Systematic Event-Based Treasury Trading Strategy
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There are two basic methods to approach building out the Systematic strategy, one is through modeling the volatility of the underlying assets using a GARCH model, and the other is through the use a of a short rate model such as the two factor Hull-White model which will fit the term structure. These two methods will be applied to events like Treasury Auctions, FOMC meetings, Month end and other dates as I work with my desk to define the events they want to look at. Ideally, I can arrive at the same trade systematically through two different methods as a way to validate the results. While the two following approaches are my general starting point, these are what I think are most likely to work without having been able to look at the actual data I will be using yet.

The GARCH(1,1) Approach

$$\sigma_t^2 = \omega + \alpha_i \epsilon_{t-i}^2 + \beta_i \sigma_{t-1}^2$$

The GARCH(1,1) model is fundamentally designed to capture and model short term changes in volatility or put another way the variances of a time series. The GARCH family of models is still best in class for modeling a volatility structure, and I my need to adjust it to a AFIRMA model, but that is hard to know until I look at the data. once a GARCH model is fit, there are a coule approaches I can think of to use, one is to follow the method of Krishnamurthy & Jorgensen 2011, where they implement an event study to look at the effects of QE on interest rates. The other way to I can utilize the GARCH model is to look at creating a type of reverting volatility model where I use the GARCH model to look at clusters of high volatility versus low volatility and see if I can create a simple rule for a market regime to use as a factor. A Kalman Filter may come in handy for this part

The Short Rate Model Approach

$$\begin{aligned} dr_t &= \theta_t dt + dx_t dy_t \\ dx_t &= \kappa_x x_t dt + \sigma_x dW_t \\ dy_t &= \kappa_y y_t dt + \sigma_y dZ_t \\ cov(dW_t, dZ_t) &= \rho \end{aligned}$$

The Hull-White model and or a Merton model may be the best short rate model or jump model of the models to choose from. I don't see an obvious reason to use the SABR model,since I don't need to calibrate to a volatility surface for swaption pricing. If we think about the term structure in the long run, we as quants often think of interest rates as mean reverting, but over a short period of time, rates can behave more like a pure jump process where we need to think about them like a credit default swap where there is a jump to default. The scenario that comes to mind is a in inflation print cause a jump from new information entering the market. This model may require me to aggregate the tick data to lower frequency intervals such as 5 minutes and larger. The reason for this is that as a general rule of thumb, observations under five minutes begin to no longer be normally distributed. For a lot of the models available, normally distributed data is highly advantages. I think the multi factor Hull-White model, and or a LMM model will be the two best candidates for modeling the actual traded rates