Data Analytics for Finance Final Project

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Signal: Net Equity Payout

1. OVERVIEW

The information that affects stock prices can be broken down in several ways. One decomposition can be tangible and intangible information. Information regarding a company's past and present performance that is mentioned in its accounting statements is referred to as tangible information, because such information is relatively concrete. All the other information, we refer to as intangible information.

This decomposition is useful for helping us think about empirical regularities discussed before. Previous theories of the reversal and book-to-market effect have emphasized the notion that stock returns are inversely related to past performance, or, in the case of behavioural explanations, that focus on the idea that investors overreact to information about a firm's recent performance.

However, Daniel and Titman empirical evidence is incosistent with these explanations. Specifically, they discover no meaningful correlation between historical performance metrics and future stock returns. Rather they find that the book-to-market and reversal effects arise because future returns are related to past realizations of intangible information, that is, to that component of past returns that cannot be explained by tangible information about the past.

In addition, they investigate the relation between a firm's composite issuance and its future stock returns. The composite issuance is probably connected to the realization of intangible information for at least two reasons. The first is that managers are likely to issue equity to fund growth opportunities, and the second is that managers are more likely to issue equity after a decline in the perceived cost of equity.

Empirically, Daniel and Titman find that composite issuance is strongly negatively related to future returns, even after controlling for past intangible returns. This offer additional proof that the realization of intangible information is negatively correlated with future profits.

The net equity payout signal is constructed as follow:

$$log\left(\frac{RI*t}{RI*t-12}\right) - log\left(\frac{ME*t}{ME*t-12}\right)$$

[1] Kent Daniel and Sheridan Titman, Market Reacion to Tangible and Intangible Information (The journal of finance, August 2006)

This formula represents cumulative returns minus change in market equity, can also be written as:

$$\frac{share\ issuance - \ total\ cash\ dividends - \ share\ buybacks}{Met * t - 12}$$

Daniel and Titman find that firms are more likely to issue equity and less likely to repurchase shares following periods in which their stock prices perform well relative to their earnings. In other words, the issuance and repurchase of choices tend to be related to past realizations of what we describe as intangible information.

As Paul Asquith and David Mullins said, equity issues reduce stock prices. The percentage reduction in stock price is small, but the aggregate loss in market value is a large fraction of the funds raised in the offering. There are several possibile explanations for the negative stock price impact of equity issues. One could be that investor's fear that management's willingness to sell a large fraction of the firm's equity reflects their assesment that stock price is especially favorable relative to their superior information. The variability of the negative market reaction to equity issues trough time and across firms reflects the varying information content of equity decision. Negative reactions to secondary distributions and insider sales suggest that whether managers sell equity for their own account or for the firm's account, investors are concerned about the implications of the decision.

Overall, the findings mentioned before, explain firms self-imposed equity capital rationing. The desire to avoid negative information impact of having to go to the equity market for funds (or decreasing dividends) encourages firms to limit their growth and investment to that sustainable with internally generated equity funds. This explains why so many firms use the sustainable growth paradigm as an integrative planning framework in determining financial policies.

The ENP signal can be used in value investing because investor seek to buy stocks that are undervaluated by the market and have the potential for future price appreciation. The ENP signal can be utilized as a screening tool to identify undervalued companies that have history of returning capital to shareholders trough dividends and share buybacks. Companies with low ENP ratios may be undervalued by the market, as the market may not be fully pricing the company's strong fundamentals and financial strength. However, the ENP signal does not consider other important factors such as a company's growth prospects, industry trends, or macroecronomic conditions. Additionally, companies may sometimes use share buybacks to boost their stock price in shor term, even if is not a good use of capital in the long term.

[1] Kent Daniel and Sheridan Titman, Market Reacion to Tangible and Intangible Information (The journal of finance, August 2006)
[2]Armen Hovakimian, Tim Opler and Sheridan Titman (The Journal of Financial and Quantitative Analysis, March 2001)
[3]Paul Asquith and David W. Mullins, Jr., Signalling with Dividends, Stock Repurchases, and Equity Issues (Financial Management, 1986)

2. STRATEGY ANALYSIS

This section explores how long, and long-short strategies can be useful to evaluate net equity payout signal. The goal is to offer a formal framework for evaluating the signal's viability and robustness when used in investment strategies. Investors can assess the effectiveness of signals and their capacity to spot stocks with an upward price potential and outperform the market or benchmarks by using long and long-short strategies. These approaches provide information on risk reduction, consistency across market situations, and signal success criteria.

2.1 Construct the strategy

The strategy involves sorting stocks into terciles based on the net equity payout signal, with the bottom tercile representing stocks with the worst expected performance and the top tercile consisting of stocks with the best expected performance. Additionally, two specific strategies, a long-only (that is long the top portfolio) and a long-short strategy (that is long the top portfolio and short the bottom portfolio), are implemented to assess the performance of the signal. The study covers the period from 2000 to 2020 and analyzes returns of portfolios constructed based on the net equity payout signal. The risk-free rate is used as a benchmark for comparison. Moreover, to achieve consistent risk levels across the portfolios, a constant leverage was applied, resulting in an annualized volatility of 10% over the full sample period. This approach ensures standardized risk exposures and enables a focused analysis of the portfolios' performance in generating returns. By maintaining a consistent level of risk using constant leverage, the comparative analysis provides valuable insights into the effectiveness of the portfolios in a controlled risk environment.

2.2 Performance Analysis

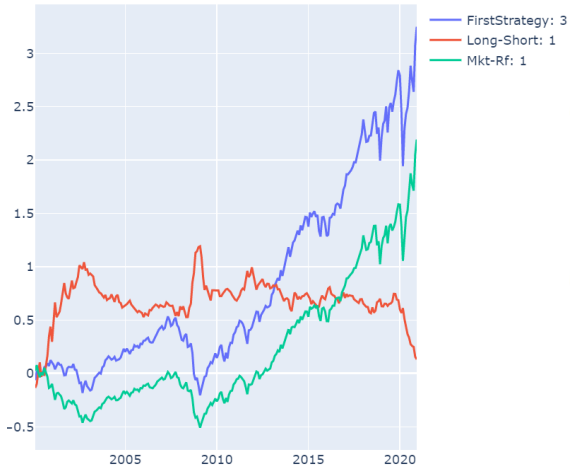

Figure 1. *Cumulative Return*

Figure 2. *Cumulative Return (10% vol.)*

On ***Figure 1.*** we find that from 2000-2013, the long-short portfolio showcased its effectiveness by generating superior cumulative returns. The strategy's ability to capitalize on both upward and downward market movements through long and short positions contributed to its outperformance. This period likely saw favorable market conditions for the long-short strategy, enabling it to identify securities that outperformed the market and exploit opportunities for profit. However, as the sample progressed into the second half (2013-2020), the long-only portfolio experienced an upward trajectory in performance. This period witnessed a shift where the long-only strategy started to outshine the long-short approach. The long-only portfolio displayed improved returns, indicating its ability to capture positive market movements and benefit from sustained upward trends.

Net equity payout, which includes share issuances, dividends, and share buybacks, can reflect a company's financial health and management's confidence in future prospects. In the first sample period (2000-2013), the net equity payout signal may have been more effective in identifying undervalued or attractive investment opportunities. This could have contributed to the long-short portfolio's outperformance, as investors may have responded positively to companies with favorable net equity payout metrics. Market conditions can evolve over time, leading to a change in the relationship between net equity payout and stock returns. In the second sample period (2013-2020), factors such as economic shifts, regulatory changes, or shifts in investor preferences could have influenced market dynamics. These changes may have reduced net equity payout signal effectiveness, causing the long-short strategy to lose its advantage in identifying profitable positions. As the market becomes more efficient, it becomes increasingly challenging to generate excess returns based on any single signal, including net equity payout. In the later period of the sample, increased market efficiency might have diminished the predictive power of the net equity payout signal, leading to decreased performance for the long-short portfolio. The performance of the long-short portfolio could also be influenced by company-specific factors. Changes in the financial condition or business prospects of individual companies within the portfolio could have affected the effectiveness of the net equity payout signal. Negative developments or challenges faced by specific companies may have led to diminished returns in the long-short strategy.

In the analysis incorporating a 10% leverage in the cumulative return (***Figure 2.***), we observed similar conclusions to those derived from the unleveraged cumulative return (***Figure 1.***). However, an observation emerges when comparing the two figures. Specifically, in instances where unlevereaged cumulative return reflects high or low returns, leveraged cumulative return exhibits even higher or lower returns, respectively. This suggests that the application of leverage amplifies the magnitude of returns, further accentuating the performance dynamics observed in the unleveraged analysis.

2.3 Summary statistics

These tables present summary statistics for the long-short, long-only and value weighted market return strategies, analyzing the performance for the first half (2000-2010), second half (2011-2020), and full sample (2000-2020).

Table 1. *Summary statistics: Long-only and Long-short portfolios*

	Average annualized excess return	Annualized Sharpe ratio	Alpha	t-statistic	Information ratio
Long-only					
Full sample	0,082	0,581	0,001	2,030	0,129
First half	0,0399	0,273	0,002	1,866	0,163
Second half	0,131	0,959	-0,0005	-0,921	-0,087
Long-short					
Full sample	0,014	0,109	0,003	1,947	0,124
First half	0,062	0,400	0,005	1,703	0,149
Second half	-0,037	-0,432	0,000	0,010	0,0009

Table 2. *Summary statistics: Value weighted market portfolio*

	Average annualized excess return	Annualized Sharpe ratio
Market portfolio		
Full sample	0,07	0,445
First half	0,004	0,027
Second half	0,147	1,028

The long-only strategy demonstrates relatively consistent risk-adjusted performance, as evidenced by a Sharpe Ratio of 0.581, indicating attractive risk-adjusted returns. The t-statistic of 2.030 confirms statistical significance. The information ratio of 0.129 indicates positive risk-adjusted performance relative to the benchmark. In the first half of the sample, the long-only strategy exhibited a low Sharpe Ratio of 0.273, the t-statistic is statistically significant at 1.866, supporting the observed performance. The information ratio also increased to 0.163, signifying improved risk-adjusted performance. However, in the second half, the long-only strategy experienced a significant boost in performance, with a higher Sharpe Ratio of 0.959. The alpha turned slightly negative at -0.0005, suggesting potential underperformance.

The long-short strategy displayed variations in performance. It had a lower Sharpe Ratio of 0.109, indicating more moderate risk-adjusted returns. The positive alpha of 0.003 suggests slight outperformance, and the t-statistic of 1.947 indicates statistical significance. The information ratio of 0.124 denotes positive risk-adjusted performance. During the first half, the long-short strategy demonstrated a Sharpe Ratio of 0.400 and an alpha of 0.005. The t-statistic remained significant at

1.703, while the information ratio increased to 0.149, reflecting enhanced risk-adjusted performance. During the second half of the sample period, the market risk-free rate surpassed the returns generated by the long-short portfolio, explaining the negative sharpe ratio obtained in the second half by the long short portfolio. This highlighted the attractiveness of investing in the market, which offered relatively higher returns with lower risk compared to the portfolio. The favorable risk-return profile of the market further support the decision to allocate resources to market investments during this period, capitalizing on the advantageous risk-reward trade-off. In summary, the analysis of the long-only and long-short strategies reveals consistent risk-adjusted performance for the long-only strategy throughout the sample period. The long-short strategy exhibits variations in performance, with improved results in the first half and a decline in the second half.

3. STRATEGY AS A PART OF DIVERSIFIED PORTFOLIO

This section presents an analysis of a new investment strategy utilizing the mean variance efficient tangency portfolio for both a long-only and long-short approach, combined with Vanguard Total Stock Market ETF and the Vanguard Total Bond Market ETF. The study incorporates along with a 60/40 portfolio as a benchmark for comparison (60% weight on VTI and 40% weight BND). The comparison between this strategy and the first one highlights the differences in risk and returns characteristics between the two strategies, helping investors understand the potential benefits/disadvantages of the new approach. The analysis of the mean variance efficient tangency portfolio allows investors to determine the optimal allocation of assets within their portfolio. By considering risk and return characteristics of different assets, this analysis assists in achieving a balance that maximizes returns for a given level of risk. It helps investors make informed decision about how much to allocate to each asset, aiming to enhance portfolio performance.

3.2 Performance Analysis

Figure 3. *Cumulative Return*

Figure 4. *Cumulative Return (10% vol.)*

Figure 3. The analysis reveals distinct performance patterns among the three portfolios. The long-short strategy and the 60/40 allocation strategy demonstrate robust performance, with average annualized excess returns of 0.112 and 0.098, respectively. These portfolios outperformed the risk-free rate significantly. Interestingly, the long-short strategy and the 60/40 allocation exhibit synchronized behavior, with their performance patterns closely aligned. When one portfolio experiences an upward movement, the other tends to exhibit a similar trend. This synchronization indicates the presence of a common factor influencing their performance, potentially related to the impact of market-wide factors on both long and short positions, as well as equities and bonds.

In contrast, the long-only strategy, despite including the same ETFs as the other two portfolios, remained below the long-short and 60/40 portfolios over the entire period. It yielded an average annualized excess return of 0.043, which was lower than the other two strategies. The underperformance of the long-only strategy, despite the inclusion of the mean variance efficient tangency portfolio, suggests the need for further refinement. Exploring additional signals or incorporating supplementary indicators may help bridge the performance gap with the long-short and 60/40 portfolios.

This suggests that relying solely on the net equity payout signal, even with the inclusion of the mean variance efficient tangency portfolio, may not be sufficient to generate superior returns compared to the 60/40 and long short strategies.

Figure 4. The analysis reveals interesting observations regarding the impact of leverage on portfolios cumulative returns. For the long-short and 60/40 allocation strategies, the cumulative returns with leverage and without leverage are almost identical. The graphs representing these portfolios also exhibit similar patterns. This can be attributed to the balanced exposure of both long and short positions, as well as the diversification across equities and bonds, which help mitigate the effects of leverage on the overall performance. The leverage is effectively applied to both the long and short sides of the portfolio, resulting in similar cumulative returns and a consistent performance pattern.

In contrast, the leveraged long-only strategy demonstrates significantly better performance than its non-leveraged counterpart. With the application of leverage, the long-only portfolio achieves higher cumulative returns compared to the other leveraged portfolios. This can be explained by the nature of the net equity payout signal used for portfolio construction. The net equity payout signal, combined with the leverage, enhances the potential returns of the selected stocks in the long-only strategy. The focused exposure on long positions allows for greater amplification of the positive returns generated by the selected stocks, leading to improved performance. The results emphasize the importance of considering the specific characteristics of the signal and the portfolio construction approach when incorporating leverage.

3.3 Summary statistics

The provided data showcases the annualized average excess returns and Sharpe ratios for the three portfolios mean variance efficient strategies without leverage: long-only, long-short, and 60/40 allocation.

	Average annualized excess return	Annualized Sharpe ratio
Long-only	0,043	0,013
Long-Short	0,112	0,011
60-40	0,098	0,011

Table 3. *Summary statistics: Long-only, Long-short, 60-40*

The long-only strategy exhibits an annualized average excess return of 0.043 and a Sharpe ratio of 0.013. The positive excess return indicates that this strategy generates returns above the risk-free rate, although the average excess return is relatively modest. In contrast, the long-short strategy demonstrates a higher annualized average excess return of 0.112, indicating a more substantial outperformance compared to the risk-free rate. However, the Sharpe ratio for the long-short strategy is 0.011, indicating a relatively lower risk-adjusted return compared to the long-only strategy. This could imply that the long-short strategy takes on higher levels of risk to achieve its excess returns. The 60/40 allocation strategy exhibits an annualized average excess return of 0.098, which is also relatively higher compared to the risk-free rate. However, the Sharpe ratio for this strategy is the same as the long-short strategy, indicating a similar level of risk-adjusted return. Overall, the long-short and 60/40 allocation strategies exhibit higher annualized average excess returns compared to the long-only strategy.

4. CONCLUSION

In conclusion, our analysis indicates that the long-only strategy (as a stand-alone investment), performed well in comparison to the market. This suggests that relying solely on the net equity payout signal can yield favorable results. On the other hand, our long-short portfolio, incorporating the mean variance efficient approach and utilizing ETFs, demonstrated a good annualized excess return, but with a Sharpe ratio relatively close to 0, suggesting a lower risk-adjusted return. It can be concluded that the net equity payout signal holds promise as a valuable tool in investment strategies. However, further research and refinement of the net equity payout signal and its integration within portfolio construction techniques can contribute to a deeper understanding of its effectiveness and potential benefits.