Nishal Dave: AFE Coursework Draft

The analysis is to explore the relationship between the BSE SENSEX index prices and the change in the term structure over the ten year period from 01/2010 to 12/2020, the term structure has been computed using the spread between 15-year and 1-year bond yields. The intuition is supported by the the fact that as the term structure increases this represents a widening in yields, implying that longer term bonds yield more than short term bonds and as such an increase in yield is driven by a decrease in their price and vice versa. My support for this selection is loosely based on the analysis by [*Chen, Roll and Ross(1986)*](https://rady.ucsd.edu/faculty/directory/valkanov/pub/classes/mfe/docs/ChenRollRoss_JB_1986.pdf), who find that the term structure of bond yields have a negative and inverse relationship with stock returns identified using the Arbitrage Pricing Theory approach.

During times of uncertainty and/or low confidence bond yields should drop as investors substitute their equity for safer investments and market forces drive the prices of bonds up and again vice versa. This analysis will aim show the relationship between these two variables using VAR methods.

(Preliminary Analysis/insert series plots)

So far we have concluded that the original data are I(1), and then I(0) as a result of taking their differences. This makes the returns variables suitable for VAR modelling, however before this, it would be worthwhile to check if there exists some cointegrating relationship between the the variables, before settling on a model.

Engle Granger Procedure

Running the ADF test on the residuals:

Based on the ADF test, the test-stat exceeds all levels of significance, we can safely reject the null of a unit root and conclude that the residuals are stationary which takes us to the second step of the EG procedure. For this bivariate case the ECM model simplifies to the following:

Therefore the coefficient on is speed of adjustment and measures the time taken to converge to the long run equilibrium is just short of 6 years, which is a considerably long time.(investigate this)

Johansen Procedure VECM(2)

(Outline the functional form below)

Let: , and generalise the form:

Where the ECM form is as follows:

is the matrix which represents the long run coefficient and the cointegrating relationship. For a pair of cointegrating variables, the condition that must hold.

The Johansen Test allows identification for more than one cointegrating vector in the variables of interest. Using 3 functional forms and an additional Maximal Eigenvalue test, there are 4 tests conducted altogether. Where is equal to the number of cointegrating vectors, the hypotheses for these test are outlined below.

(insert table of test results)

It is found that 3 of the tests identify a cointegrating relationship whilst the trace test incorporating a time trend suggests cointegration may not exist.

(insert table of estimates)