Question 2: Currency Hedging Analysis

Jan-Hendrik Pretorius[a]

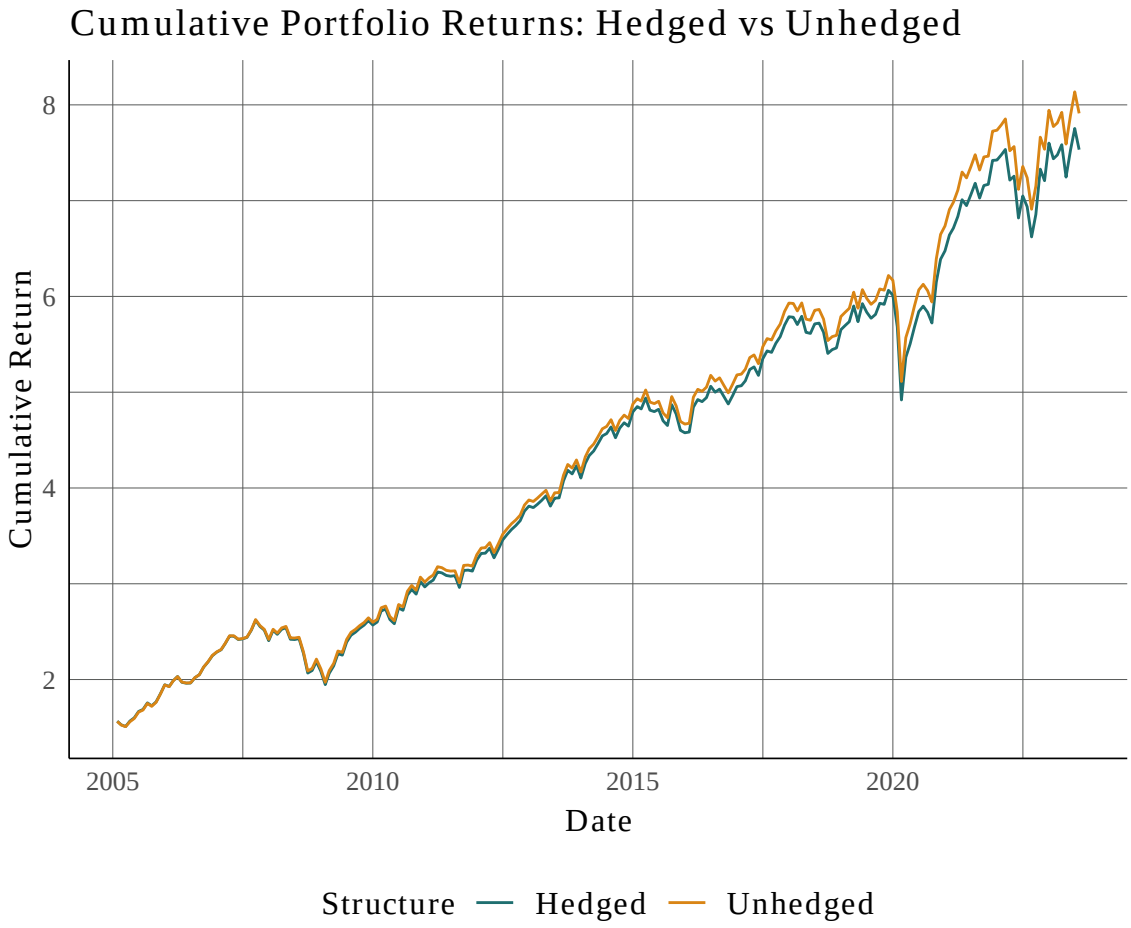
[a]*Stellenbosch University*

Abstract

This report examines the impact of currency hedging on a 60/40 Equity/Bond portfolio. Comparing hedged and unhedged strategies, we analyze their effects on portfolio volatility and performance, providing insights for effective currency risk management in portfolio construction.

Email address: 20713479@sun.ac.za (Jan-Hendrik Pretorius)

1. Hedged vs Unhedged Growth

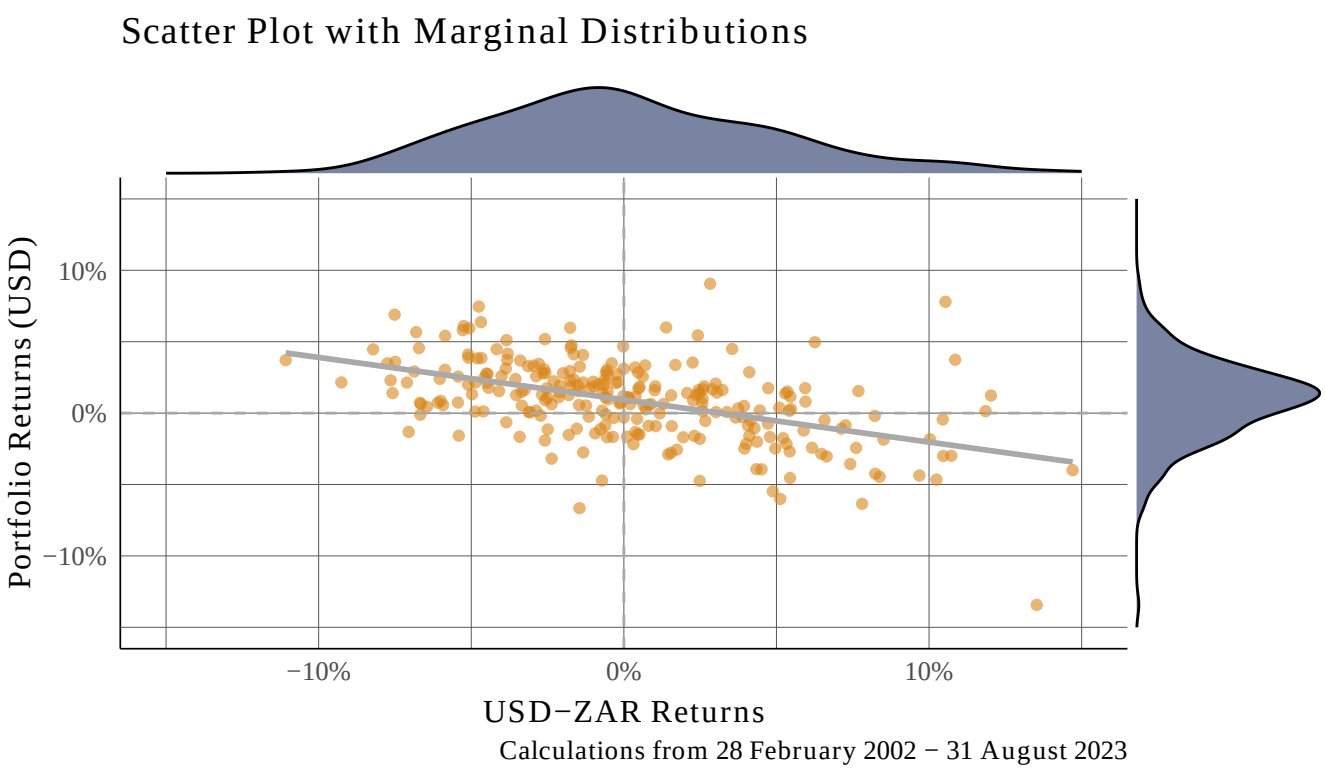


The graph above illustrates the cumulative returns of hedged versus unhedged portfolios from 2005 onwards. Both strategies show growth over time, with the hedged portfolio occasionally outperforming the unhedged one. There is some divergence, particularly during periods of market volatility, but the long-term trajectory of both portfolios appears similar, indicating that hedging may not significantly impact cumulative returns over an extended period.

The 3-year rolling returns chart below for hedged and unhedged portfolios highlights fluctuations over time. Despite some periods where the hedged portfolio shows slightly lower volatility, overall, both portfolios follow a similar pattern. This suggests that hedging may not provide a clear advantage in smoothing returns over a three-year rolling period.

The figure below was replicated from a recent study around currency hedging. It shows how global allocation and the rand have a strong negative relationship since 2004. This means that when one goes up, the other goes down, and vice versa. This happens because both are influenced by the same global factors. For example, when there's positive risk sentiment, both global allocation and the rand tend to do well, and when sentiment is negative, they both suffer.

Also, notice that the rand tends to drop more significantly in value in a month than it appreciates. So, if you make a wrong hedge (on the right side of the plot), it can be much costlier than the benefit of getting it right (on the left side).



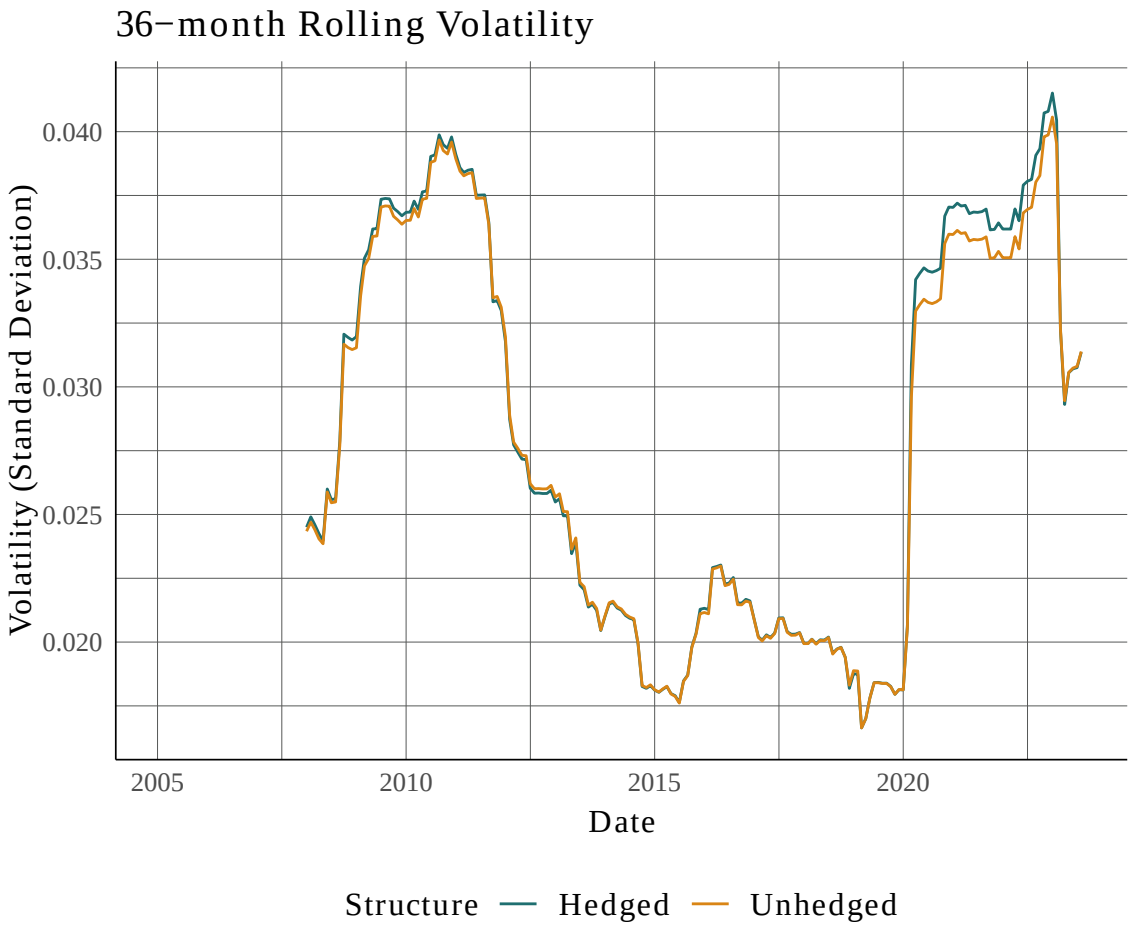
2. Volatility

When comparing the hedged and unhedged portfolios, the hedged portfolio tends to exhibit slightly higher downside risk, as indicated by the higher values in semi-deviation, downside deviation, maximum drawdown, VaR, ES, and modified VaR. However, the differences between the two portfolios are relatively small, suggesting that the choice between hedging or not may depend on other factors such as investment goals and risk tolerance. This information is presented in the table below.

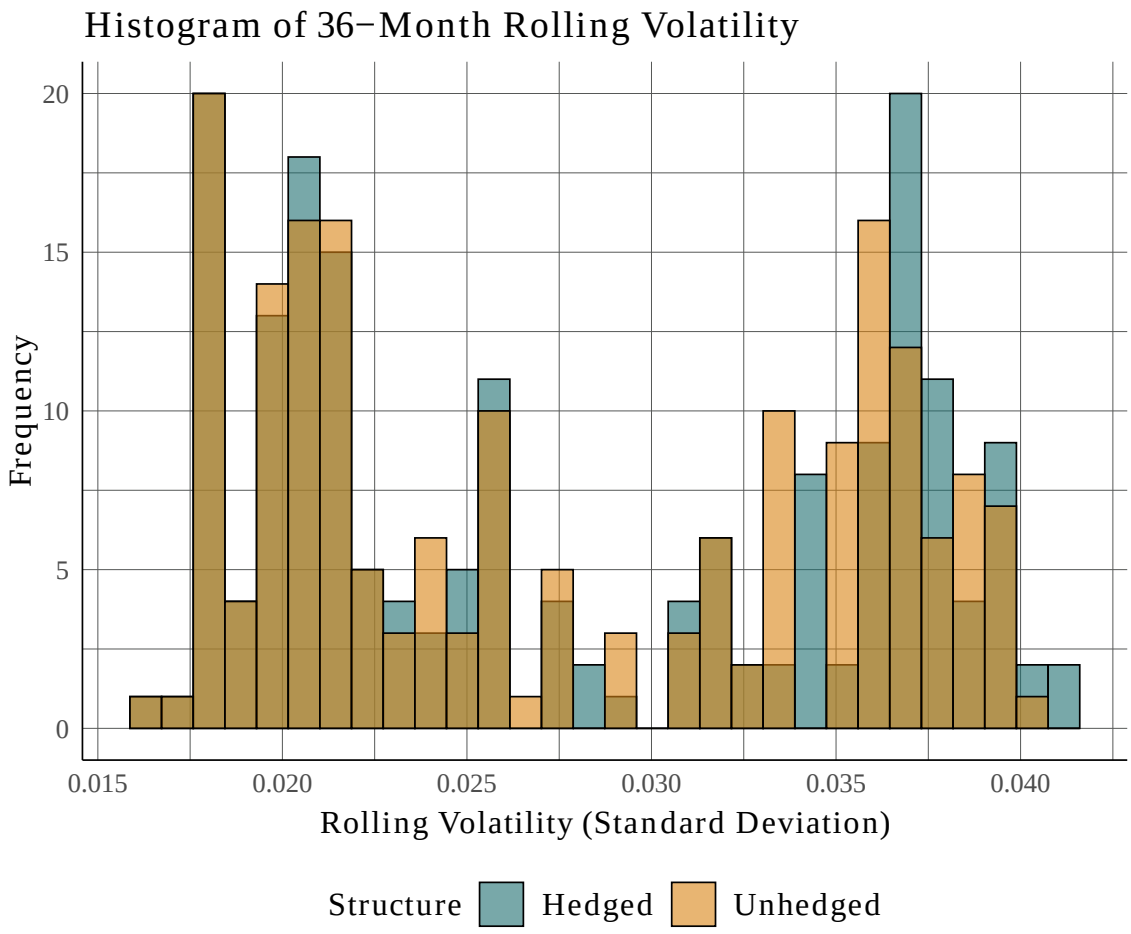
Downside Risk Estimates

	Unhedged	Hedged
Semi Deviation	2.15%	2.19%
Downside Deviation (Rf=0%)	1.78%	1.84%
Maximum Drawdown	24.96%	25.65%
Historical VaR (95%)	−4.15%	−4.22%
Historical ES (95%)	−5.98%	−6.16%
Modified VaR (95%)	−4.26%	−4.40%
Modified ES (95%)	−7.03%	−7.58%

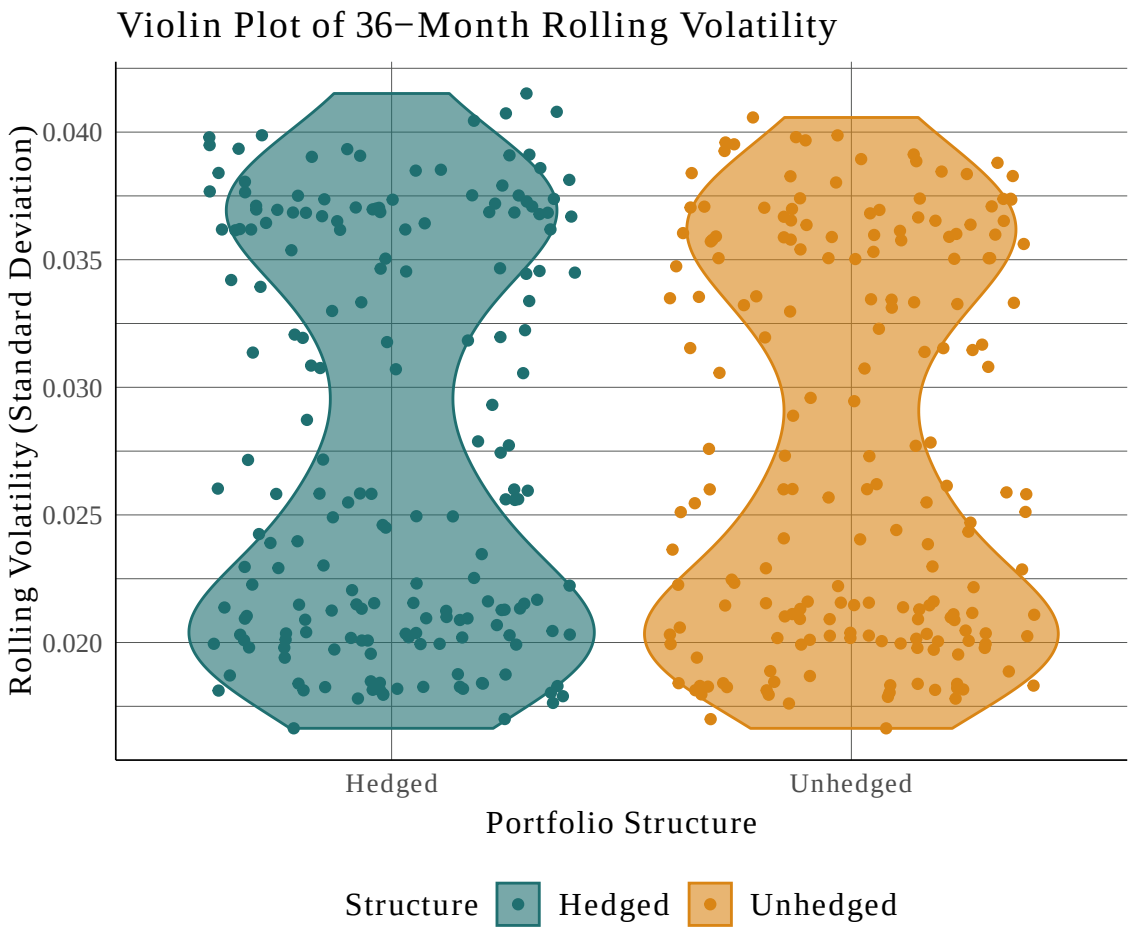
The graphical representations presented in the following figures (which include the 36-month rolling volatility, volatility histogram, and violin plot) provide compelling evidence that hedging strategies may not deliver the anticipated reduction in volatility. In fact, the data suggests a counterintuitive trend—over extended timeframes, volatility tends to exhibit an upward trajectory. This unexpected pattern challenges the fundamental goal of hedging, which is often implemented to mitigate risk and stabilize portfolio performance. This intriguing finding invites further exploration and analysis into the dynamics of hedging and its long-term impact on portfolio volatility.



The figure above presents a comparison of 36-month rolling volatility between hedged and unhedged portfolio structures. The two portfolios track closely together throughout the timeline, with the unhedged portfolio exhibiting slightly higher volatility at various points. Notably, both portfolios experience a sharp rise in volatility around 2020, likely reflecting the increased market uncertainty during that period. The convergence of the two lines for most of the observed period suggests that currency hedging may not significantly reduce portfolio volatility over a longer time horizon.



The histogram above compares the distribution of 36-month rolling volatility for hedged and unhedged portfolios. Both distributions appear to have a similar central tendency, but the unhedged portfolio displays a slightly wider spread, indicating more frequent occurrences of higher volatility levels. The hedged portfolio's distribution is slightly skewed towards lower volatility levels, suggesting that while hedging may not drastically reduce overall volatility, it might limit the frequency of higher volatility outcomes. Despite this, there's considerable overlap in the volatility distributions of both strategies, reinforcing the conclusion that the benefits of hedging in terms of reducing volatility may be marginal.



The Violin Plot of 36-Month Rolling Volatility indicates that both hedged and unhedged portfolios have a similar central volatility frequency, but the unhedged portfolio exhibits a slightly wider distribution, suggesting more frequent high volatility occurrences. The symmetry of both distributions implies a balanced spread of volatility around the median, and the presence of outliers shows that extreme values were present in both portfolios, though marginally more pronounced in the unhedged portfolio. Overall, the plot suggests that while hedging might slightly constrain volatility, both strategies experience a comparable range of volatility over the long term.

3. Conclusion

The results demonstrate that the decision to hedge a portfolio does not consistently lead to significant differences in performance or risk metrics over time. The cumulative and rolling returns, alongside the scatter plot analysis, suggest that hedging's influence is nuanced, with periods of outperformance and underperformance that tend to cancel each other out in the long run. Furthermore, volatility assessments, encompassing downside risk measures and the distribution of rolling volatilities, reveal that hedging may slightly reduce the frequency of high volatility instances without drastically altering

the overall risk-return profile. These findings highlight the importance of aligning hedging strategies with an investor's specific objectives and risk appetite, rather than a one-size-fits-all approach, as the benefits of hedging appear to be context-dependent and marginal when viewed through the lens of an extended investment timeline.