

## Chapter 10

# Conclusion

This dissertation highlights some of the real world deviations from the Black-Scholes option pricing framework.

Unlike the assumption of constant volatility of increments in Brownian motion, volatility in the market is stochastic. Markets with stochastic volatility are no longer complete, as it is in the Black-Scholes structure. Options in incomplete markets are harder to price since investors demand higher returns for taking additional risk.

Duan [10] proposed a new measure under which to price options in incomplete markets, called the Local Risk-Neutral Valuation Relationship (LRNVR). The LRNVR and related option pricing methodology is discussed in detail in this dissertation. The necessary measure theoretical and stochastic calculus background is given for a clear understanding of this relationship.

The stochastic volatility in this dissertation is assumed to be a statistical time-series process, the Generalized Autoregressive Conditional Heteroscedastic (GARCH) process. Time-series processes are discussed in this dissertation, to give readers who aren't familiar with these statistical methods a reasonable foothold therein.

Warrants are option-like instruments traded on the JSE Exchange. Warrants can't be sold short. This restriction adds to incompleteness in the market. In this dissertation the GARCH option pricing process is applied to the implied volatility of the warrant instead of the stock price process as done by Duan. This is because the standard deviation of the stock price and the implied volatility levels differ significantly because of the short selling restrictions and the illiquidity of the market.

Results of the application of the GARCH option pricing process to implied volatility, shows that it compares well to the use of implied volatility of current warrant prices in forecasting future warrant prices.