Question 1b:

For two of the stocks, make a time plot of the historical risk premium, and risk premium predicted by the regression model, and the associated residuals. Are there any episodes or dates that appear to correspond with unusually large residuals? If so, attempt to interpret them.

Answer:

From the lecture notes, we know that (ri − rf) =αi + βi(rM − rf) + ei э:

* ri − rf is a stock risk premium
* rM − rf is a market risk premium
* αi is stock’s expected return if market’s excess return is zero; also known as Jensen’s Alpha
* ei is the component of return due to unexpected firm-specific events

Following analysis is divided into two parts, one is for Apple and another one is for Amazon.

Apple:

The following graph represents the Apple’s Risk Premium vs. Apple’s Predicted Risk Premium in addition with corresponding residuals.

In the above graph, we have that Blue is Apple’s risk premium (excess) and Orange is Apple’s predicted risk premium (excess; calculated using the CAPM regression model) with Grey representing the residuals (calculated using the CAPM regression model). Note, Apple’s excess tends to vary by greater degree compared to the predicted Apple’s excess. Therefore, the magnitude of change in the actual data is greater than that of predicted data. This suggests that Apple has greater idiosyncratic risk and thus its residuals move in tandem with actual excess.

From the above graph, it can be seen that the residuals generally varied between 20% interval. Residuals for APPL are closely related to residuals of S&P (market) because it has high r-square, so high residuals due to market events. An example of this would be high negative residuals for dates of 1/2/2008 and 9/2/2008 when the US market in recession due to financial crisis. This suggests that the Apple has underperformed compared to how market to the market to the market’s expectations.

Amazon:

From the above graph, Blue is Amazon’s excess, Orange is Amazon’s predicted excess, and Grey is the Amazon’s residuals. Not that Amazon’s excess varies to a greater degree compared to the predicted Amazon’s excess. This suggests that Amazon has greater idiosyncratic risk. This suggests that Apple’s excess and its corresponding residuals move in tandem.

Amazon’s high residuals are different because it has low r-square, so most of the high variance are firm specific events. In addition, they vary to a greater degree compared to Apple. Most of the residuals vary between the 20% mark with spikes in residuals on dates of 7/3/2006 (stock underperforms the market), 4/2/2007 (stock over performs the market), and 10/1/2009 (stock over performs the market).

In conclusion, both Apple (technology/computer industry) and Amazon (internet/technology industry) have high idiosyncratic risk when compared to the systematic (market) risk. From the lecture notes, we know that ei = α βi(rM − rf) - (ri − rf) э: ei an idiosyncratic risk. Therefore, smaller the residual, higher the correspondence between the company’s excess and company’s predicted excess; higher the residual, greater the disparity between the company’s excess and predicted company’s excess.