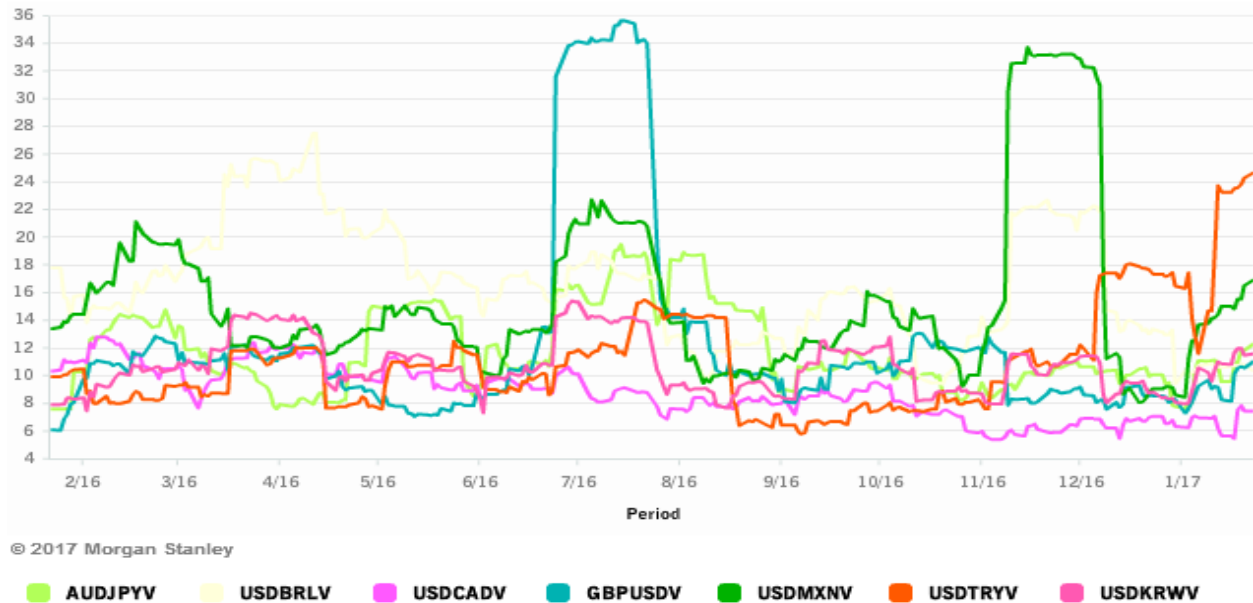


Mexico's Currency After Trump: Using GARCH(1,1) to Analyze the Peso

Donald Trump has led to problems for the Mexican peso. Since the U.S. presidential election, the peso has fallen approximately 20% against the dollar. Unsurprisingly, USDMXN has remained very volatile since the election, too. A graph of one month realized volatility for a variety of currencies in 2016 is below. The second green spike in this graph represents volatility immediately after Trump's victory.

Chart 5

Spot Realized Vol 1M %

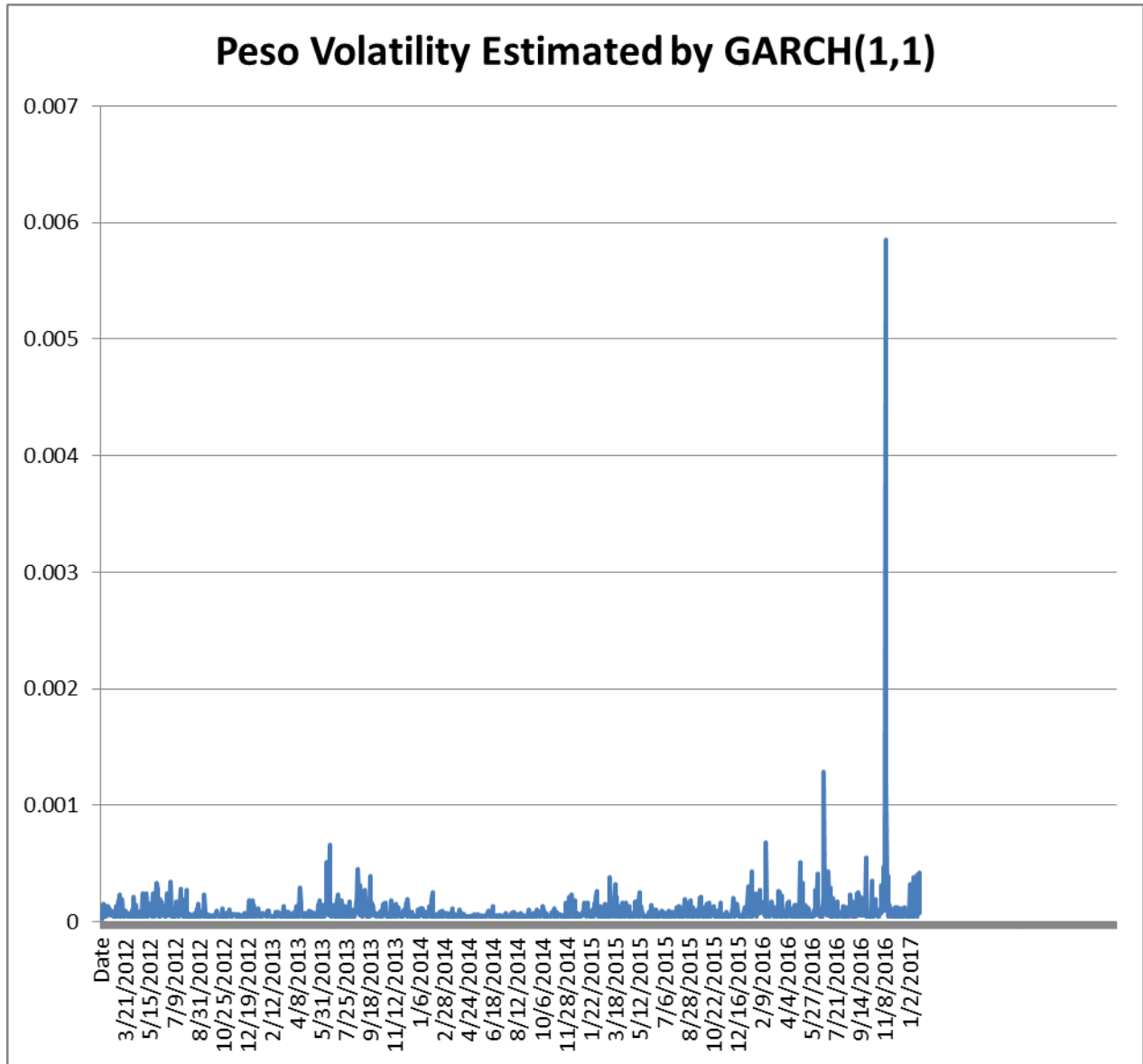


Clearly, as seen in the graph above, currency volatility is not always constant. Volatility clustering in finance relates to the fact there are periods of calm and periods of increased volatility for financial assets. The Generalized AutoRegressive Conditional Heteroskedasticity model, or GARCH, is commonly used in academia to model volatility clustering. Since GARCH processes are autoregressive, these models depend on past variances and observations to model the current period's variance.

In this report, we will analyze volatility of the Mexican peso using daily USDMXN readings from 2012 to 2017. The formula for the GARCH model we will use can be seen below, where α_{t-1} represents the percentage change in USDMXN from the previous day and σ_{t-j} represents the standard deviation from the previous day. To further explain the model, α_i is a scaling factor that measures the extent to which a shock in volatility feeds into the volatility of the following period. Intuitively, $\alpha_i + \beta_j$ can be thought of as the rate at which volatility from the current period fades away over time.

$$\sigma_t^2 = \alpha_o + \sum_{i=1}^p \alpha_i a_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2$$

A graph of the forecasted volatility of the Mexican peso produced by GARCH can be seen below. This graph makes logical sense, with the GARCH model forecasting high volatility for USDMXN immediately following the U.S. presidential election.



The GARCH(1,1) model determines that $\alpha_1 = 0.09386$, $\beta_j = 0.843323$, and $\alpha_o = 3.94 \cdot 10^{-5}$. The GARCH long-run average variance (σ_L) is defined as $\sigma_L = \alpha_o / (1 - \alpha_1 - \beta_j)$. Thus, in the five year period from 2012 to 2017, USDMXN has a long term volatility of approximately 2.5%.

Although volatility in the Mexican peso has fallen since the U.S. presidential election, threats still remain to the Mexican peso. Trump has threatened to rip apart NAFTA and re-negotiate NAFTA, and, if Trump takes action, the peso could be thrown into a tailspin. Mexico sends over 80% of exports to the U.S., so Trump's actions could significantly impact the Mexican economy and currency. Just something to keep an eye on...