08	-0,00	-0,00	0,02	0,11	0,02	0,01	-0,01	0,02								
F. V/P (Top 30)	**-0,01**	**-0,02**	**0,01**	**0,08**	**-0,00**	**-0,00**	**0,02**	**0,12**	**0,03**	**0,02**	**0,00**	**0,04**								
F. V/P (+5Y) (Quintile)	-0,03	-0,05	-0,05	0,03	-0,04	-0,07	-0,07	0,09	-0,05	-0,07	-0,04	0,12	-0,04	-0,06	-0,04	0,13	-0,00	0,01	0,01	0,09
F. V/P (+5Y) (Top 20)	**-0,02**	**-0,02**	**-0,01**	**0,09**	**-0,00**	**-0,01**	**0,00**	**0,07**	**0,00**	**-0,03**	**-0,04**	**-0,05**								
F. V/P (+5Y) (Top 30)	-0,03	-0,05	-0,04	0,08	-0,01	-0,01	-0,00	0,07	0,01	0,01	-0,02	-0,00								
F. Target Price / P	**-0,02**	**-0,09**	**-0,14**	**-0,26**	**-0,04**	**-0,13**	**-0,20**	**-0,36**	**-0,04**	**-0,12**	**-0,20**	**-0,35**	**-0,01**	**-0,07**	**-0,14**	**-0,33**	**-0,00**	**-0,05**	**-0,09**	**-0,18**
F. ROE (Trailing)	-0,03	-0,06	-0,06	0,04	-0,05	-0,08	-0,06	0,10	-0,07	-0,09	-0,06	0,11	-0,04	-0,11	-0,06	0,11	-0,02	-0,04	-0,02	0,06
F. ROE (Forward)	**-0,01**	**-0,03**	**-0,04**	**-0,06**	**-0,05**	**-0,12**	**-0,17**	**-0,16**	**-0,06**	**-0,15**	**-0,20**	**-0,17**	**-0,06**	**-0,17**	**-0,22**	**-0,20**	**-0,01**	**-0,02**	**-0,01**	**0,06**
F. P/E (Trailing)	-0,00	0,01	0,01	0,00	0,01	0,06	0,10	0,24	0,02	0,07	0,10	0,22	0,02	0,07	0,09	0,22	0,01	0,03	0,04	0,09
F. P/E (Forward)	**-0,03**	**-0,04**	**-0,05**	**0,03**	**0,01**	**0,04**	**0,07**	**0,16**	**0,03**	**0,08**	**0,12**	**0,19**	**0,02**	**0,08**	**0,13**	**0,21**	**0,02**	**0,07**	**0,11**	**0,17**
F. PEG (Trailing)	-0,02	0,00	0,01	-0,01	0,02	0,07	0,12	0,23	0,03	0,10	0,16	0,28	0,03	0,10	0,17	0,31	0,03	0,08	0,13	0,22
F. PEG (Forward)	**0,02**	**0,06**	**0,06**	**0,12**	**-0,01**	**0,01**	**0,02**	**0,10**	**-0,00**	**0,01**	**0,01**	**0,12**	**0,00**	**0,03**	**0,03**	**0,16**	**-0,01**	**-0,01**	**0,01**	**0,07**
F. P/B (Trailing)	0,01	0,05	0,06	0,09	0,00	0,04	0,04	0,17	0,00	0,03	0,05	0,20	0,01	0,06	0,08	0,25	-0,00	0,01	0,02	0,13
F. P/B (Forward)	**0,00**	**0,03**	**0,07**	**0,14**	**0,01**	**0,08**	**0,15**	**0,34**	**0,04**	**0,13**	**0,20**	**0,35**	**0,04**	**0,14**	**0,21**	**0,37**	**0,02**	**0,09**	**0,13**	**0,24**
F. EV/EBITDA Historical	0,03	0,05	0,05	0,03	0,09	0,19	0,22	0,21	0,10	0,23	0,30	0,31	0,09	0,21	0,26	0,31	0,07	0,15	0,17	0,24
F. EV/EBITDA Forward	**0,04**	**0,09**	**0,12**	**0,09**	**0,08**	**0,18**	**0,20**	**0,17**	**0,09**	**0,20**	**0,24**	**0,28**	**0,10**	**0,23**	**0,28**	**0,31**	**0,04**	**0,10**	**0,12**	**0,16**
F. Size	0,04	0,11	0,15	0,17	0,04	0,11	0,14	0,17	0,05	0,14	0,17	0,19	0,05	0,14	0,19	0,21	0,06	0,14	0,19	0,23

Table – B6 - EU. Information coefficients' t-stat for quintiles and top/bottom 20-30 stocks (only V/P)

	Pooled IC T-Stat																			
	1				2				3				4				5			
Factor	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M	1 M	6 M	12 M	36 M
F. V/P (Quintile)	**-3,78**	**-9,13**	**-4,52**	**8,65**	**-7,58**	**-11,46**	**-6,69**	**19,12**	**-6,79**	**-8,78**	**-3,91**	**26,29**	**-4,98**	**-5,34**	**-1,05**	**24,26**	**0,47**	**2,43**	**2,93**	**13,39**
F. V/P (Top 20)	0,03	-1,19	1,46	4,99	-0,36	-0,23	5,99	35,33	1,58	0,59	-0,84	1,15								
F. V/P (Top 30)	**-0,84**	**-1,58**	**1,18**	**6,49**	**-1,19**	**-0,96**	**5,48**	**36,28**	**2,30**	**1,36**	**0,05**	**2,89**								
F. V/P (+5Y) (Quintile)	-4,90	-8,76	-7,28	3,81	-7,18	-12,21	-10,46	13,00	-7,84	-11,74	-7,13	18,56	-6,11	-9,28	-5,73	19,65	-0,16	1,35	2,33	13,56
F. V/P (+5Y) (Top 20)	**-1,16**	**-1,62**	**-0,86**	**6,07**	**-1,48**	**-3,29**	**0,81**	**21,05**	**0,03**	**-2,12**	**-3,18**	**-3,30**								
F. V/P (+5Y) (Top 30)	-2,38	-4,72	-3,36	6,25	-2,26	-4,41	-0,52	20,92	1,04	0,57	-1,54	-0,10								
F. Target Price / P	**-4,02**	**-15,86**	**-23,74**	**-42,58**	**-6,80**	**-22,70**	**-34,70**	**-60,46**	**-6,23**	**-20,39**	**-34,26**	**-57,56**	**-1,23**	**-12,69**	**-24,28**	**-53,00**	**-0,66**	**-7,63**	**-15,30**	**-27,98**
F. ROE (Trailing)	-5,13	-9,71	-8,82	5,73	-8,02	-12,66	-9,09	14,18	-9,98	-14,01	-8,40	15,50	-6,36	-16,30	-8,95	14,05	-2,62	-5,31	-3,03	7,61
F. ROE (Forward)	**-2,29**	**-5,99**	**-7,41**	**-9,42**	**-8,12**	**-21,04**	**-29,89**	**-25,52**	**-10,93**	**-26,13**	**-35,65**	**-26,80**	**-11,33**	**-29,68**	**-39,36**	**-33,00**	**-1,01**	**-2,85**	**-1,29**	**10,15**
F. P/E (Trailing)	-0,75	1,72	1,99	0,56	1,68	10,49	16,52	38,51	4,29	11,77	16,20	35,00	4,31	11,56	15,72	34,92	1,72	5,63	6,63	14,13
F. P/E (Forward)	**-5,04**	**-7,53**	**-9,45**	**4,83**	**1,98**	**6,66**	**11,59**	**25,74**	**4,84**	**14,95**	**21,60**	**30,96**	**4,14**	**14,78**	**22,75**	**34,68**	**4,41**	**12,77**	**19,21**	**27,52**
F. PEG (Trailing)	-2,88	0,17	2,24	-0,97	3,38	11,76	20,18	37,07	5,09	16,84	27,30	45,95	5,11	17,53	29,22	51,68	5,22	14,03	21,17	35,84
F. PEG (Forward)	**3,63**	**9,66**	**9,87**	**18,04**	**-0,99**	**2,45**	**2,77**	**15,88**	**-0,36**	**1,73**	**1,29**	**18,57**	**0,29**	**4,35**	**5,47**	**24,06**	**-1,24**	**-1,04**	**2,00**	**10,35**
F. P/B (Trailing)	1,62	8,25	9,20	13,25	0,78	6,46	7,13	26,73	0,85	5,73	7,81	31,96	2,27	9,45	12,73	39,27	-0,05	1,15	2,80	19,28
F. P/B (Forward)	**0,12**	**5,52**	**11,43**	**22,84**	**1,24**	**14,84**	**25,51**	**56,50**	**7,23**	**23,24**	**36,17**	**59,35**	**6,64**	**25,01**	**37,24**	**63,50**	**4,42**	**15,99**	**22,05**	**39,81**
F. EV/EBITDA Historical	4,28	7,06	8,05	4,65	14,76	30,17	35,43	31,12	15,96	37,82	48,50	47,08	15,05	34,64	42,11	47,35	11,09	23,13	26,01	35,71
F. EV/EBITDA Forward	**6,29**	**13,36**	**16,89**	**11,55**	**11,94**	**26,30**	**29,53**	**22,77**	**13,83**	**30,46**	**36,42**	**39,92**	**15,44**	**35,79**	**41,59**	**44,33**	**5,86**	**15,23**	**16,81**	**22,08**
F. Size	6,46	20,46	26,34	27,05	7,50	19,81	24,30	28,27	8,95	25,38	30,26	30,36	9,70	26,11	33,90	34,51	10,92	25,98	34,68	39,89

Table – B7 - EU. Long-short (F1-FN) spread return correlation for quintiles and top/bottom 20-30 stocks (only V/P)

F1-FN Return Correlation

Factor	V/P (Quintile)	V/P (Top 20)	V/P (Top 30)	V/P (+5Y) (Quintile)	V/P (+5Y) (Top 20)	V/P (+5Y) (Top 30)	Target Price / P	ROE (Trailing)	ROE (Forward)	P/E (Trailing)	P/E (Forward)	PEG (Trailing)	PEG (Forward)	P/B (Trailing)	P/B (Forward)	EV/EBITDA Historical	EV/EBITDA Forward	Mkt Value Size
F. V/P (Quintile)	1,00																	
F. V/P (Top 20)	0,92	1,00																
F. V/P (Top 30)	0,95	0,98	1,00															
F. V/P (+5Y) (Quintile)	0,91	0,82	0,86	1,00														
F. V/P (+5Y) (Top 20)	0,55	0,59	0,58	0,65	1,00													
F. V/P (+5Y) (Top 30)	0,74	0,74	0,74	0,85	0,86	1,00												
F. Target Price / P	-0,23	-0,18	-0,19	-0,21	-0,10	-0,15	1,00											
F. ROE (Trailing)	0,20	0,17	0,19	0,10	-0,05	0,06	-0,43	1,00										
F. ROE (Forward)	0,02	0,00	0,01	0,27	0,28	0,26	0,22	-0,30	1,00									
F. P/E (Trailing)	-0,10	-0,07	-0,08	-0,24	-0,30	-0,23	-0,26	0,43	-0,57	1,00								
F. P/E (Forward)	0,28	0,25	0,28	0,17	-0,03	0,09	-0,35	0,46	-0,36	0,75	1,00							
F. PEG (Trailing)	0,58	0,51	0,56	0,44	0,19	0,32	-0,40	0,58	-0,36	0,48	0,82	1,00						
F. PEG (Forward)	0,13	0,14	0,16	0,01	-0,15	-0,06	-0,34	0,62	-0,47	0,74	0,73	0,62	1,00					
F. P/B (Trailing)	0,21	0,22	0,24	0,07	-0,12	-0,01	-0,34	0,58	-0,46	0,69	0,68	0,63	0,92	1,00				
F. P/B (Forward)	0,50	0,46	0,50	0,36	0,09	0,25	-0,32	0,44	-0,33	0,68	0,88	0,81	0,64	0,66	1,00			
F. EV/EBITDA Historical	0,61	0,48	0,53	0,52	0,27	0,41	-0,34	0,12	-0,24	0,12	0,39	0,55	0,28	0,31	0,54	1,00		
F. EV/EBITDA Forward	0,59	0,48	0,53	0,52	0,27	0,41	-0,27	0,02	-0,19	-0,06	0,22	0,41	0,16	0,21	0,37	0,81	1,00	
F. Size	0,01	-0,00	-0,00	0,05	-0,02	0,06	-0,01	0,05	0,03	-0,03	0,06	-0,01	-0,03	-0,03	0,01	0,07	0,14	1,00

APPENDIX C – US - Core Statistics on monthly rebalanced portfolios for sub-periods (95-05), (00-10), (07-10), (10-18)

Sub-period 1995-2005 (US)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	14,85	18,03	15,63	16,56	7,41	-0,86	**9,28**	**1,15**	**1,10**	**1,03**	**0,36**	**-0,04**	**0,77**	**0,80**	**0,91**	**1,19**	**1,18**
F. V/P (Top 20)	23,31	24,27	11,95	-3,65			9,28	1,37	0,75	-0,14			0,77	0,96	1,24		
F. V/P (Top 30)	17,05	22,13	11,92	0,37			**9,28**	**1,31**	**0,74**	**0,02**			**0,76**	**0,97**	**1,17**		
F. V/P (+5Y) (Quintile)	9,46	16,00	15,65	15,93	7,41	2,11	9,28	1,07	1,09	1,04	0,39	0,09	0,80	0,79	0,90	1,09	1,22
F. V/P (+5Y) (Top 20)	13,67	19,06	11,97	0,83			**9,28**	**1,03**	**0,78**	**0,03**			**0,94**	**0,93**	**1,31**		
F. V/P (+5Y) (Top 30)	10,09	18,12	12,15	2,81			9,28	1,03	0,80	0,11			0,92	0,92	1,31		
F. Target Price / P	-11,19	6,33	11,63	15,13	13,85	17,76	**9,28**	**0,29**	**0,62**	**0,84**	**0,77**	**1,00**	**1,09**	**1,11**	**1,02**	**0,90**	**0,88**
F. ROE (Trailing)	-0,91	6,39	10,38	5,83	12,37	8,30	9,28	0,26	0,65	0,28	0,77	0,55	1,60	1,07	0,92	0,73	0,95
F. ROE (Forward)	8,96	14,44	14,19	13,75	10,39	1,25	**9,28**	**0,85**	**0,88**	**0,88**	**0,73**	**0,05**	**1,04**	**0,95**	**0,90**	**0,79**	**1,30**
F. P/E (Trailing)	-8,53	3,80	12,84	13,11	13,10	14,29	9,28	0,16	0,85	0,84	0,81	0,83	1,29	0,84	0,90	0,95	1,00
F. P/E (Forward)	-2,23	6,17	15,06	13,74	9,46	8,52	**9,28**	**0,24**	**1,00**	**0,93**	**0,61**	**0,35**	**1,27**	**0,73**	**0,83**	**0,95**	**1,21**
F. PEG (Trailing)	-0,34	10,99	12,69	12,01	11,69	7,89	9,28	0,57	0,84	0,80	0,74	0,29	1,03	0,76	0,86	0,95	1,36
F. PEG (Forward)	-1,06	6,09	14,47	15,71	11,23	7,42	**9,28**	**0,25**	**0,76**	**1,12**	**0,77**	**0,38**	**1,29**	**1,03**	**0,79**	**0,79**	**0,95**
F. P/B (Trailing)	4,16	9,68	16,23	13,73	10,28	4,56	9,28	0,42	0,91	0,89	0,65	0,22	1,22	0,96	0,87	0,84	0,94
F. P/B (Forward)	3,32	14,96	13,66	10,88	8,99	4,92	**9,28**	**0,86**	**0,88**	**0,64**	**0,50**	**0,18**	**0,90**	**0,87**	**0,99**	**1,04**	**1,19**
F. EV/EBITDA Historical	4,01	9,05	10,39	9,46	5,80	0,77	9,28	0,50	0,67	0,65	0,35	0,03	0,96	0,82	0,84	1,01	1,57
F. EV/EBITDA Forward	4,01	9,05	10,39	9,46	5,80	0,77	**9,28**	**0,50**	**0,67**	**0,65**	**0,35**	**0,03**	**0,96**	**0,82**	**0,84**	**1,01**	**1,57**
F. Mkt Value Size	4,43	10,34	15,61	9,72	8,64	5,70	9,28	0,56	0,64	0,59	0,52	0,37	1,01	1,14	0,92	0,96	0,92

Sub-period 2000-2010 (US)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	8,34	6,67	7,78	6,90	2,60	-3,44	**1,64**	**0,38**	**0,51**	**0,39**	**0,13**	**-0,15**	**0,95**	**0,88**	**1,02**	**1,19**	**1,34**
F. V/P (Top 20)	20,49	9,34	4,82	-11,80			1,64	0,42	0,27	-0,43			1,11	1,05	1,54		
F. V/P (Top 30)	16,10	10,30	4,71	-7,17			**1,64**	**0,49**	**0,27**	**-0,28**			**1,08**	**1,04**	**1,47**		
F. V/P (+5Y) (Quintile)	8,19	7,09	6,26	7,45	3,78	-3,52	1,64	0,43	0,40	0,43	0,20	-0,14	0,92	0,90	1,03	1,12	1,40
F. V/P (+5Y) (Top 20)	13,08	5,67	5,11	-9,37			**1,64**	**0,31**	**0,29**	**-0,36**			**0,97**	**1,06**	**1,42**		
F. V/P (+5Y) (Top 30)	10,98	5,02	5,45	-8,14			1,64	0,28	0,31	-0,31			0,96	1,04	1,46		
F. Target Price / P	-5,67	0,48	4,10	6,06	7,34	4,75	**1,64**	**0,03**	**0,22**	**0,34**	**0,40**	**0,22**	**1,02**	**1,08**	**1,05**	**1,05**	**1,24**
F. ROE (Trailing)	-0,59	3,45	7,60	6,05	8,16	5,05	1,64	0,13	0,42	0,35	0,48	0,29	1,50	1,10	0,91	0,89	1,00
F. ROE (Forward)	10,21	10,38	6,28	5,94	4,89	-1,09	**1,64**	**0,34**	**0,37**	**0,35**	**0,28**	**-0,05**	**1,29**	**1,00**	**0,99**	**1,01**	**1,38**
F. P/E (Trailing)	-4,87	-1,12	5,82	7,07	6,13	4,82	1,64	-0,05	0,33	0,42	0,36	0,27	1,44	1,04	0,99	0,98	1,00
F. P/E (Forward)	5,62	6,08	8,62	7,11	3,12	1,21	**1,64**	**0,17**	**0,51**	**0,45**	**0,20**	**0,06**	**1,63**	**0,97**	**0,92**	**0,93**	**1,13**
F. PEG (Trailing)	2,37	3,09	7,69	7,23	4,03	-0,20	1,64	0,14	0,46	0,47	0,24	-0,01	1,28	0,95	0,91	0,99	1,32
F. PEG (Forward)	-2,48	-1,20	6,97	6,93	2,36	2,58	**1,64**	**-0,05**	**0,31**	**0,43**	**0,16**	**0,15**	**1,51**	**1,31**	**0,95**	**0,87**	**0,95**
F. P/B (Trailing)	0,87	0,78	7,77	4,58	2,90	1,03	1,64	0,03	0,37	0,27	0,19	0,06	1,52	1,22	1,00	0,89	0,97
F. P/B (Forward)	9,59	8,78	8,39	6,30	3,92	-0,95	**1,64**	**0,27**	**0,48**	**0,35**	**0,21**	**-0,05**	**1,41**	**1,01**	**1,04**	**1,07**	**1,04**
F. EV/EBITDA Historical	7,29	8,60	7,60	4,68	4,93	-0,98	1,64	0,42	0,45	0,29	0,28	-0,04	1,12	0,95	0,92	1,04	1,46
F. EV/EBITDA Forward	7,29	8,60	7,60	4,68	4,93	-0,98	**1,64**	**0,42**	**0,45**	**0,29**	**0,28**	**-0,04**	**1,12**	**0,95**	**0,92**	**1,04**	**1,46**
F. Mkt Value Size	5,69	5,22	9,95	5,64	8,47	-0,03	1,64	0,27	0,33	0,30	0,28	-0,00	1,13	1,28	1,09	1,26	0,93

Sub-period 2007-2010 (US)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	-1,18	-3,12	2,82	2,82	0,38	-3,61	**-2,04**	**-0,12**	**0,13**	**0,12**	**0,01**	**-0,12**	**1,11**	**0,95**	**1,06**	**1,13**	**1,32**
F. V/P (Top 20)	5,28	-6,02	0,65	-13,21			-2,04	-0,18	0,03	-0,36			1,33	1,09	1,54		
F. V/P (Top 30)	3,89	-2,51	0,54	-8,78			**-2,04**	**-0,08**	**0,02**	**-0,25**			**1,27**	**1,08**	**1,51**		
F. V/P (+5Y) (Quintile)	5,53	2,13	1,30	1,28	0,68	-5,85	-2,04	0,09	0,06	0,05	0,03	-0,19	1,02	1,02	1,09	1,09	1,36
F. V/P (+5Y) (Top 20)	7,79	-1,64	0,54	-12,39			**-2,04**	**-0,07**	**0,02**	**-0,38**			**0,97**	**1,11**	**1,34**		
F. V/P (+5Y) (Top 30)	5,56	-3,46	0,94	-11,95			-2,04	-0,14	0,04	-0,36			1,00	1,10	1,42		
F. Target Price / P	0,16	0,05	1,72	1,54	-1,15	-4,11	**-2,04**	**0,00**	**0,07**	**0,06**	**-0,04**	**-0,13**	**0,94**	**1,04**	**1,08**	**1,16**	**1,38**
F. ROE (Trailing)	4,80	-0,72	1,81	1,26	-0,71	-3,69	-2,04	-0,02	0,07	0,06	-0,03	-0,16	1,46	1,13	1,00	1,00	1,02
F. ROE (Forward)	24,94	19,54	2,95	-1,72	-4,19	-4,10	**-2,04**	**0,38**	**0,13**	**-0,07**	**-0,16**	**-0,14**	**1,51**	**1,03**	**1,06**	**1,14**	**1,28**
F. P/E (Trailing)	-1,69	-3,59	-0,78	3,02	1,25	-0,75	-2,04	-0,11	-0,03	0,13	0,05	-0,03	1,39	1,10	1,06	1,02	1,02
F. P/E (Forward)	15,49	13,43	0,52	-0,91	-2,29	0,30	**-2,04**	**0,25**	**0,02**	**-0,04**	**-0,11**	**0,01**	**1,71**	**1,15**	**1,01**	**0,96**	**1,01**
F. PEG (Trailing)	-2,81	-4,99	1,65	1,53	1,47	-1,25	-2,04	-0,16	0,07	0,07	0,06	-0,05	1,37	1,13	0,95	1,01	1,16
F. PEG (Forward)	-4,08	-4,98	0,16	3,70	-2,32	1,39	**-2,04**	**-0,15**	**0,01**	**0,16**	**-0,12**	**0,07**	**1,43**	**1,40**	**1,04**	**0,89**	**0,86**
F. P/B (Trailing)	-5,31	-7,25	3,18	-0,13	1,17	0,66	-2,04	-0,21	0,11	-0,01	0,06	0,03	1,51	1,31	1,03	0,90	0,87
F. P/B (Forward)	16,27	12,13	-1,18	1,31	0,70	-2,08	**-2,04**	**0,23**	**-0,05**	**0,05**	**0,03**	**-0,09**	**1,66**	**1,10**	**1,07**	**1,05**	**0,95**
F. EV/EBITDA Historical	-6,51	-2,40	1,20	-2,55	3,79	3,19	-2,04	-0,08	0,05	-0,11	0,17	0,11	1,19	1,04	1,00	1,02	1,32
F. EV/EBITDA Forward	-6,51	-2,40	1,20	-2,55	3,79	3,19	**-2,04**	**-0,08**	**0,05**	**-0,11**	**0,17**	**0,11**	**1,19**	**1,04**	**1,00**	**1,02**	**1,32**
F. Mkt Value Size	4,23	0,06	15,46	0,34	17,00	-3,10	-2,04	0,00	0,32	0,01	0,34	-0,15	1,15	1,45	1,17	1,47	0,94

Sub-period 2010-2018 (US)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	3,77	14,95	11,87	11,86	10,64	10,08	**12,26**	**1,28**	**0,96**	**0,92**	**0,80**	**0,69**	**0,95**	**1,03**	**1,09**	**1,10**	**1,15**
F. V/P (Top 20)	3,55	15,61	11,84	9,49			12,26	1,18	0,95	0,48			0,94	1,06	1,36		
F. V/P (Top 30)	1,75	15,03	11,74	11,34			**12,26**	**1,19**	**0,94**	**0,63**			**0,95**	**1,06**	**1,29**		
F. V/P (+5Y) (Quintile)	1,79	14,04	12,71	11,49	10,01	11,49	12,26	1,17	1,07	0,92	0,73	0,79	0,99	0,99	1,04	1,15	1,15
F. V/P (+5Y) (Top 20)	-2,34	12,16	11,90	13,71			**12,26**	**0,87**	**0,95**	**0,79**			**1,10**	**1,05**	**1,28**		
F. V/P (+5Y) (Top 30)	0,36	13,70	11,84	12,30			12,26	1,02	0,95	0,74			1,06	1,05	1,24		
F. Target Price / P	2,61	14,38	11,29	10,96	11,49	10,90	**12,26**	**1,10**	**0,91**	**0,87**	**0,92**	**0,75**	**1,04**	**1,03**	**1,06**	**1,02**	**1,17**
F. ROE (Trailing)	0,45	10,88	14,15	11,52	11,55	10,84	12,26	0,60	0,98	0,94	1,10	1,07	1,43	1,20	1,03	0,87	0,79
F. ROE (Forward)	-0,64	11,29	13,10	11,47	11,01	11,44	**12,26**	**0,92**	**1,03**	**0,91**	**0,91**	**0,79**	**1,02**	**1,06**	**1,06**	**1,00**	**1,13**
F. P/E (Trailing)	-2,16	10,80	9,99	12,64	12,71	13,15	12,26	0,78	0,82	1,00	0,99	1,00	1,10	1,00	1,06	1,08	1,08
F. P/E (Forward)	-1,84	10,39	11,57	12,24	11,74	12,58	**12,26**	**0,66**	**0,88**	**1,04**	**0,99**	**0,99**	**1,24**	**1,08**	**0,98**	**0,98**	**1,01**
F. PEG (Trailing)	0,43	11,20	11,58	14,42	11,01	10,91	12,26	0,68	0,89	1,29	0,93	0,85	1,32	1,08	0,93	0,97	1,01
F. PEG (Forward)	-2,65	9,38	11,24	12,60	13,19	12,58	**12,26**	**0,61**	**0,74**	**1,00**	**1,15**	**1,16**	**1,22**	**1,26**	**1,05**	**0,95**	**0,86**
F. P/B (Trailing)	-3,03	8,05	12,86	13,30	13,04	11,73	12,26	0,49	0,85	1,06	1,13	1,17	1,31	1,24	1,05	0,95	0,77
F. P/B (Forward)	-4,83	9,38	11,54	11,13	11,52	14,50	**12,26**	**0,65**	**0,93**	**0,88**	**0,95**	**1,05**	**1,16**	**1,01**	**1,05**	**1,01**	**1,05**
F. EV/EBITDA Historical	-2,71	9,92	12,06	13,16	12,48	12,93	12,26	0,67	0,98	1,12	1,06	0,97	1,20	1,03	0,98	0,99	1,06
F. EV/EBITDA Forward	-2,71	9,92	12,06	13,16	12,48	12,93	**12,26**	**0,67**	**0,98**	**1,12**	**1,06**	**0,97**	**1,20**	**1,03**	**0,98**	**0,99**	**1,06**
F. Mkt Value Size	2,80	14,71	9,58	10,92	10,74	11,79	12,26	1,04	0,74	0,86	0,89	1,01	1,13	1,08	1,05	1,01	1,00

APPENDIX D - Europe - Core Statistics on monthly rebalanced portfolios for sub-periods (95-05), (00-10), (07-10), (10-18)

Sub-period 1995-2005 (EU)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	10,63	20,68	14,03	11,26	9,04	5,81	**8,45**	**1,32**	**0,92**	**0,74**	**0,49**	**0,25**	**0,74**	**0,81**	**0,84**	**1,06**	**1,22**
F. V/P (Top 20)	11,74	20,45	12,31	3,71			8,45	1,19	0,76	0,15			0,74	0,93	1,20		
F. V/P (Top 30)	11,54	20,96	12,23	4,33			**8,45**	**1,25**	**0,75**	**0,18**			**0,72**	**0,93**	**1,19**		
F. V/P (+5Y) (Quintile)	5,73	16,95	14,05	12,95	9,35	8,23	8,45	1,12	0,96	0,83	0,50	0,38	0,78	0,77	0,88	1,07	1,16
F. V/P (+5Y) (Top 20)	0,12	11,40	12,68	7,65			**8,45**	**0,66**	**0,79**	**0,31**			**0,79**	**0,93**	**1,22**		
F. V/P (+5Y) (Top 30)	4,20	12,72	12,94	5,29			8,45	0,76	0,81	0,22			0,84	0,92	1,24		
F. Target Price / P	-10,57	7,79	10,16	11,46	14,05	19,23	**8,45**	**0,36**	**0,64**	**0,72**	**0,85**	**1,02**	**1,12**	**0,89**	**0,89**	**0,89**	**0,96**
F. ROE (Trailing)	4,19	3,74	8,93	9,46	4,36	-0,41	8,45	0,13	0,49	0,57	0,27	-0,02	1,42	1,02	0,84	0,75	0,94
F. ROE (Forward)	-0,92	10,81	14,66	13,04	13,47	11,31	**8,45**	**0,65**	**0,94**	**0,85**	**0,83**	**0,62**	**0,92**	**0,87**	**0,85**	**0,92**	**1,02**
F. P/E (Trailing)	-3,01	9,26	14,02	13,03	12,79	13,17	8,45	0,45	0,83	0,81	0,86	0,81	1,14	0,95	0,91	0,83	0,90
F. P/E (Forward)	3,59	12,97	16,96	12,81	11,35	8,53	**8,45**	**0,64**	**1,13**	**0,93**	**0,76**	**0,42**	**1,12**	**0,78**	**0,74**	**0,86**	**1,09**
F. PEG (Trailing)	11,88	19,61	13,52	12,55	11,10	5,42	8,45	1,01	0,89	0,86	0,71	0,24	1,05	0,79	0,80	0,91	1,19
F. PEG (Forward)	4,22	12,42	16,51	13,58	11,23	8,16	**8,45**	**0,60**	**0,88**	**0,86**	**0,78**	**0,49**	**1,14**	**1,03**	**0,88**	**0,81**	**0,91**
F. P/B (Trailing)	7,47	15,89	15,12	13,25	9,74	8,17	8,45	0,75	0,81	0,83	0,65	0,52	1,15	1,04	0,90	0,84	0,85
F. P/B (Forward)	7,77	18,20	14,37	11,07	11,13	7,87	**8,45**	**0,98**	**0,89**	**0,73**	**0,75**	**0,38**	**0,99**	**0,87**	**0,84**	**0,83**	**1,05**
F. EV/EBITDA Historical	6,99	15,65	14,37	12,59	10,12	6,58	8,45	0,93	0,99	0,90	0,64	0,32	0,91	0,76	0,76	0,89	1,10
F. EV/EBITDA Forward	6,87	12,92	11,57	7,42	1,50	3,25	**8,45**	**0,76**	**0,81**	**0,47**	**0,09**	**0,14**	**0,89**	**0,74**	**0,84**	**0,98**	**1,31**
F. Size	0,68	12,20	13,21	13,91	12,98	10,82	8,45	0,77	0,82	0,87	0,79	0,61	0,86	0,88	0,89	0,95	1,04

Sub-period 2000-2010 (EU)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	8,92	9,22	5,78	4,93	2,95	-0,95	**-2,45**	**0,48**	**0,33**	**0,28**	**0,15**	**-0,04**	**1,02**	**0,98**	**1,00**	**1,10**	**1,25**
F. V/P (Top 20)	8,00	7,63	4,57	-2,12			-2,45	0,34	0,25	-0,09			1,11	1,06	1,23		
F. V/P (Top 30)	7,88	8,05	4,56	-1,47			**-2,45**	**0,38**	**0,25**	**-0,06**			**1,06**	**1,06**	**1,25**		
F. V/P (+5Y) (Quintile)	6,43	7,31	7,18	5,16	2,50	-0,27	-2,45	0,39	0,41	0,29	0,13	-0,01	1,03	0,97	1,02	1,09	1,25
F. V/P (+5Y) (Top 20)	6,31	6,79	4,60	-2,31			**-2,45**	**0,36**	**0,25**	**-0,09**			**0,95**	**1,07**	**1,31**		
F. V/P (+5Y) (Top 30)	7,78	7,42	4,68	-2,34			-2,45	0,39	0,25	-0,10			1,02	1,06	1,33		
F. Target Price / P	-8,57	0,79	4,98	5,37	2,95	7,38	**-2,45**	**0,04**	**0,31**	**0,31**	**0,15**	**0,29**	**0,99**	**0,91**	**0,99**	**1,09**	**1,37**
F. ROE (Trailing)	2,21	2,52	5,33	6,58	5,27	0,89	-2,45	0,09	0,27	0,39	0,32	0,05	1,42	1,10	0,93	0,87	0,94
F. ROE (Forward)	1,26	4,84	5,67	5,73	4,41	3,00	**-2,45**	**0,28**	**0,31**	**0,32**	**0,24**	**0,16**	**0,96**	**1,02**	**1,02**	**1,05**	**1,08**
F. P/E (Trailing)	-2,14	2,40	3,26	5,35	5,61	5,43	-2,45	0,10	0,17	0,29	0,33	0,32	1,33	1,11	1,02	0,95	0,92
F. P/E (Forward)	4,09	3,79	8,30	6,93	3,76	0,52	**-2,45**	**0,16**	**0,44**	**0,44**	**0,24**	**0,03**	**1,36**	**1,03**	**0,88**	**0,88**	**0,97**
F. PEG (Trailing)	9,02	6,61	6,13	6,56	4,42	-1,73	-2,45	0,27	0,34	0,40	0,27	-0,09	1,37	1,00	0,92	0,93	1,11
F. PEG (Forward)	1,17	3,95	4,82	3,63	5,52	3,69	**-2,45**	**0,17**	**0,21**	**0,20**	**0,37**	**0,23**	**1,31**	**1,30**	**1,04**	**0,83**	**0,90**
F. P/B (Trailing)	1,23	4,62	4,70	3,52	4,10	4,69	-2,45	0,18	0,21	0,20	0,26	0,30	1,42	1,25	0,98	0,87	0,86
F. P/B (Forward)	4,90	6,32	3,96	5,62	5,31	2,00	**-2,45**	**0,26**	**0,21**	**0,33**	**0,35**	**0,12**	**1,35**	**1,06**	**0,97**	**0,84**	**0,89**
F. EV/EBITDA Historical	11,57	9,87	9,32	8,82	3,67	-2,01	-2,45	0,53	0,54	0,55	0,22	-0,10	1,04	0,95	0,90	0,94	1,07
F. EV/EBITDA Forward	8,42	9,62	8,48	6,93	2,02	0,19	**-2,45**	**0,49**	**0,50**	**0,42**	**0,11**	**0,01**	**1,05**	**0,94**	**0,94**	**0,99**	**1,23**
F. Size	4,37	5,79	6,21	6,41	3,81	1,19	-2,45	0,32	0,34	0,35	0,21	0,07	1,02	1,00	1,04	1,04	1,04

Sub-period 2007-2010 (EU)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	-2,34	-7,34	-1,87	-0,58	1,12	-5,13	**-8,20**	**-0,28**	**-0,08**	**-0,02**	**0,05**	**-0,21**	**1,17**	**1,04**	**1,09**	**1,08**	**1,16**
F. V/P (Top 20)	-0,21	-9,86	-2,12	-9,39			-8,20	-0,32	-0,09	-0,36			1,34	1,10	1,15		
F. V/P (Top 30)	0,77	-9,60	-1,73	-10,41			**-8,20**	**-0,34**	**-0,07**	**-0,41**			**1,23**	**1,10**	**1,17**		
F. V/P (+5Y) (Quintile)	-0,03	-5,41	-1,10	-3,08	1,33	-5,69	-8,20	-0,21	-0,05	-0,13	0,06	-0,22	1,16	1,09	1,07	1,03	1,20
F. V/P (+5Y) (Top 20)	9,14	0,92	-2,67	-8,68			**-8,20**	**0,04**	**-0,11**	**-0,33**			**1,03**	**1,11**	**1,16**		
F. V/P (+5Y) (Top 30)	8,62	0,82	-2,64	-8,01			-8,20	0,03	-0,11	-0,30			1,11	1,10	1,22		
F. Target Price / P	-2,51	-0,70	-0,13	-2,26	-6,58	-4,22	**-8,20**	**-0,04**	**-0,01**	**-0,10**	**-0,26**	**-0,12**	**0,86**	**0,90**	**1,04**	**1,17**	**1,55**
F. ROE (Trailing)	4,92	-2,84	-3,49	-1,27	-0,89	-5,66	-8,20	-0,09	-0,14	-0,06	-0,04	-0,28	1,45	1,20	1,00	0,94	0,93
F. ROE (Forward)	5,32	2,73	-3,34	-2,85	-3,98	-3,11	**-8,20**	**0,13**	**-0,14**	**-0,13**	**-0,16**	**-0,14**	**0,95**	**1,09**	**1,06**	**1,12**	**1,06**
F. P/E (Trailing)	-1,66	-3,81	-4,91	-2,26	-1,09	-1,20	-8,20	-0,13	-0,20	-0,10	-0,05	-0,06	1,35	1,18	1,05	1,01	0,92
F. P/E (Forward)	0,18	-3,41	-1,03	-2,28	-2,51	-2,05	**-8,20**	**-0,11**	**-0,04**	**-0,11**	**-0,14**	**-0,11**	**1,41**	**1,18**	**1,00**	**0,85**	**0,84**
F. PEG (Trailing)	-1,31	-7,37	-3,15	0,60	1,28	-4,55	-8,20	-0,23	-0,13	0,03	0,07	-0,21	1,48	1,10	1,00	0,90	1,01
F. PEG (Forward)	0,38	-2,07	-4,17	-5,34	-0,93	-1,05	**-8,20**	**-0,08**	**-0,13**	**-0,22**	**-0,05**	**-0,06**	**1,25**	**1,44**	**1,15**	**0,84**	**0,85**
F. P/B (Trailing)	-2,08	-5,65	-1,83	-4,33	-0,21	-1,66	-8,20	-0,18	-0,06	-0,20	-0,01	-0,09	1,40	1,40	1,01	0,84	0,88
F. P/B (Forward)	-1,76	-3,70	-6,32	-0,94	-0,64	-0,32	**-8,20**	**-0,11**	**-0,26**	**-0,04**	**-0,03**	**-0,02**	**1,51**	**1,13**	**1,02**	**0,85**	**0,79**
F. EV/EBITDA Historical	7,77	1,91	0,76	4,12	-0,82	-5,23	-8,20	0,08	0,03	0,19	-0,04	-0,24	1,08	1,04	0,97	0,87	0,98
F. EV/EBITDA Forward	-0,13	-2,62	2,67	2,15	-0,79	-2,64	**-8,20**	**-0,11**	**0,12**	**0,10**	**-0,04**	**-0,11**	**1,11**	**1,04**	**0,99**	**0,92**	**1,11**
F. Size	5,26	-0,40	-0,94	-0,01	-4,54	-5,27	-8,20	-0,02	-0,04	-0,00	-0,20	-0,24	1,07	1,04	1,09	1,09	1,02

Sub-period 2010-2018 (EU)

		Universe Return						Sharpe Ratio					Beta				
Factor	F1-FN	1	2	3	4	5	Benchmark Return	1	2	3	4	5	1	2	3	4	5
F. V/P (Quintile)	1,95	9,11	9,03	8,34	6,41	6,74	**3,30**	**0,75**	**0,73**	**0,69**	**0,52**	**0,53**	**0,91**	**0,96**	**0,95**	**0,95**	**0,94**
F. V/P (Top 20)	1,93	9,00	7,97	6,05			3,30	0,59	0,67	0,38			0,97	0,94	1,04		
F. V/P (Top 30)	0,82	8,71	7,94	7,17			**3,30**	**0,61**	**0,66**	**0,48**			**0,97**	**0,94**	**0,98**		
F. V/P (+5Y) (Quintile)	2,40	10,00	8,11	7,69	7,21	6,78	3,30	0,93	0,68	0,63	0,56	0,48	0,81	0,93	0,95	1,00	1,04
F. V/P (+5Y) (Top 20)	3,44	8,93	8,11	3,53			**3,30**	**0,72**	**0,68**	**0,19**			**0,82**	**0,94**	**1,21**		
F. V/P (+5Y) (Top 30)	1,23	8,77	8,03	6,26			3,30	0,74	0,67	0,38			0,82	0,94	1,11		
F. Target Price / P	4,12	11,32	8,97	7,82	6,92	5,14	**3,30**	**1,08**	**0,79**	**0,64**	**0,54**	**0,30**	**0,73**	**0,86**	**0,94**	**0,99**	**1,21**
F. ROE (Trailing)	-1,33	5,88	8,51	8,56	9,26	7,78	3,30	0,33	0,63	0,75	0,90	0,82	1,30	1,05	0,89	0,79	0,69
F. ROE (Forward)	1,73	8,72	8,54	8,44	8,82	5,97	**3,30**	**0,84**	**0,72**	**0,72**	**0,71**	**0,40**	**0,77**	**0,91**	**0,91**	**0,96**	**1,10**
F. P/E (Trailing)	-4,47	5,21	5,77	8,89	9,94	10,18	3,30	0,35	0,46	0,73	0,83	0,92	1,08	0,97	0,95	0,92	0,81
F. P/E (Forward)	-1,51	7,17	6,67	7,93	9,74	8,93	**3,30**	**0,49**	**0,52**	**0,67**	**0,90**	**0,78**	**1,07**	**0,99**	**0,91**	**0,82**	**0,85**
F. PEG (Trailing)	-0,72	7,26	7,11	8,12	8,88	8,38	3,30	0,42	0,55	0,71	0,83	0,78	1,27	0,99	0,88	0,81	0,78
F. PEG (Forward)	-4,31	4,07	7,06	9,13	10,60	9,04	**3,30**	**0,27**	**0,50**	**0,77**	**0,96**	**0,88**	**1,10**	**1,08**	**0,92**	**0,83**	**0,79**
F. P/B (Trailing)	-5,01	2,95	8,30	8,89	10,89	8,75	3,30	0,18	0,60	0,75	1,03	0,88	1,19	1,06	0,92	0,80	0,76
F. P/B (Forward)	-4,32	5,78	6,93	7,54	9,40	10,56	**3,30**	**0,36**	**0,55**	**0,63**	**0,83**	**1,01**	**1,16**	**0,98**	**0,92**	**0,86**	**0,73**
F. EV/EBITDA Historical	0,04	8,88	6,65	9,38	9,84	8,92	3,30	0,65	0,52	0,87	0,92	0,80	1,03	1,00	0,83	0,78	0,81
F. EV/EBITDA Forward	-1,96	8,64	7,29	8,07	9,87	10,97	**3,30**	**0,60**	**0,59**	**0,71**	**0,91**	**1,00**	**1,08**	**0,96**	**0,88**	**0,81**	**0,80**
F. Size	2,31	8,76	9,58	7,82	8,40	6,24	3,30	0,70	0,81	0,67	0,67	0,52	0,94	0,88	0,90	0,98	0,96

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