**STAT 4559: Summary of analysis**

**What statistical results were obtained?**

A time-invariant coefficient model was rejected by all assets in all market model specifications (CAPM, FF3, FF5). This supports the use of the time-varying coefficient model in further analysis.

A fair proportion of the assets tested show statistically significant relationships between the previous day’s return and the current day’s return.

* In CAPM: 8/12 assets reject the null (i.e. this relationship is zero over the full sample period).
* In FF3: 7/12 reject the null.
* In FF5: 5/12 reject the null.

This relationship, as quantified by the coefficient on lagged returns in the regression of current-period returns, is fairly robust to market model specification. This suggests that the result is not spurious.

* Plots of the coefficient point estimate and 95% pointwise confidence intervals are close to identical in the three market models tested (CAPM, FF3, and FF5).
* The three model specifications identify similar portions of the assets’ returns series as “non-random walks” in the sample period.

**What is the economic intuition behind these results (if any)?**

Significant autocorrelation in lagged returns appears to be associated with periods of significantly increased volatility in daily returns.

* Plots of standard deviation of daily returns generally show positive discontinuities in the portions of the assets’ return series identified as “non-random walks”
* The size and location of these discontinuities appears to be fairly robust to market model specification

When the autocorrelation is positive, this phenomenon can be explained in terms of market overreaction. A negative returns shock will be amplified by market participants who sell in outsized quantities. This drives further negative returns and rapid sell-offs. These sudden and severe drops in price correspond to increased volatility of returns.

* Cumulative return plots for assets such as Telecommunications, Manufacturing, and Other show that lagged returns are significant during periods which see steep price decreases.
* The “negative shock and overreaction” hypothesis is especially plausible for the Telecommunications portfolio, as this was one of the industries “hit” hardest by the burst of the dot com bubble.

When the autocorrelation is negative, the phenomenon is more difficult to explain.

**What is the practical significance of these results?**

A trader only has past information off of which to base his decisions. Fortunately, the relationship between lagged and current returns identified by the symmetric kernel analysis is well-captured by a backward-facing kernel as well.

* Point estimates and 95% pointwise confidence intervals from the backward-facing estimation follow those of the symmetric kernel estimation very well, though with significantly more volatility.
* The backward and symmetric kernel estimations identify fairly similar portions of the assets’ returns series as “non-random walks.” However, the intervals given by the backward kernel estimation are fairly volatile.

The magnitude of the coefficient on lagged returns is small (< 0.5) for all model specifications and kernels. Compared to other coefficients in the model, this is nowhere near the most economically significant predictor of returns in the cross section.

Despite this, it is possible that a trader can capitalize on this relationship in order to earn an “edge” above competitors. However, simple tests of trading strategy suggest that this is not the case.

* A trading strategy that forecasts the next day’s return as

*Ft+1 = (betat \* factorst) + I(phit significantly > 0 or phit significantly < 0)\*( phit \* returnt)*

and goes long if Ft+1 > 0 (short if Ft+1 < 0) outperforms a “pure” factor model approach in a FF5 specification only. (This test considered a portfolio of Telecommunications, Business Equipment, Durables, Manufacturing, and Other.)

* Neither the lagged returns strategy nor the factor strategy outperforms a simply buy-and-hold strategy in this portfolio over this timeframe.

The above models likely fail in forecasting because their basic assumptions (i.e. that coefficients and factors both follow random walks without drift) are faulty.

* Estimating the coefficient functions parametrically could improve forecast performance.
* Different market models could improve performance if they included variables that are more readily forecastable. Note that the CAPM/FF3/FF5 factors are themselves portfolio returns. Thus, it is difficult to forecast the return to asset i based on these factors when they themselves are returns which ought to also be based on factors which are returns…etc.