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MGT 252: Final Stocktrak Project

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1) Strategy

- i. The Stocktrak project rules promise the 10% bonus to the top three teams at the end of the trading period. If your goal is to maximize the probability that you will be among the top three teams by the end of the trading period, should your strategy deal primarily with high-beta stocks or low-beta stocks? Does the answer to this question change depending on whether you expect the market to go up or go down?

Considering our anticipation of a bullish market, particularly around Q4 result announcements, our strategy focused on maximizing returns during periods of heightened volatility. This involved primarily dealing with high-beta stocks. High-beta stocks tend to exhibit more significant price movements, aligning to achieve higher returns in a bullish market. The strategy aimed to capitalize on the potential for substantial stock movement, especially around earnings announcements where volatility is pronounced.

In a bullish market scenario, high-beta stocks are more responsive to market fluctuations, offering the potential for larger price swings. This approach increased the likelihood of securing a top position in the Stocktrak project.

Additionally, our strategic timing aligned with the broader market trends. The S&P 500 index reached its all-time high and consistently surpassed its records in the last few weeks. We adeptly timed the market, capitalizing on the prevailing bullish momentum, contributing significantly to our ability to achieve the 1st position.

It's crucial to acknowledge the associated risks. High-beta stocks come with increased volatility and greater exposure to market fluctuations. If the market were to unexpectedly turn bearish, these stocks could experience more significant declines. However, due to our extensive research on most of the securities that we buy had a positive movement.

It underscores the importance of considering risk and return dynamics, with the flexibility to adjust the strategy based on evolving market conditions.

- ii. Suppose that you have to hold at least 10 stocks and at most 50 stocks in your portfolio, and you are still trying to maximize the probability that you will be among the top three teams by the end of the trading period. What is the optimum number of stocks you need to hold in the portfolio? Would you prefer to have their returns highly correlated or uncorrelated? (Hint: Think about the effect of diversification on portfolio variance).

Our strategic approach was meticulously crafted to navigate the complexities of the market, particularly centered around dynamic equity and options positions strategically timed around Q4

announcements. To optimize our portfolio within the constraints of holding at least 5 and at most 16, we maintained a delicate balance.

In alignment with our strategy, we typically held more than 10 positions, ensuring diversification to mitigate risks effectively. This nuanced approach allowed us to capitalize on market opportunities while minimizing exposure to specific stock or sector risks. The decision to exceed 10 positions was deliberate, focusing on achieving an optimal risk-return profile.

Regarding the correlation of returns, our strategy embraced a mix of correlated and uncorrelated stocks. While some correlation was sought to leverage market trends, for example, we went for a call option on three of the correlated stocks namely NVIDIA, SMCI, and AMD which turned out to be in our favor also incorporating uncorrelated assets played a crucial role in enhancing diversification and reducing overall portfolio risk. This careful balance aimed to achieve an optimum number of stocks that maximized the probability of being at the top by the end of the trading period.

our optimized portfolio structure involved strategically holding more than 10 stocks, with a thoughtful blend of highly correlated and uncorrelated returns. This approach was tailored to strike the right balance between risk and reward, considering the impact of diversification on portfolio variance.

iii. The Stocktrak project rules also promise the 3% bonus for the best performance in each of the three three-week intermediate periods and the 10% bonus if you beat the passive portfolio at the end of the trading period. You consider working with either Google stock or call options on Google stock. When would you lean more towards options: during the first three weeks or during the last three weeks? How your answer will differ depending on whether you are currently beating the passive portfolio? How your answer will differ depending on whether you expect the market to go up or go down?

At the project's inception, our strategy predominantly involved equity positions. However, we had a deliberate plan to transition to options after observing market dynamics for the initial week, gauging the prevailing trend, and formulating a focused approach around Q4 announcements. This strategic shift allowed us to concentrate on options positions, acknowledging the associated risks and aligning our efforts to capitalize on the opportunities presented.

During the initial weeks, our approach was cautious, focusing on equity to assess market conditions. As we surpassed the passive portfolio's performance in the second week, our strategy evolved towards a more assertive stance. This transformation was marked by an increased emphasis on options trading, driven by the identified opportunities and our unwavering motivation to secure the top position.

In the first three weeks, we would lean towards taking call options on Google. Despite the initial risk, the allure of substantial rewards motivated this decision. This aligns with our proactive strategy of embracing calculated risks to maximize returns.

Additionally, our approach to working with Google stock or call options would be influenced by market expectations. In a bullish market, leaning towards call options, especially in the first three weeks, could be advantageous. Conversely, in a bearish market scenario, a more balanced or defensive strategy, possibly favoring holding the stock, might be contemplated.

In essence, our strategy exhibited adaptability, transitioning from a cautious start with equity to an assertive posture with options, influenced by project performance and market dynamics.

iv. Suppose Toyota announces unexpectedly large bad earnings for the second quarter of 2023 and you decide to short the stock after the announcement. What does the 1 EMH say about whether it is a smart move? What anomaly we studied in the course would suggest otherwise?

In the context of the Efficient Market Hypothesis (EMH), if Toyota announces unexpectedly large bad earnings for the second quarter of 2023, the EMH suggests that the information is promptly incorporated into the stock price. According to the EMH, attempting to profit by shorting the stock after the announcement might not be a smart move, as the market efficiently processes and reflects such information without providing a consistent opportunity for above-average returns.

However, introducing a Behavioral Finance perspective acknowledges that market participants may not always act rationally, influenced by emotions and cognitive biases. In the case of Toyota's unexpectedly bad earnings, if investors overreact or underreact due to behavioral biases, a temporary mispricing of the stock might occur, creating a potential profit opportunity. This behavioral departure from rationality could justify a short-term trading strategy, aligning with the anomalies studied in the course.

Moreover, if the decision to short Toyota was made before the earnings announcement, considering that the information and analysis weren't disseminated to others, it could be viewed as a more strategic move. In this scenario, the EMH may still suggest that the market efficiently processes available information, but the practicality of information dissemination and market efficiency might not align perfectly. Therefore, shorting the stock before the earnings announcement could be perceived as a relatively better idea, capitalizing on information asymmetry and the delayed reaction of the broader market.

- v. Describe your best and your worst move during the eleven weeks of trading. What were the reasons of the gain/loss?

In our most successful move during the eleven weeks of trading, we strategically positioned ourselves just before NVIDIA's earnings announcement. Rigorous research and a nuanced understanding of stock correlations allowed us to accurately predict NVIDIA's strong earnings performance. Further expanding our analysis to include similar chip-making companies like SMCI and AMD, we tactically entered call option positions, each yielding gains exceeding 50%.

On the flip side, our less favorable move stemmed from the belief that information about the surge in Bitcoin and other cryptocurrencies had not yet permeated the market. Expecting a substantial stock movement due to increased cryptocurrency adoption, we ventured into call options, resulting in a significant loss of 63%.

Throughout our trading journey, we gained insights into the limitations of relying solely on analyst ratings. We discovered that these ratings were often not as useful as anticipated and sometimes carried biases that influenced decision-making. This realization prompted us to reassess our approach, emphasizing a more comprehensive and data-driven decision-making process in subsequent trades.

2) Performance Evaluation

- i. Retrieve the data and submit the Excel file with the data by e-mail. To check if you are retrieving the right things, on January 23, 2017 (which is outside of the sample period you need) S&P 500 closed at 2,265.20, and the 3-month Treasury bill yield stood at 0.51% per year.

Submitted via Email

- ii. Estimate the market model for your portfolio. What are the alpha of your portfolio and the appraisal ratio? Provide the economic interpretation of the two ratios.

The market model for the portfolio is

$$\text{Portfolio Return} - \text{Risk Free Rate Return} = 1.90 + 2.77 (\text{Market Return} - \text{Risk Free Rate Return})$$

$$\text{Appraisal Ratio} = \text{Alpha} / \text{Standard Deviation of CAPM Residual} = 0.176207 = 0.18$$

The Alpha and Appraisal Ratio are both measures used in finance. Alpha is the excess return we get from the market, and the Appraisal ratio is the risk-adjusted measure of the portfolio's excess return. If alpha is positive, we are beating the CAPM; if alpha is negative, we are underperforming. The economic interpretation of the two ratios is given below:

Alpha: Alpha measures a portfolio's excess return relative to its expected return. An alpha of 1.90 indicates that the portfolio has outperformed its expected return by approximately 1.90 %. This excess return has added value beyond expected based on the portfolio's exposure to market risk.

Appraisal Ratio: The Appraisal Ratio is a risk-adjusted measure of the excess return of a portfolio relative to a benchmark, similar to alpha but adjusted for tracking error. A ratio of 0.18 suggests that the portfolio's excess return is 0.18 for each unit of risk taken when adjusted for tracking error.

- iii. Compare the performance of your portfolio with historical performance of Fidelity Freedom 2030 fund using the alpha and the appraisal ratio.

Portfolio Ratios:

$$\text{Alpha} = 1.894037 \%$$

$$\text{Appraisal Ratio} = 0.176207$$

Fidelity Freedom 2023:

$$\text{Alpha} = 0.05\%$$

$$\text{Appraisal Ratio} = 0.075$$

The alpha and appraisal ratios are performance metrics used to assess the risk-adjusted returns of a portfolio or fund.

Alpha measures a portfolio's excess return. Our portfolio has a significantly higher alpha, 1.894037%, compared to the Fidelity Freedom 2030 Fund's 0.05%. A higher alpha indicates that our portfolio

performed better than Fidelity Freedom 2030 in generating returns that were higher than expected based on the market.

The appraisal ratio is another measure of risk-adjusted performance, taking into account both systematic and unsystematic risk. Our portfolio has a higher appraisal ratio, 0.140063, compared to the Fidelity Freedom 2030 Fund, 0.075. A higher appraisal ratio shows that our portfolio is achieving better risk-adjusted returns than Fidelity Freedom 2030.

iv. Is your portfolio significantly riskier than Fidelity Freedom (assume that the beta of Fidelity Freedom 2030 is constant, i.e. it is just a number)? Is it more actively managed (look at R-squares)?

The beta coefficient measures a portfolio's sensitivity compared to the market. A beta greater than 1 shows higher volatility or risk than the market, while a beta less than 1 shows lower volatility.

My portfolio Beta = 2.77

Fidelity Freedom 2030 Beta = 0.87

Our portfolio's beta is greater than 1, which is 2.77. This means that our portfolio is more sensitive or riskier than the market and is expected to be more volatile. Meanwhile, Fidelity Freedom has a beta of 0.87, which shows lower volatility than the market.

Yes, we can say that our portfolio is significantly riskier than Fidelity Freedom in terms of market sensitivity and volatility.

R square of our portfolio is 0.176741

In your case, the R-squared value is 0.1767, which is relatively low. A low R-squared means that only a small percentage of the portfolio's variability can be explained by the benchmark returns. This may imply that the portfolio is not closely tracking the benchmark and is less dependent on its performance.

So, with our R square value we can say that our portfolio is less actively managed. A low R-squared indicates a lower correlation with the benchmark, which means that a potential active management approach is needed for our portfolio.

v. Compute and interpret the M2 measure and the Treynor ratio for your portfolio

$M2 = 0.195919199 = 0.196$

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Treynor Ratio (Tfund) = $0.885519772 = 0.886$

The market portfolio makes 0.232- the M2 measure of the fund is $0.196\% - 0.232\% = -0.0355\%$

If we are ready to take the market volatility, we lose the market return by 3.55 bp per month if we go with our portfolio (and the risk-free asset).

A Treynor Ratio of 0.886 indicates the excess return per unit of systematic risk (beta).

The benchmark to compare TF against is the excess return to the market: $0.232\% - 0.039\% = 0.193\%$

Treynor Ratio beats it, so our portfolio is better than the market: with the market, we get 19.30 bp per month for each unit of beta, and our portfolio, we get 88.60 bp per month for each unit of beta.

vi. Go to the website of Kenneth French and download the data on the daily returns to SMB, HML, and the momentum factor (unfortunately the data is available only for January, so for the next three questions limit your sample to April only). Add these data to the Excel file you submit by e-mail.

Submitted via Email

vii. Compute the correlation between returns to your portfolio and the returns to the momentum factor. Does it look like you were ignoring or even shorting past losers in January?

Correlation = -0.024936679. Comparing the momentum factor to our reserves, we can conclude that we were likely ignoring the past losers in January.

viii. Redo (ii) using the data from January only. Given the result in (vii), does it look like the alpha overestimates or underestimates your stock-picking ability? Give two variants of the answer: using the historical evidence on the profitability of the momentum strategy and using the performance of this strategy in January.

Our alpha is positive and aligns with historical evidence supporting the profitability of momentum strategies; it indicates that our stock-picking ability is consistent with the expected performance based on momentum trends. A negative alpha and underperformance in January might suggest a misalignment with historical momentum trends during that period only; we have an alpha of (-0.313037) in January, which underestimates our stock-picking ability. If we were to use the performance of this strategy in January, it would be inconsistent with the Using historical evidence of the profitability of the momentum strategy.

- ix. Estimate the Carhart model for the daily return to your portfolio. What does it say about whether you seem to be buying large or small stocks? Value or growth stocks? Based on your actual holdings, do you agree with this assessment?

Carhart's four-factor model incorporates momentum into the Fama-French three-factor model (market, size, value, momentum). According to our estimations, our strategy involved buying large and growth stocks, with a particular emphasis on momentum during the Q4 announcements and the upward market trend, growth stocks exhibited more momentum than value stocks, aligning with our actual holdings.

- x. What does the Carhart model conclude about your stock-picking ability? What is the maximum expense ratio you can charge as a mutual fund manager? (A negative number is acceptable as the expense ratio if you feel that you will need to be paying your investors for letting you train using their money). (Hint: remember that the expense ratio is being charged once a year).

Regarding our stock-picking ability, the Carhart model anticipates consistent outperformance against expected returns based on the four factors. Our results indeed demonstrate that we exceeded these expected returns. As a fund manager evaluating against the industry average, the maximum expense ratio we can justify is approximately 2%. This aligns with the average expense ratio mutual fund managers charge for the funds they oversee. Starting with an initial fund size of \$500,000 and later managing a fund of \$1,000,000, the calculated maximum expense ratio would be around \$20,000 for the fund that we managed.