Question 6

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1. Introduction

Need to use multivariate volatility modelling to determine the comovement of assets. The higher the correlation, the lower the diversification. Time-varying correlation estimates prvode insight into the underlying comovement structures of a portfolio of assets.

First, I need to combine the data to make an appropriate return series. Of particular interest is the MSCI_RE (real estate), MSCI_ACWI (equities), Bcom_index (commodities) and the US 10 year bond yield. The US 10 year bond, being a yield, is divided by 100 to make it comparable to the other series'. The MARCH test indicates that all the MV portmanteau tests reject the null of no conditional heteroskedasticity, motivating our use of MVGARCH models.

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Contributions:
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2. Volatility of indices

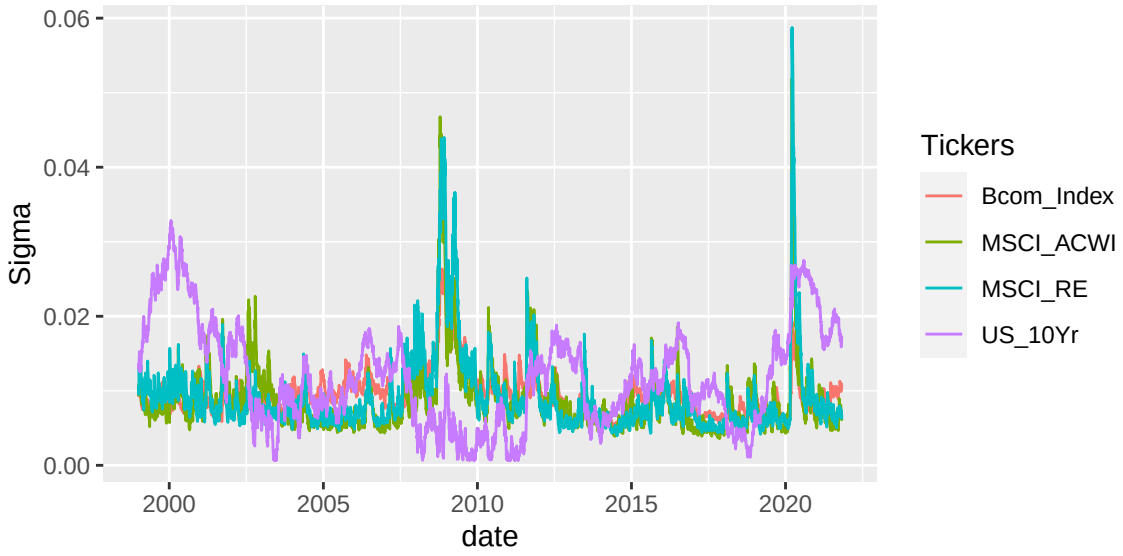

Figure 2.1: Caption Here

From the Figure 2.1, it is clear that the MSCI_RE is the most volatile asset class.

3. Time-varying conditional correlations

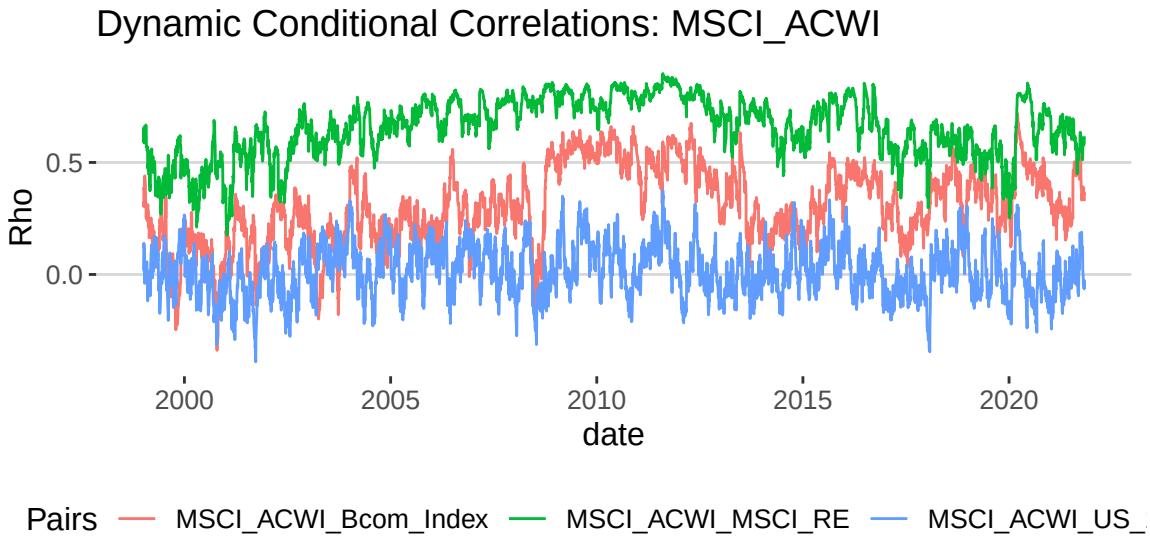

Figure 3.1: Caption Here

Figure 3.1 displays the dynamic conditional correlation for MSCI_ACWI. An issue with packages limited my analysis to only one correlation. I was, however, able to manually print the other graphs but couldn't knit them.

4. MSCI analysis

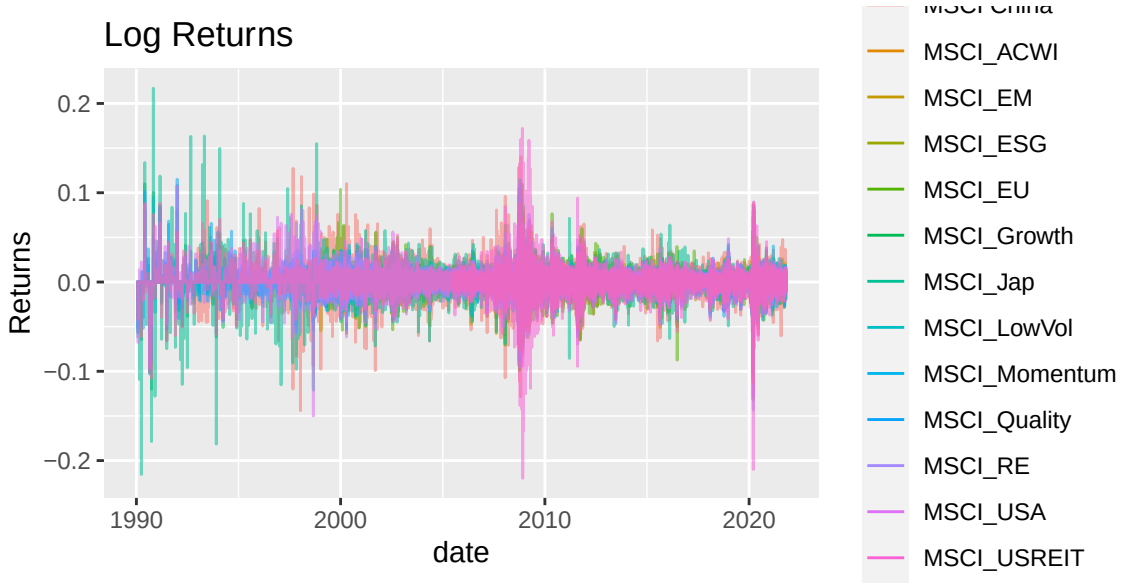

Figure 4.1: Caption Here

Figure 4.1 displays the log returns of the various MSCI indices.

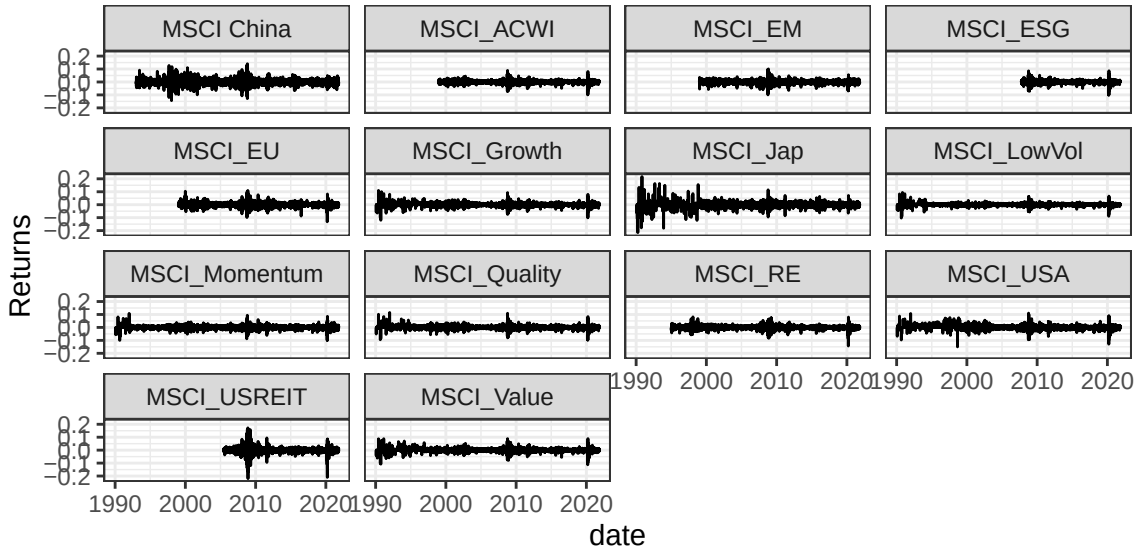

Figure 4.2: Caption Here

Figure 4.2 displays the same as Figure 4.1. The return profiles seem to have converged over the past decade, with a few exceptions. The most recent 'exception' is that of the 2020 spike due to the pandemic.

5. Conclusion

Over the past decade, the return profiles of different asset classes have increased in their convergence.