

Quantitative vs Qualitative

Portfolio Performance
Analysis – FNCE 443

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Investment Objective

Goal

Successfully hedge the price of oil

Timeline

For the 1-month period of November 2022

Constraints

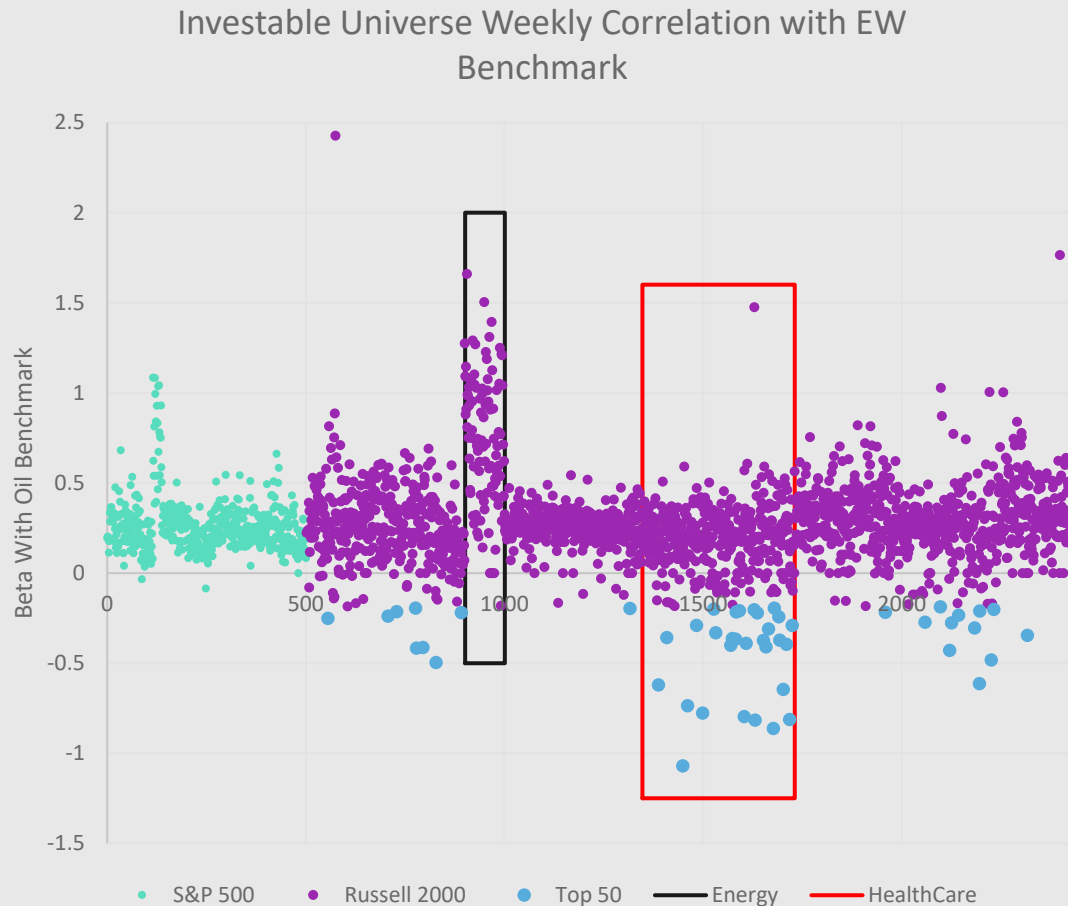
Without using margin or shorting securities

Strategy

By concentrating on negatively correlated securities

Strategy Overview

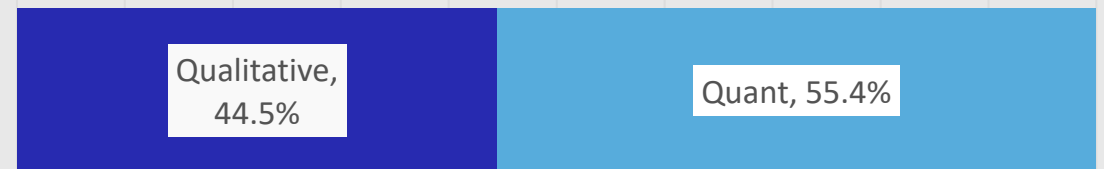
Quant Selections



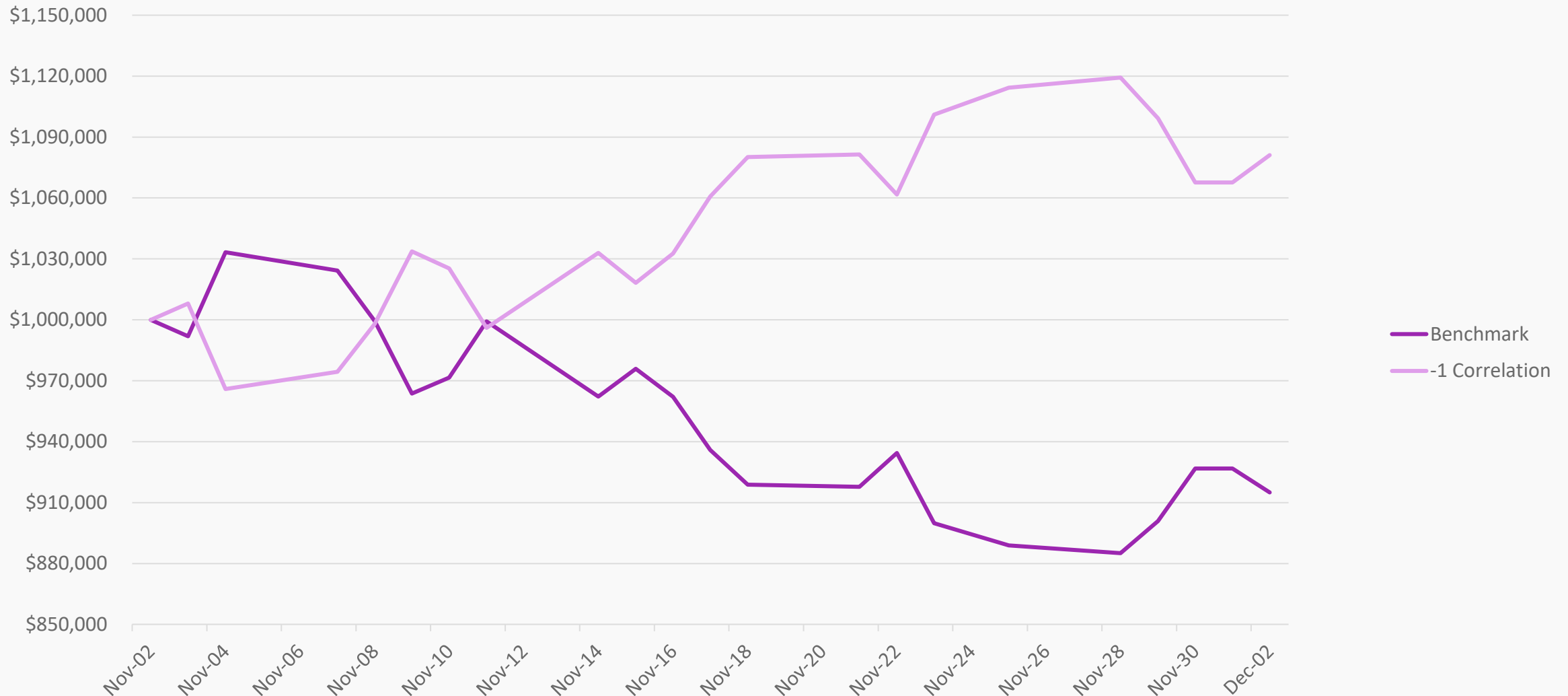
Qualitative Selections



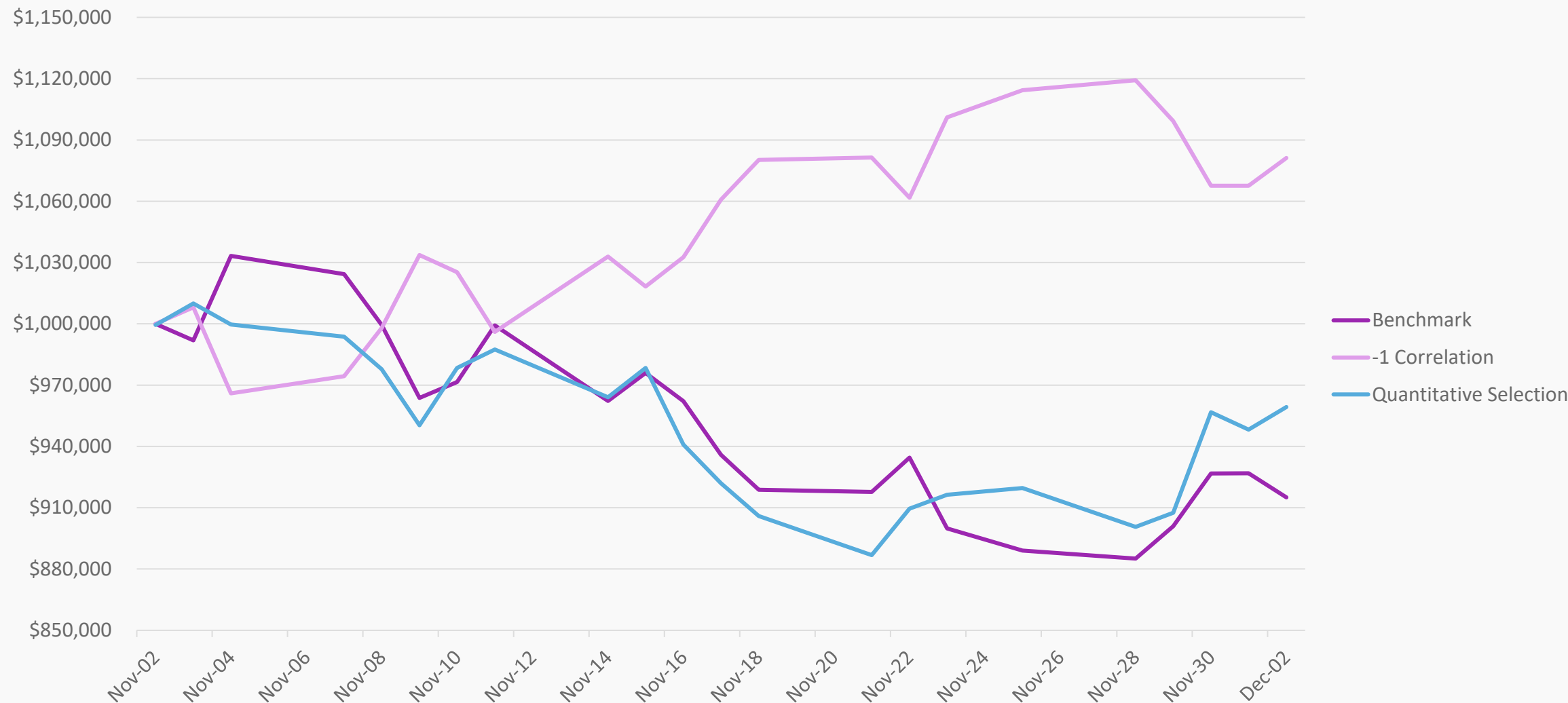
Breakdown Selections



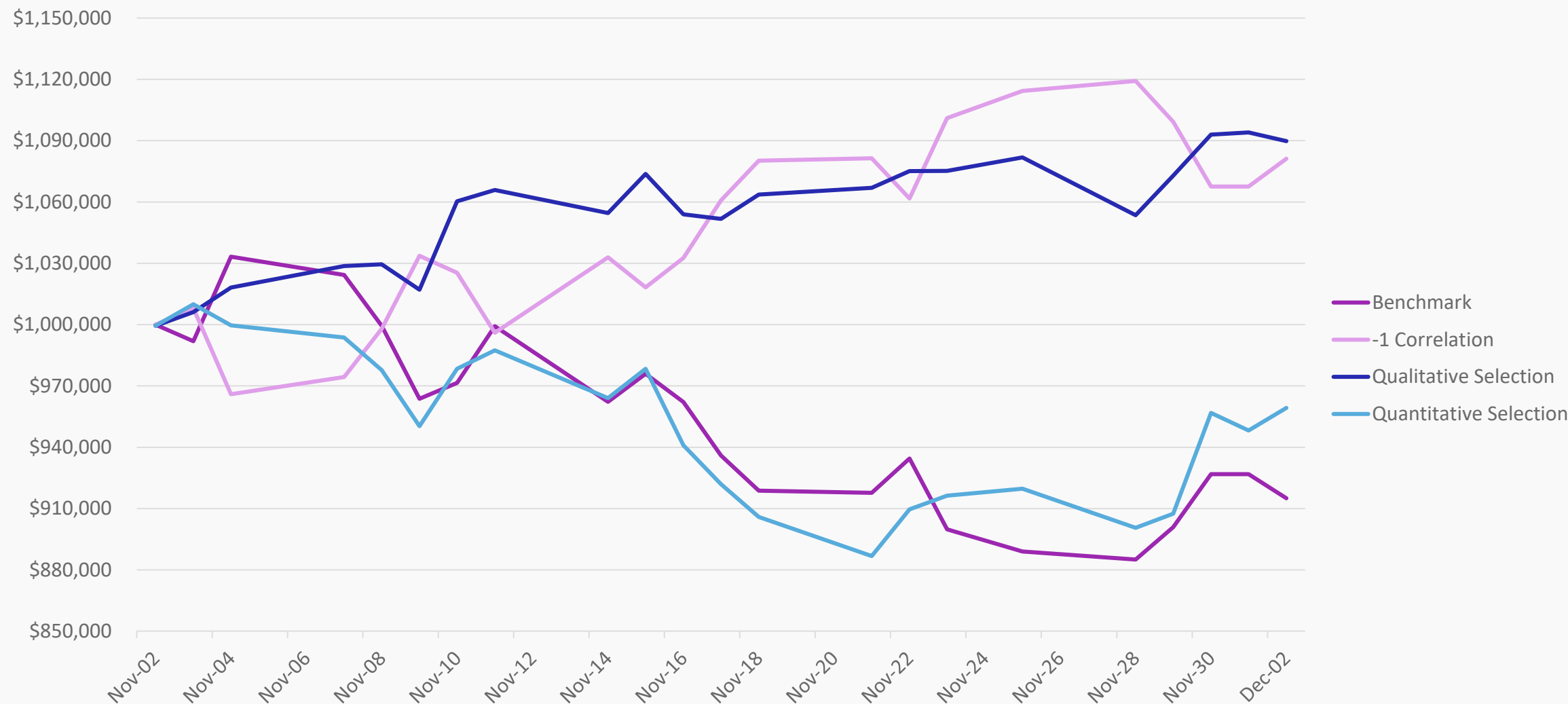
Portfolio Performance (Benchmark)



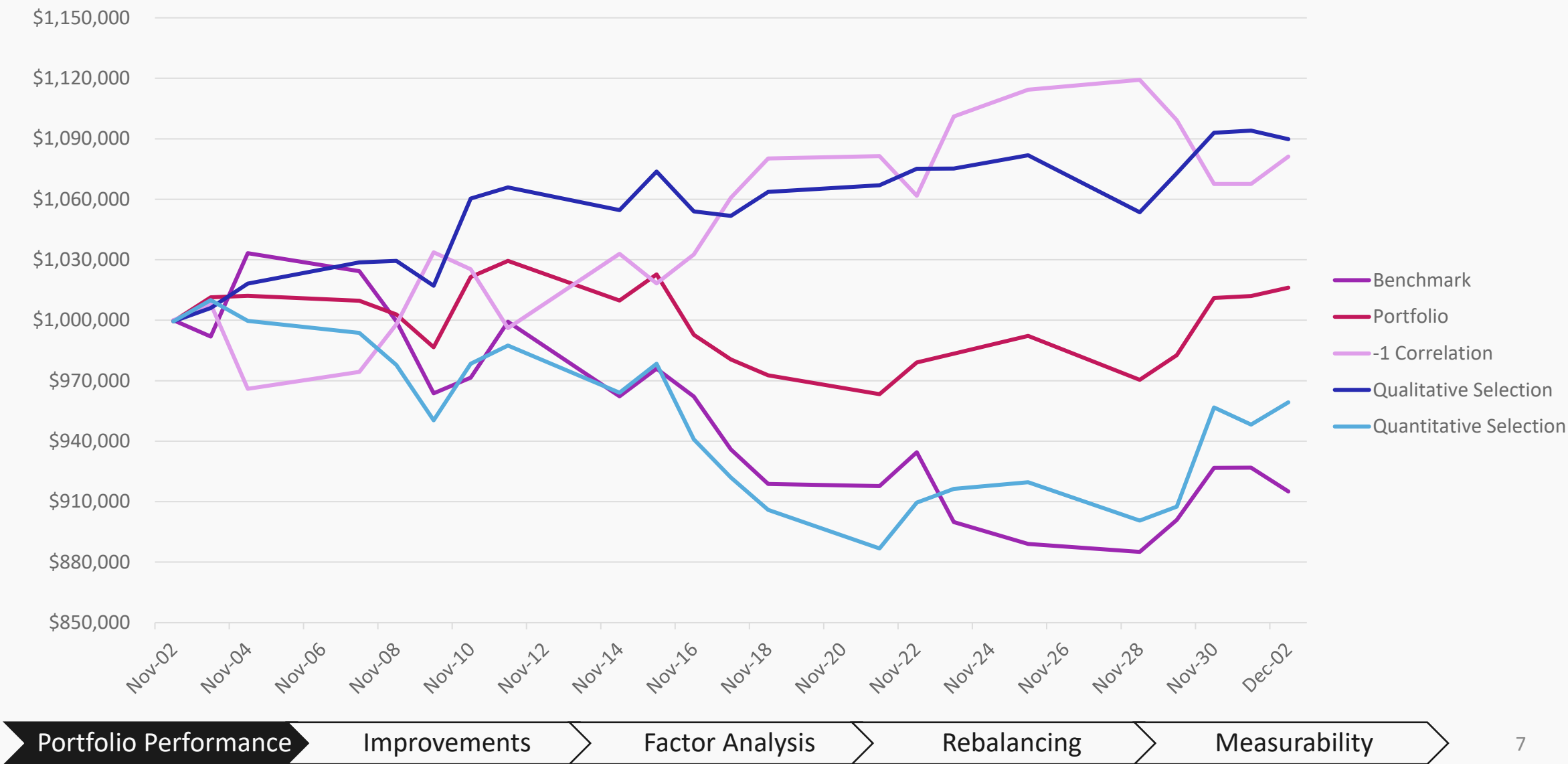
Portfolio Performance (Quant Model)



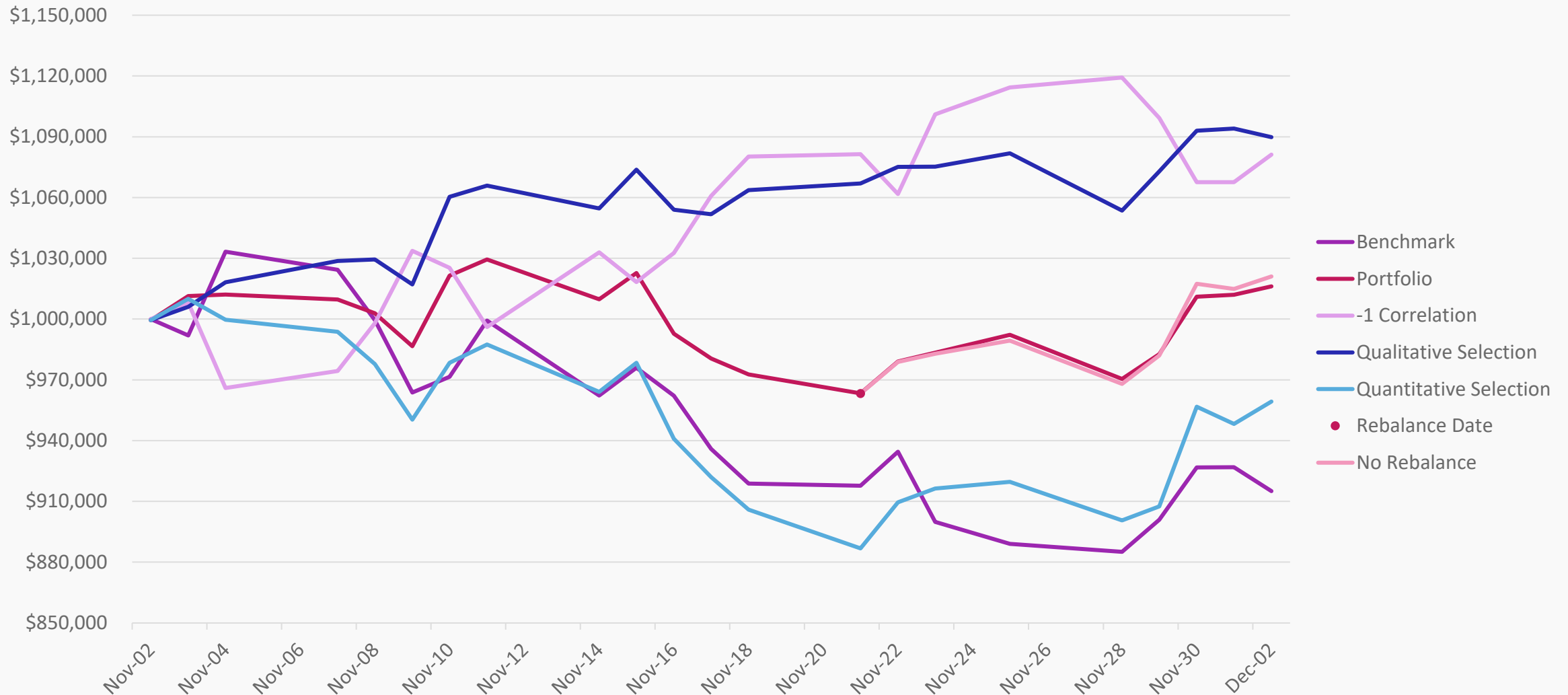
Portfolio Performance (Qualitative Securities)



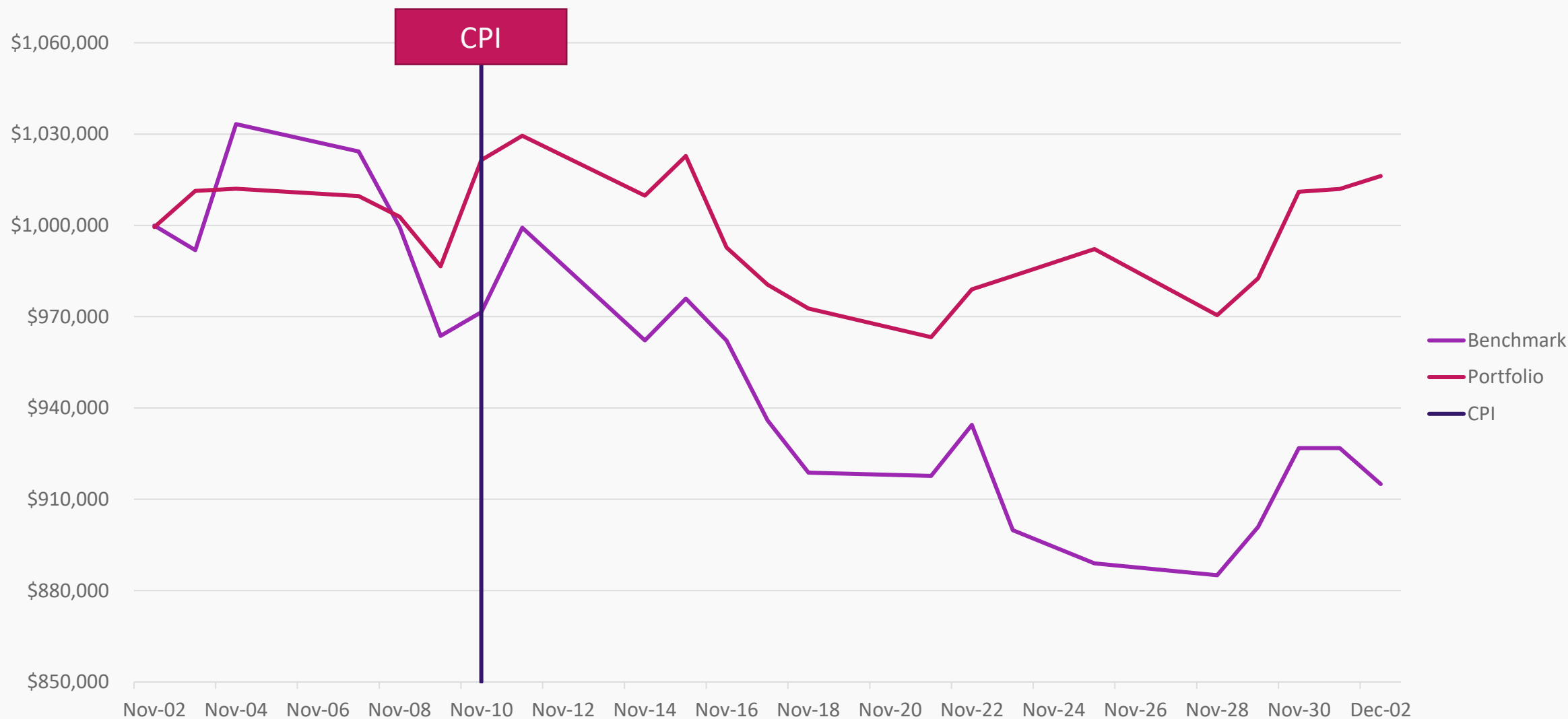
Portfolio Performance (Portfolio)



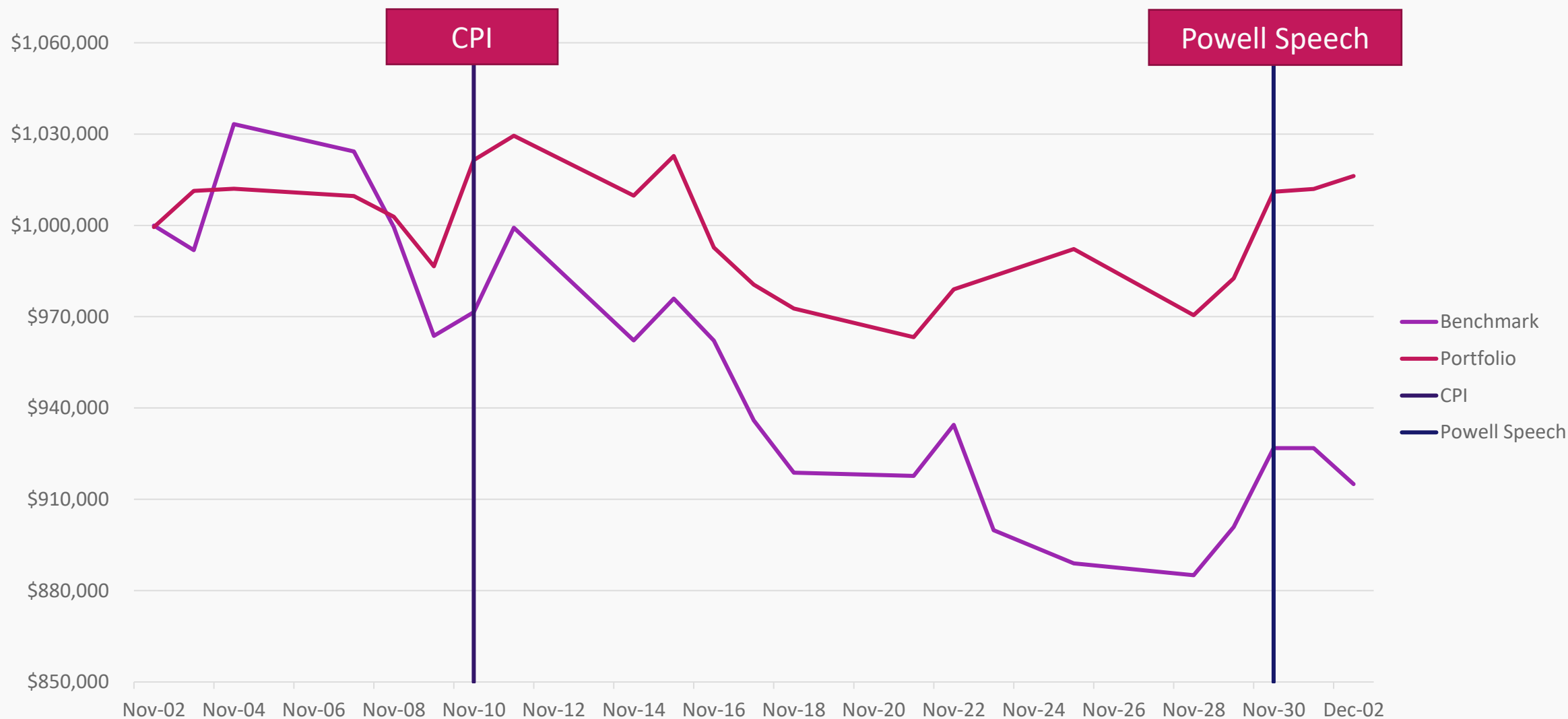
Portfolio Performance (Rebalancing)



Important News Events



Important News Events



Market Anomalies



Historical data suggests that Biotech stocks are negatively correlated with the price of Oil



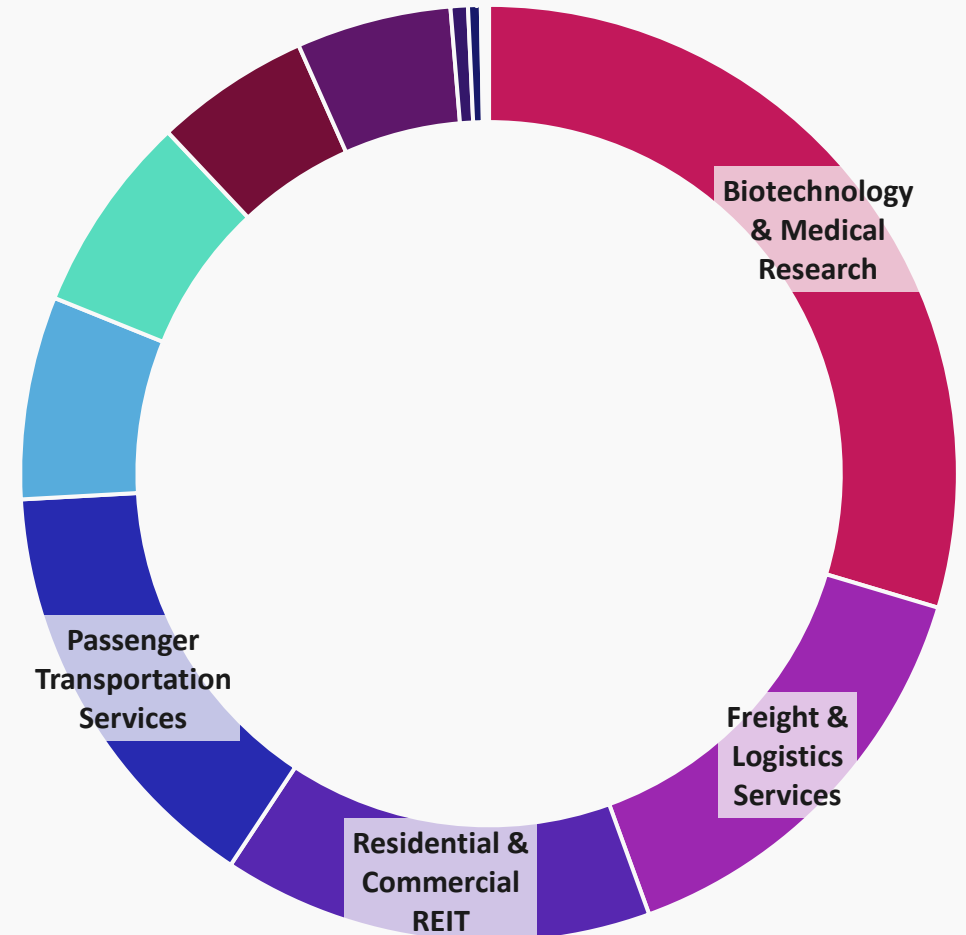
During the month of November, Biotech stocks were found to be positively correlated to the price of oil



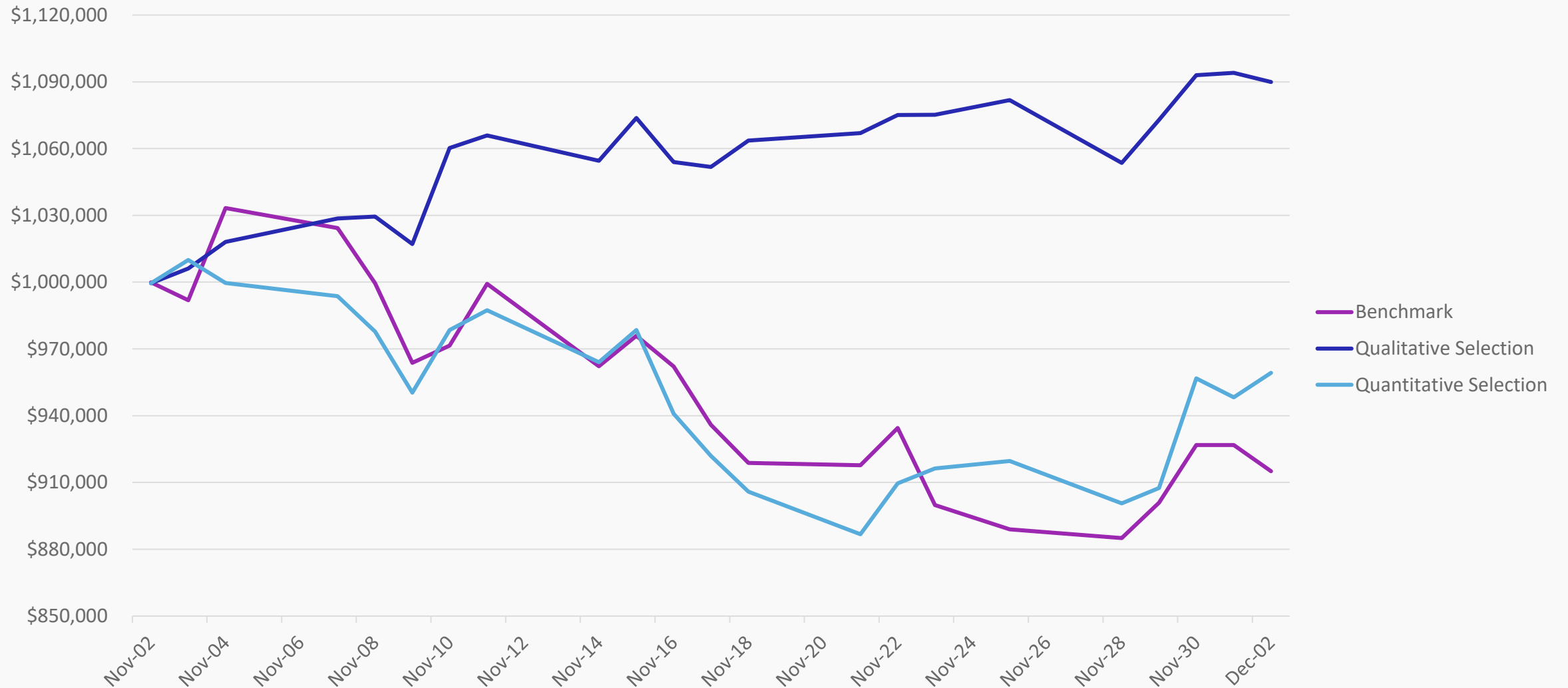
This negatively impacted the performance of our portfolio relative to our benchmark because our expectations / assumptions were wrong for the month

Market Anomalies

Industry	Weight
Biotechnology & Medical Research	29.62%
Freight & Logistics Services	14.84%
Residential & Commercial REIT	14.84%
Passenger Transportation Services	14.84%
Banking Services	6.99%
Electronic Equipment & Parts	6.87%
Specialty Retailers	5.36%
Software & IT Services	5.34%
Financial Technology (Fintech) & Infrastructure	0.60%
Healthcare Equipment & Supplies	0.44%
Electrical Utilities & IPPs	0.07%
Investment Banking & Investment Services	0.07%
Household Goods	0.07%
Hotels & Entertainment Services	0.07%



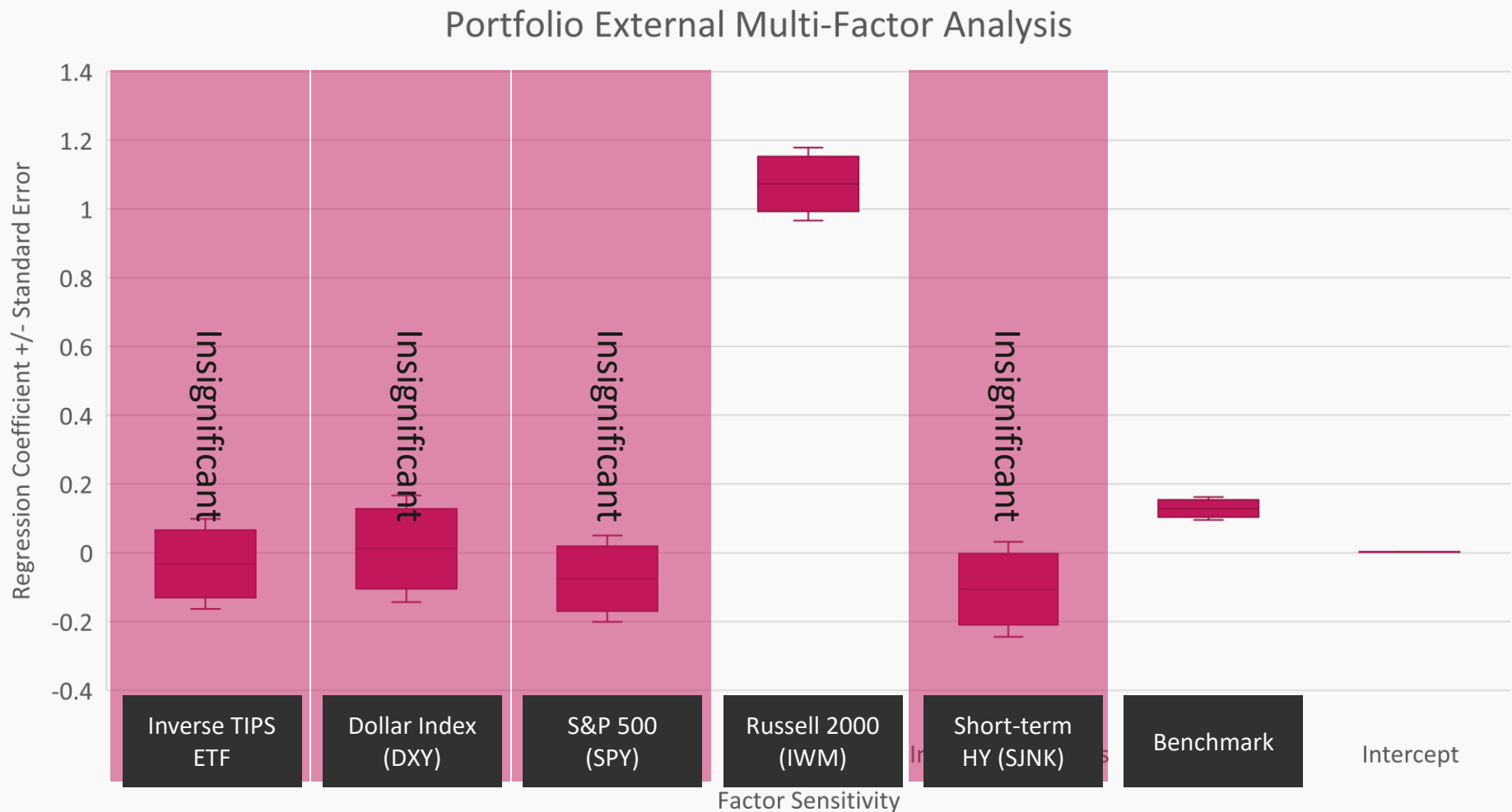
Market Anomalies



What could have been done better?

Overfit Data	Longer historical data in selection	Optimized weighting strategy	Beta instead of correlations maximization
Blind Test	Weekly Frequency	Weighting over multiple time frequencies	Negative correlation is built into the beta
Suspiciously high monthly correlation in blind test	50 weeks cut off is too short	Increasing time frames for all frequencies	Optimizing by beta weights
	Ideally 150 weeks minimum of data in search	Optimize for a Sharpe ratio of 0 assuming shorting the benchmark to purchase the portfolio	

Multi-Factor Analysis



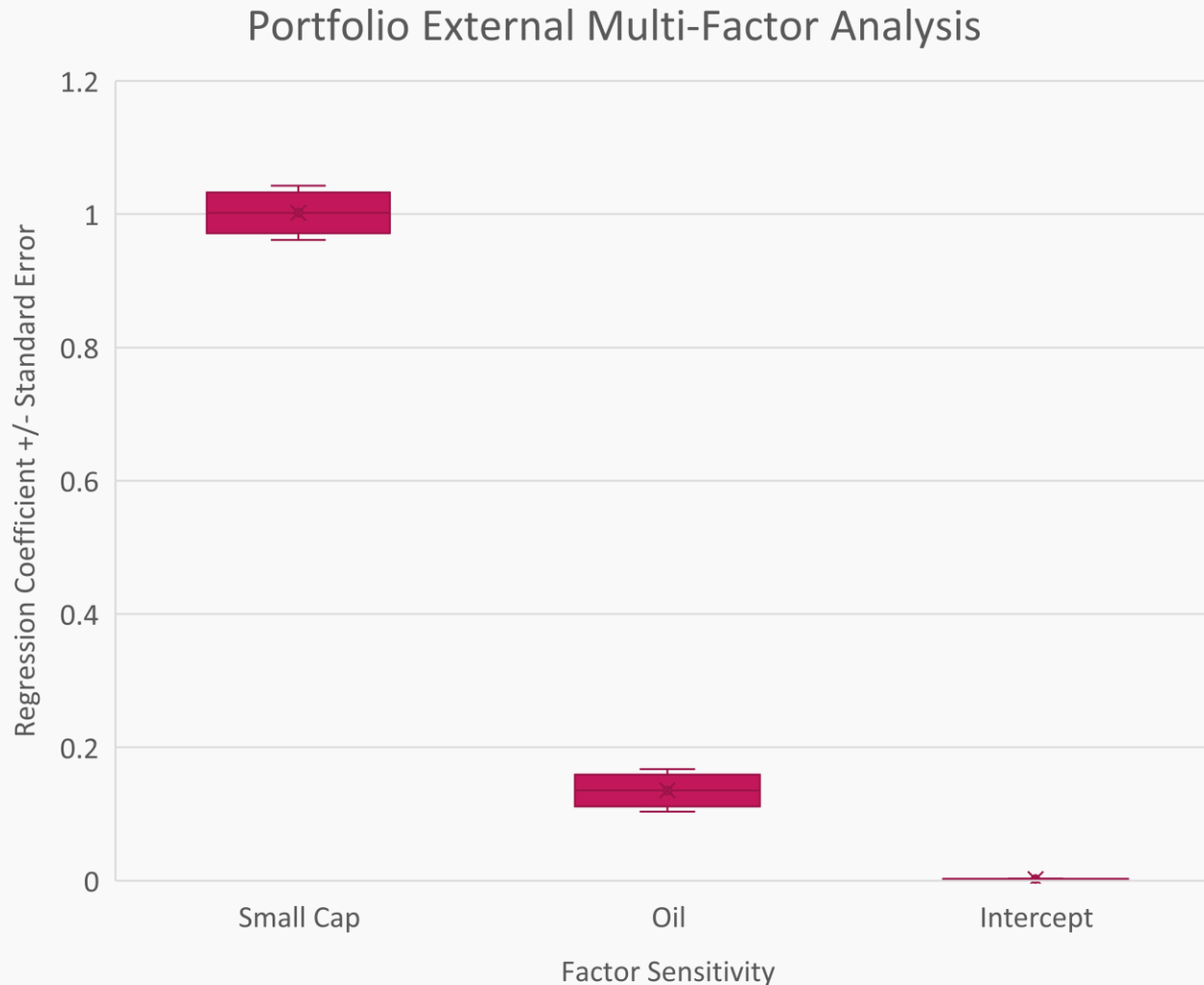
Key Takeaways

Portfolio performance strongly affected by Small Cap Movements

Portfolio was minimally affected by Oil movements

Statistical Significance

Multi-Factor Equation



Multiple Linear Regression Equation

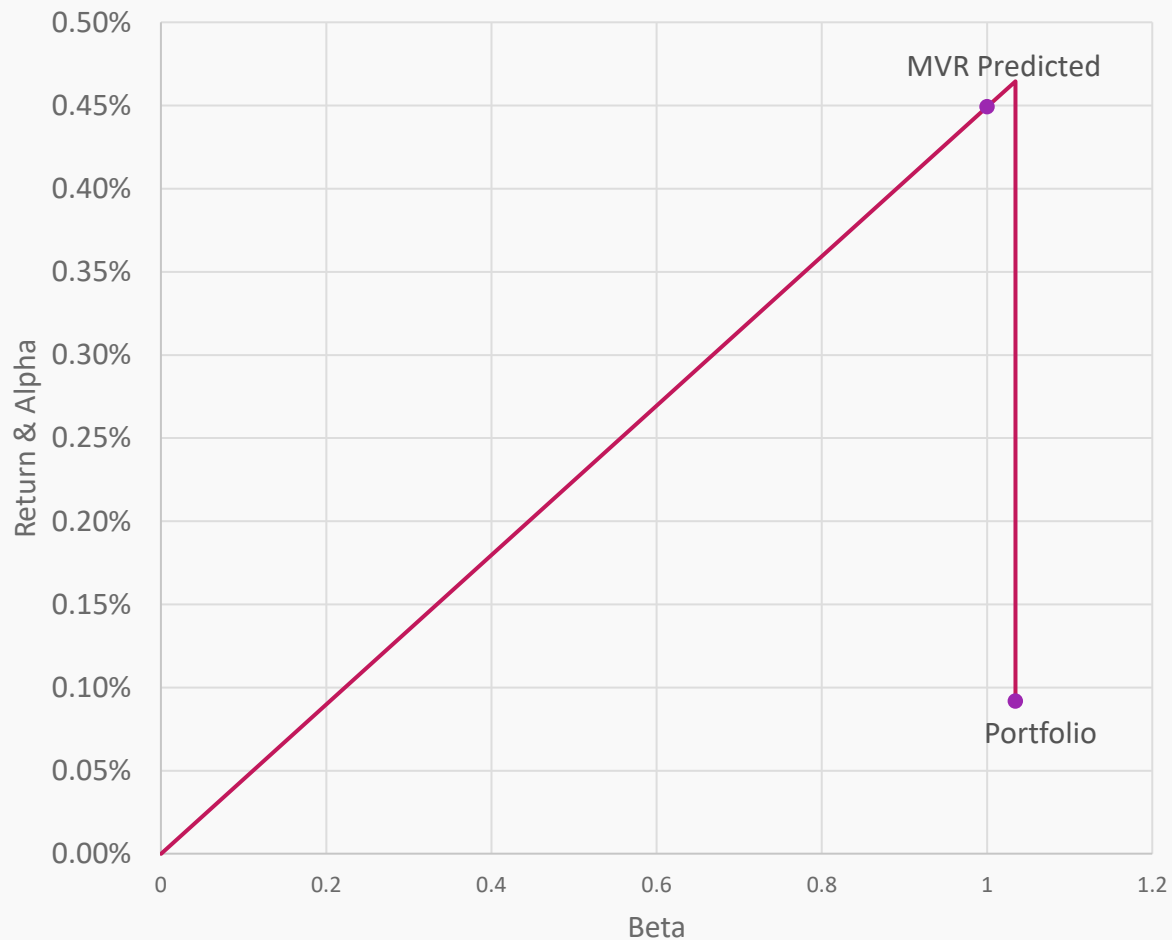
$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$$

Equation Explanation

$y_{intercept}$
+ $\beta_{Small\ Cap} x_{Small\ Cap}$
+ $\beta_{Oil} x_{Oil}$
+ unexplained error
 $Port_{Daily\ Return}$

Multi-Factor Prediction

Multi Factor Analysis Linear Equation



Constraints on Data

1 year, daily data

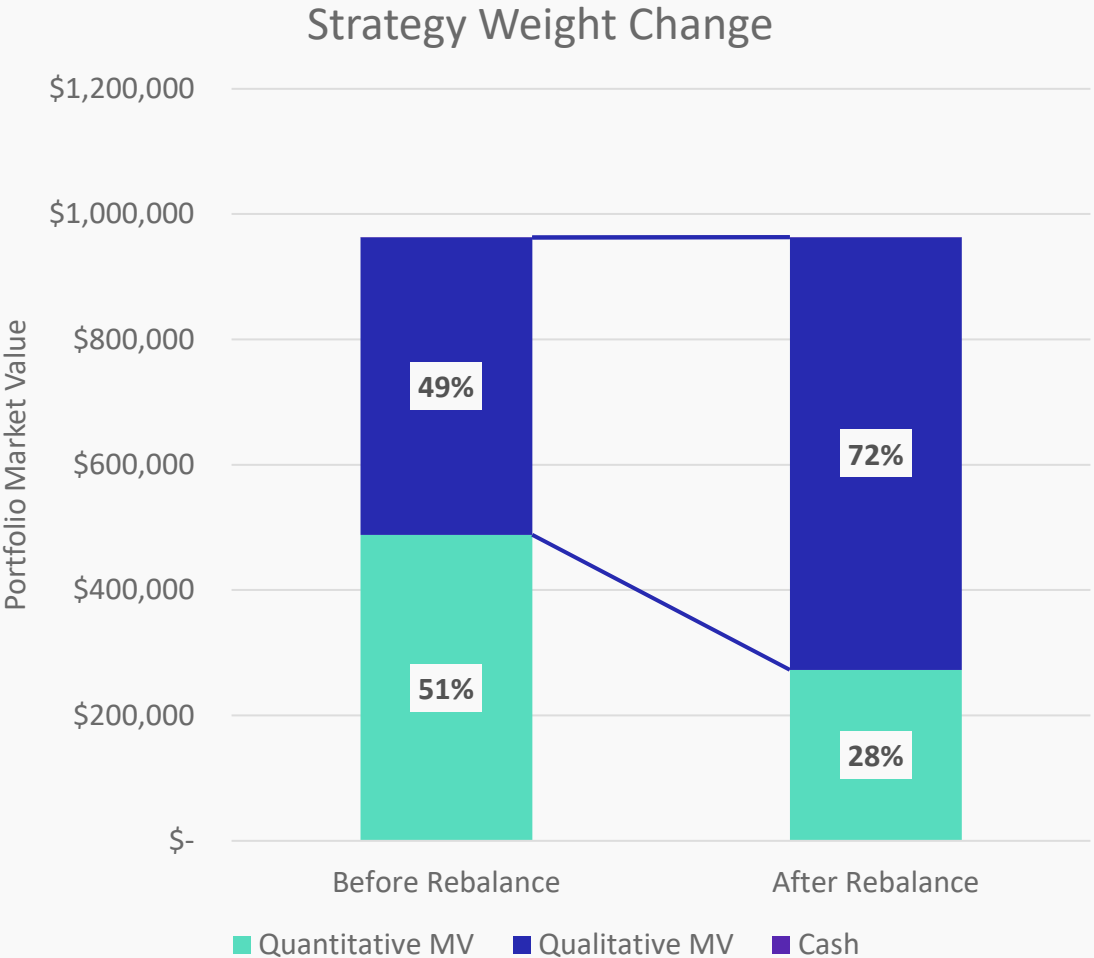
Portfolio's Beta compared to MVR

1.03

Portfolio's Alpha

-0.373%

Rebalancing



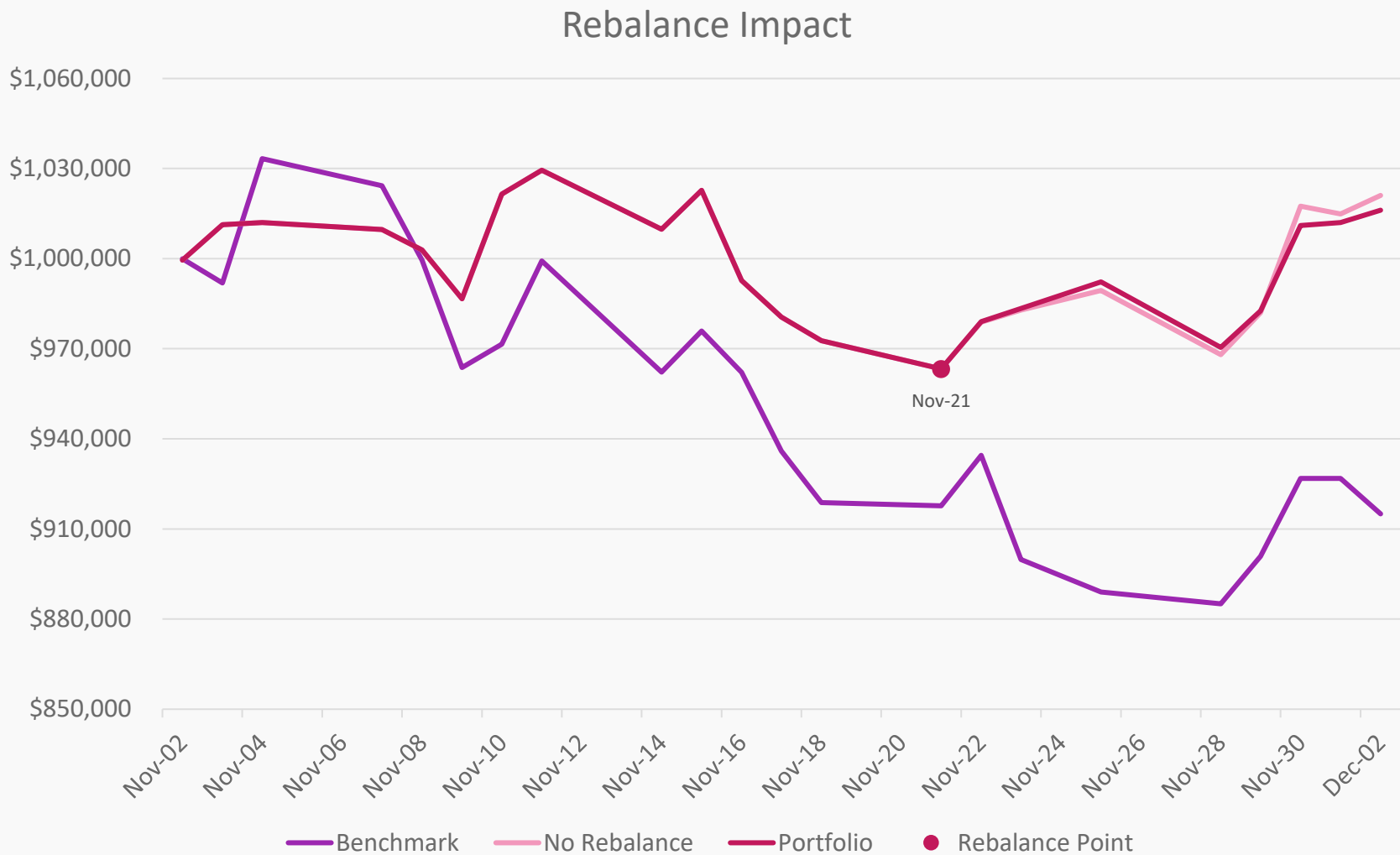
Companies Sold

Company	Market Value Sold	13 Day Daily Correlation	Realized Gain/Loss	
BLFY	\$ 73,665.09	0.505	\$	3,764.73
FIGS	\$ 45,917.08	0.677	-\$	6,222.04
MKFG	\$ 39,813.57	0.783	-\$	18,889.65
VIR	\$ 36,365.40	0.699	\$	5,965.56
DIBS	\$ 10,965.45	0.628	-\$	927.16
MQ	\$ 3,226.95	0.540	-\$	409.05
RBOT	\$ 2,676.96	0.596	-\$	285.12
PWP	\$ 828.24	0.547	\$	140.07
COUR	\$ 758.45	0.552	\$	69.30
NUVL	\$ 704.00	0.632	\$	18.92
MTTR	\$ 698.36	0.639	\$	11.05

Companies Purchased

Company	Market Value Purchased	Shares Purchased
LMT	\$ 107,730.56	224
DAL	\$ 107,961.42	3154

Rebalancing Performance



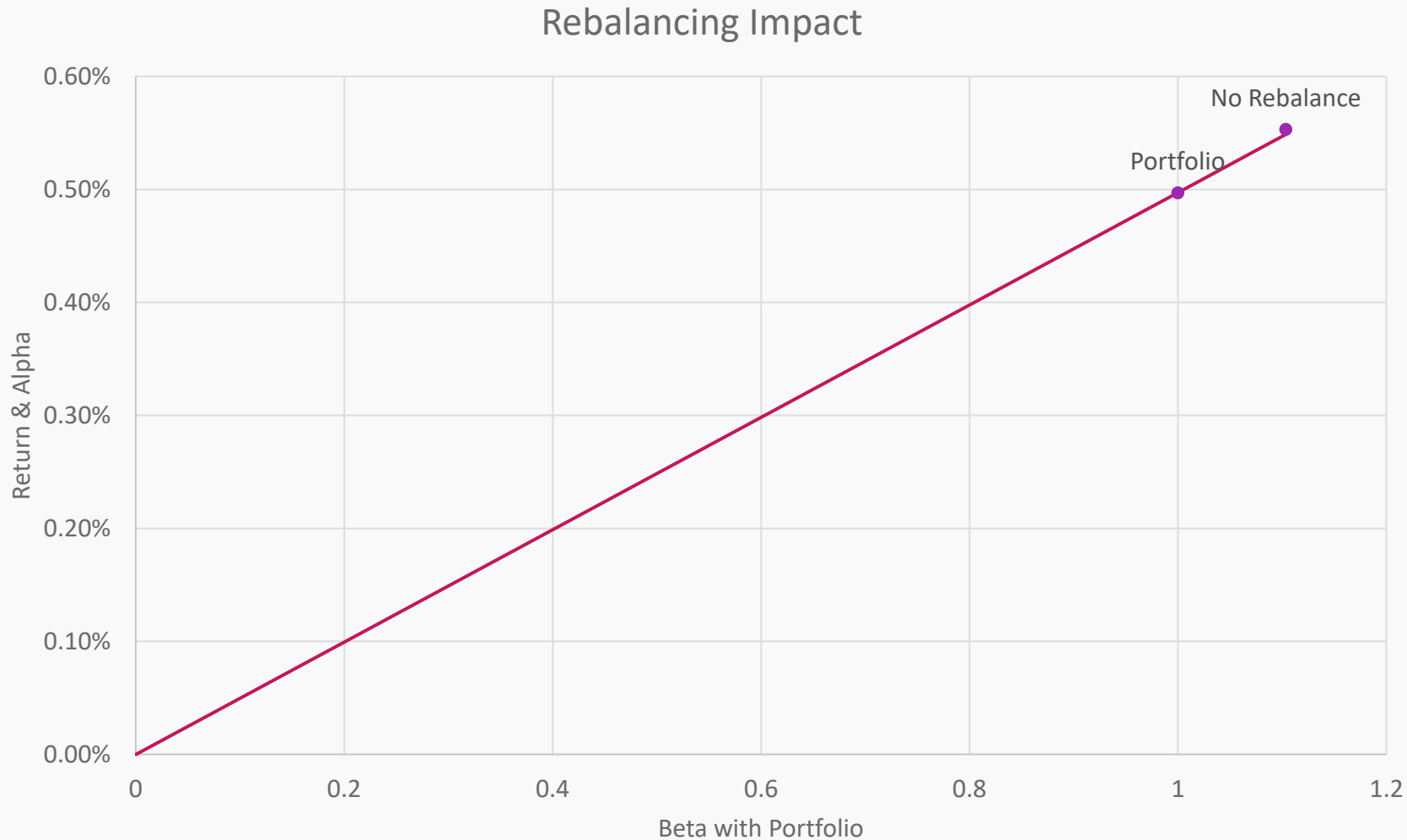
Key Takeaways

Rebalance was not material to performance

\$129.35 of transaction costs occurred during the rebalance

Both portfolios had a negative correlation with our benchmark for the month

Rebalancing Impact



Key Takeaways

Beta: 1.10

Alpha: 0.0045%

Negligible impact of
rebalance

Expected Performance

		Performance	Success
Monthly Correlation near 0.00	Base Case	Monthly correlation of -0.197	Expectation met
Monthly Correlation between -0.50 and -1.00	Better Case	Monthly correlation of -0.197	Expectation not met
Daily correlation near 0.00 or slightly negative	Best Case	Daily correlation of 0.567	Expectation not met

Expected Performance

Portfolio	Monthly Correlation	Weekly Correlation	Daily Correlation
Portfolio	-0.196	0.732	0.568
Quantitative Model	0.474	0.803	0.552
Qualitative Selection	-0.940	0.107	0.520
No Rebalance	-0.254	0.771	0.579

Proxy Monthly Correlation

Correlation Formula Issue

$$\text{Correlation} = \frac{\text{covariance.s}(\text{Return Port}, \text{Return Benchmark})}{\text{variance.s}(\text{Return Benchmark})}$$

$$\text{variance.s}(x) = \frac{1}{n-1} \sum_{i=1}^n (x_i - E(X))^2$$

Proxy Correlation Formula

$$\text{Proxy Correlation} = \frac{\min\{|\text{Return Port}|, |\text{Return Benchmark}|\}}{\max\{|\text{Return Port}|, |\text{Return Benchmark}|\}} \times \text{sign}(\text{Return Port} \times \text{Return Benchmark})$$

Questions?

