Notes on regime switching

Regime switching is a way to describe structural changes in a data series. For example, an inflation timeseries may change states from ARMA to linear as the economy moves from a period of cyclical growth to prolonged recession. A stock price may, say, be determined by and correlated to the main equity index when it has a large market capitalization and then by a sub-index when it's relative size shrinks - consider Apple. Regime switching enables a very powerful dynamic regression analysis of time series by incorporating both of these periods.

It can be modeled using dynamic linear model.

Literatures on regime switching:

Hamilton (1989) describes a model for the U.S. GNP, which uses the regime-switching structure

- Hamilton's version was a state-switching ARMA model where the auto-regressive parameters could change depending on the state
- Hamilton assumes that the underlying economic states are unobservable so the process must be estimated through an algorithm that he defines
- In addition, the model had to be simplified owing to a relative lack of computational power at that time

Diebold (1994) introduced a time-varying component to the transition probability matrix

- Previous models had a constant probability transformation matrix that did not see the transition probabilities as endogenous
- Diebold uses a logistic model to transform the explanatory variables of the state-switching probabilities

Nielson (2014) introduced a model that divides equity cycle into 4 distinct phases—despair, hope, growth, optimism

- Although these states do not perfectly coincide with the ones used in our model, they do paint a broad picture of the equity cycle
- The framework describes the relationship between earnings growth and price performance as it changes over the cycle by analyzing the economic context and the drivers of stock market return for each phase.
- The model we propose uses similar equity variables but adds measures of aggregate leverage