# Currency Hedging Analysis

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The study posits that volatility behaves differently than returns due to the role of covariance in a portfolio. While returns combine linearly, volatility does not. For example, holding two assets with equal returns of 10% and 20% results in an average return of 15%. However, adding a volatile asset to a portfolio doesn't necessarily increase overall portfolio volatility. This counter intuitive outcome arises from the relationship between assets. If two assets are negatively correlated, their movements can offset each other. For instance, a gain in one asset could neutralize a loss in another, leading to reduced overall volatility. This illustrates how diversification can reduce risk, even when adding a volatile asset, as long as its co-movement with other portfolio assets is favorable.

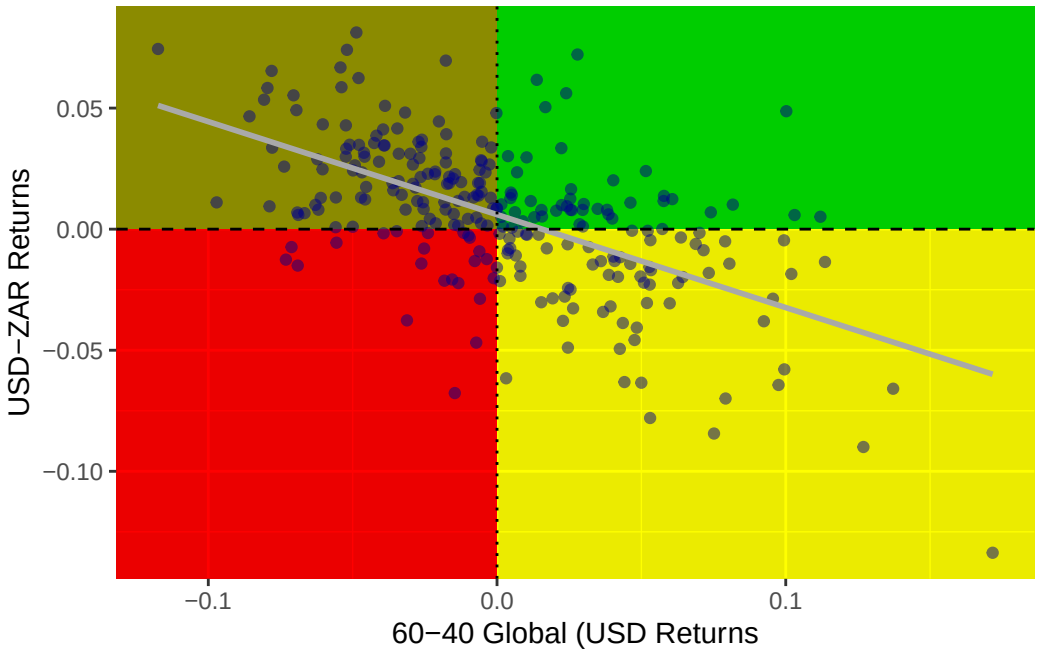


Figure 1: Impact of ZAR Hedging

To illustrate this dynamic, the study estimates a simple 60/40 equity and bond portfolio. In such a portfolio, the rand's movements can significantly influence overall returns. When global markets perform well, the stronger rand amplifies local returns, while during downturns, a weaker rand cushions global losses in rand terms. This interaction underscores the importance of understanding currency dynamics in portfolios with both local and global components. The scatter plot in Figure 1 above illustrates this relationship, where there is a strong negative correlation between the global portfolio and the rand from December 2004 to January 2022. The study considered a sample period until January 2023, but given data limitations, it was shortened by a year.

This downward slope is explained by the fact that the ZAR does not move in isolation. The same factors influencing the USD influence the ZAR. Positive risk sentiments also tend to favour both. There is also a strong right tail, indicating that the rand experiences deeper monthly depreciations than appreciations. This implies that getting the hedge wrong has a greater cost than getting it right. To further illustrate this, if the simple portfolio now also included local assets with a 70% local and 30% global split and rebalanced quarterly, consider the outcomes of a hedged and unhedged alternative represented in Table 1 below. A hedged portfolio does not account for rand exosure, while an unhedged portfolio does.

Table 1: Portfolio Performance

| Fund | Returns.Ann. | Std.Ann. |
|---|---|---|
| Global (USD Returns: Hedged | 0.0590382 | 0.1080368 |
| Global + Local (Hedged) | 0.0947088 | 0.0982696 |
| Global + Local (Unhedged | 0.1159900 | 0.0837712 |

We can see here that the unhedged fund has greater annualised returns and lower annualized volatility. These results are not an exact replication of the study, but they are very similar and echoe the same sentiments. Delving even deeper, downside risk estimates represented in Table 2 indicate that the hedged fund has a greater maximum drawdown, value at risk, and expected shortfall.

Table 2: Downside Risks

| | Estimate | Hedged | Unhedged |
|---|---|---|---|
| 1 | Semi Deviation | 0.0213 | 0.0166 |
| 5 | Downside Deviation (Rf=0%) | 0.0177 | 0.0122 |
| 7 | Maximum Drawdown | 0.2527 | 0.1663 |
| 8 | Historical VaR (95%) | -0.0396 | -0.0265 |
| 9 | Historical ES (95%) | -0.0614 | -0.0425 |
| 10 | Modified VaR (95%) | -0.0421 | -0.0285 |
| 11 | Modified ES (95%) | -0.0706 | -0.0463 |

The plots that follow visualize the arguments made here. The unhedged portfolio sees much higher cumulative returns and sees a lower rolling 12-month volatility (I know the 12-month vol is not annualized)

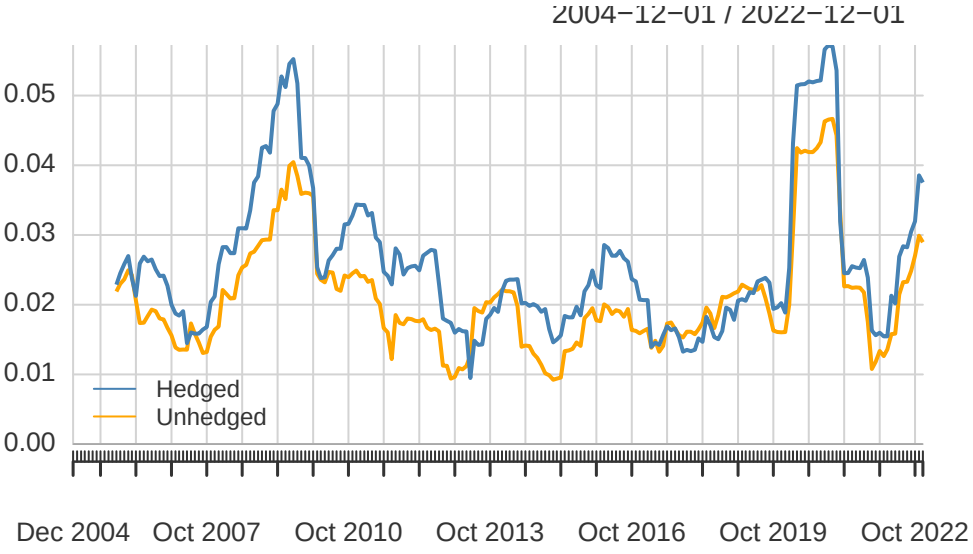


Figure 2: Rolling 12-Month Standard Deviation

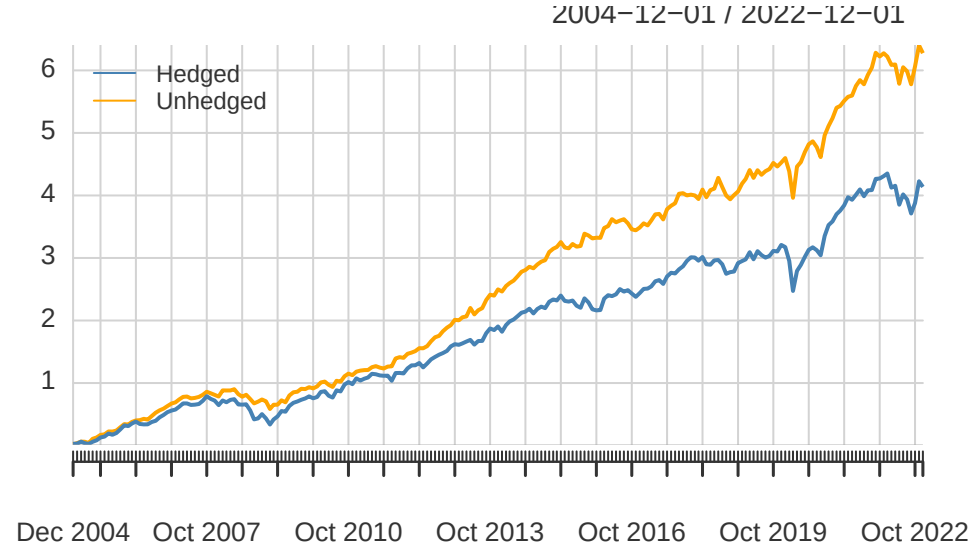


Figure 3: Cumulative Returns