# Volatility Spillovers from US to SA Markets

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**Abstract**

I investigate the relationship between the voaltilities of S\&P 500 and the JSE Top 40. The purpose of this study is to investigate if this relationship changes in any significant way during the two biggest crisis periods in the last two decades, namely the Global Financial Crisis and Covid-19. I first do a stratification analysis which reveals significant evidence of these two indices sharing periods of high volatility. I then fit multiple multivariate GARCH models to further investigate the volatility relationship and find...

*Keywords:* Multivariate GARCH, Spillovers

## 1. Introduction

## 2. Data and Methodology

### *2.1. Data*

Three return series are used in the analysis that follows. These are the monthly returns for the S\&P 500 and the JSE Top 40, as well as thhe ZAR/USD exchange rate. The exchange rate is represented as the amount of Rands required to buy one US Dollar. Since the series is represented as a growth rate, a postive growth rate represents a depreciation of the Rand, and conversely, an appreciation of the Dollar. The returns for these 3 series' are visualised below in Figures 2.1 to 2.3.

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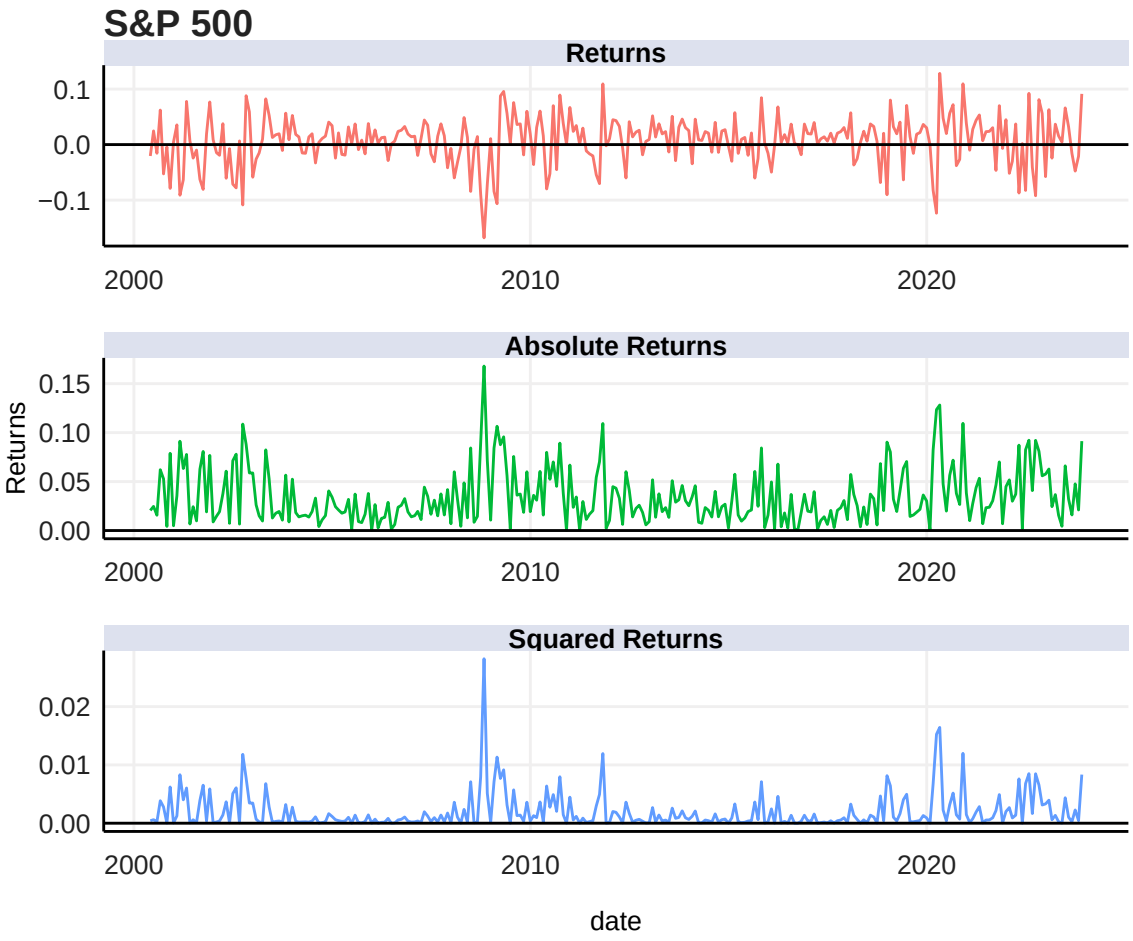


Figure 2.1: S&P 500 Returns

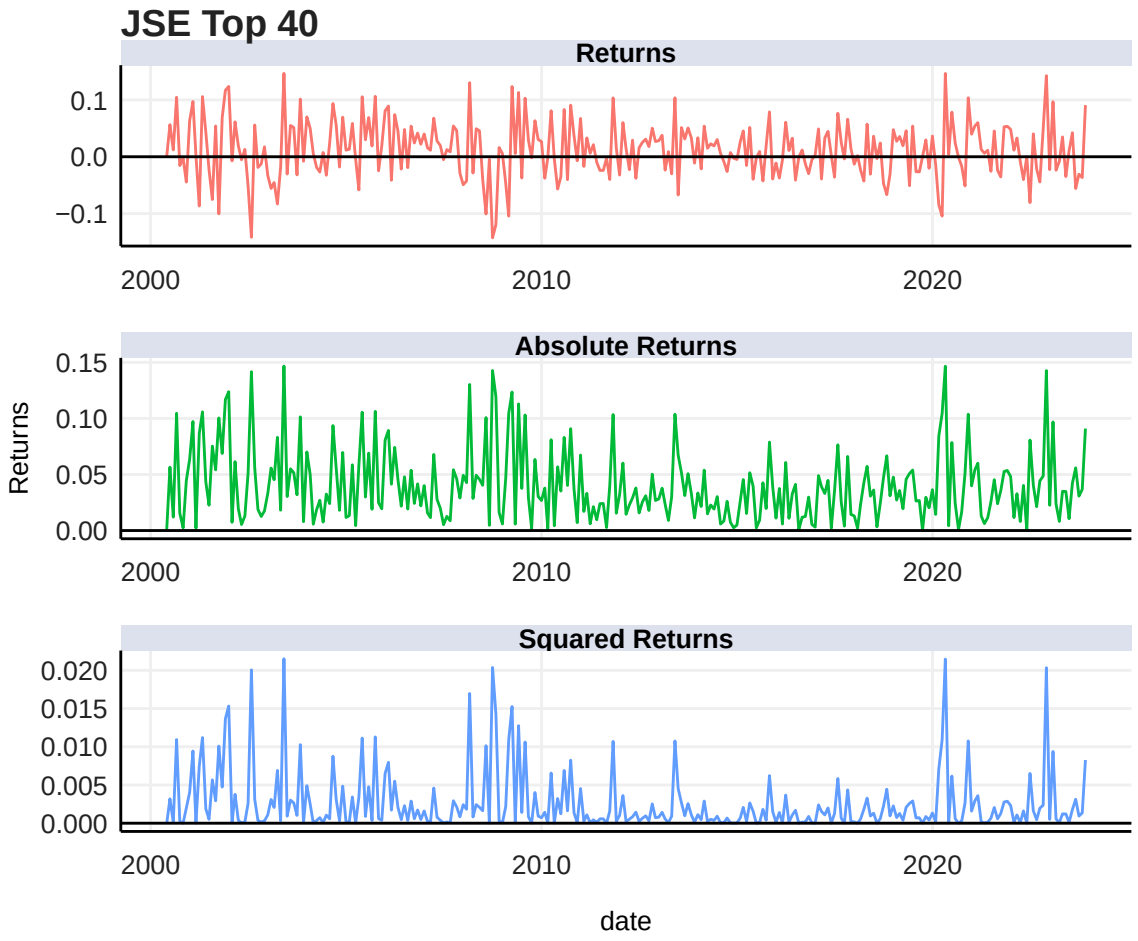


Figure 2.2: JSE Top 40 Returns

Not much information can be revealed through simply observing the returns over time. However, when investigating the squared returns as a measure of volatility, it is clear to see that the JSE Top 40 is substantially more volatile than the S\&P 500. This result is reinforced by Table 2.1, where the JSE showcases a standard deviation considerably higher than that of the S\&P. Interestingly, the JSE Top 40 showcases higher average monthly returns, however that comes at the cost of the increased volatility as described above. Lastly, as shown in Table 2.1 the S\&P experienced the largest draw down, while the JSE experienced the largest uptick.

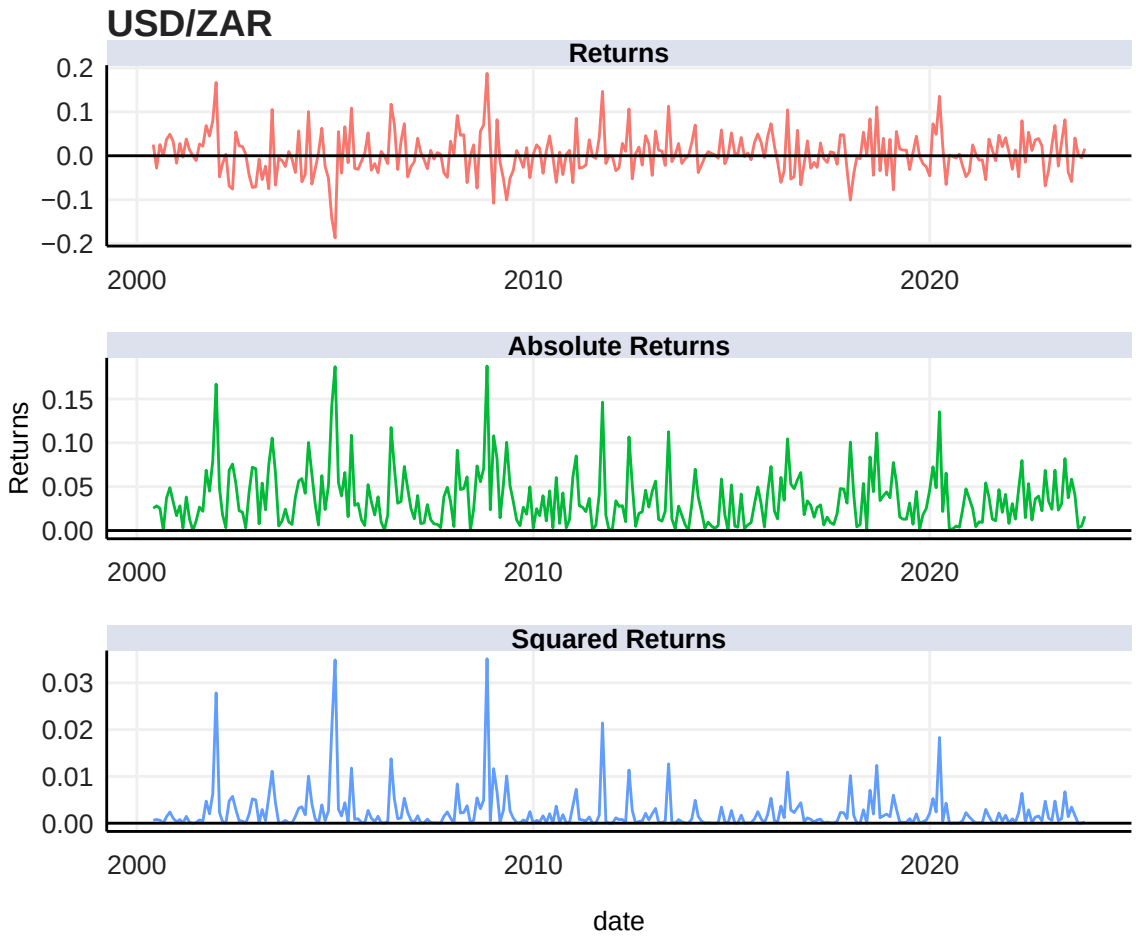


Figure 2.3: ZAR/USD Returns

Table 2.1: Summary Statistics

| | S&P 500 | JSE Top 40 | ZAR/USD |
|---|---|---|---|
| Mean | 0.0066 | 0.0121 | 0.0040 |
| Median | 0.0124 | 0.0115 | 0.0018 |
| Std. Dev. | 0.0445 | 0.0502 | 0.0485 |
| Kurtosis | 3.7769 | 3.3257 | 4.5258 |
| Skewness | -0.5048 | 0.0359 | 0.2933 |
| Minimum | -0.1680 | -0.1427 | -0.1868 |
| Maximum | 0.1282 | 0.1467 | 0.1875 |

### *2.2. Methodology*

## 3. Results

### *3.1. DCC*

### *3.2. Go-GARCH*

### *3.3. BEKK-GARCH*

## 4. Conclusion

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## References

Katzke, N.F. 2017. *Texevier: Package to create elsevier templates for rmarkdown.* Stellenbosch, South Africa: Bureau for Economic Research.

## Appendix

*Appendix A*

Some appendix information here

*Appendix B*