

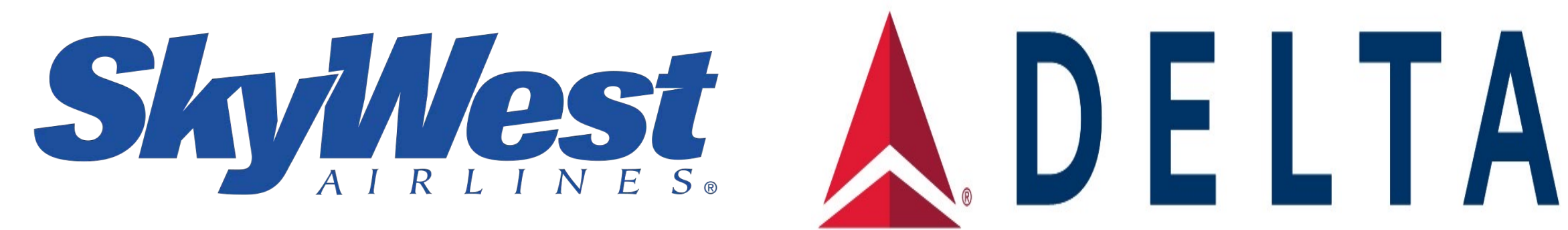
# Small vs. Large Estimating Betas for 6 Companies

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## Introduction

I stumbled upon a news article from Yahoo finance recently that discussed some of the best small-cap stocks for the month of December 2020. This got me thinking about different sectors, and how small and large stocks alike are doing. With the market currently experiencing a comeback from an awful downturn related to the Covid-19 pandemic, I thought it would be useful to examine the returns of small and large firms within the same industry. In economic downturns, as well as economic expansions, it is relevant to observe a stock's beta. Beta measures the sensitivity of the stock's returns to how the market is performing overall. A beta of 1 indicates that a stock's returns move nearly perfectly in sync with market movement; and in general, stocks with a beta > 1 are considered to be "cyclical stocks," while stocks with beta < 1 are called "defensive stocks." This makes beta one of the better ways to predict a stock's returns. In my research, I will be taking a closer look at betas of 3 small stocks and 3 large stocks. These companies were not selected randomly, rather, I have chosen one small stock and one large stock for each of 3 sectors: Airline (SkyWest and Delta), Retail and Wholesale trade (Big Lots and Walmart), and Pharmaceutical (Vaxart and Eli Lilly). These 3 sectors all contain particular relevance related to the current global pandemic, and I would like to investigate whether it makes a significant difference to be a smaller or larger company in these sectors.



## Methods

I will be running regressions in RStudio using the ordinary least squares (linear) regression technique. The first, will be a single-factor model which is commonly known as "CAPM." The Capital Asset Pricing Model is used to generate an expected return for a stock, using the market risk-premium (market returns minus risk free rate, which is the one-month treasury bill's rate of return) as the x-variable, and the individual asset's risk-premium as the dependent variable. In these CAPM regressions, the intercept coefficient will represent the individual asset's alpha, an indicator of firm-specific risk. The coefficient for the independent variable will represent beta, the stock's sensitivity to the market's performance, also known as the market-risk component. I will include a graph with a line of best-fit, allowing for a visual comparison of the assets' performances to their predicted performance from the model.

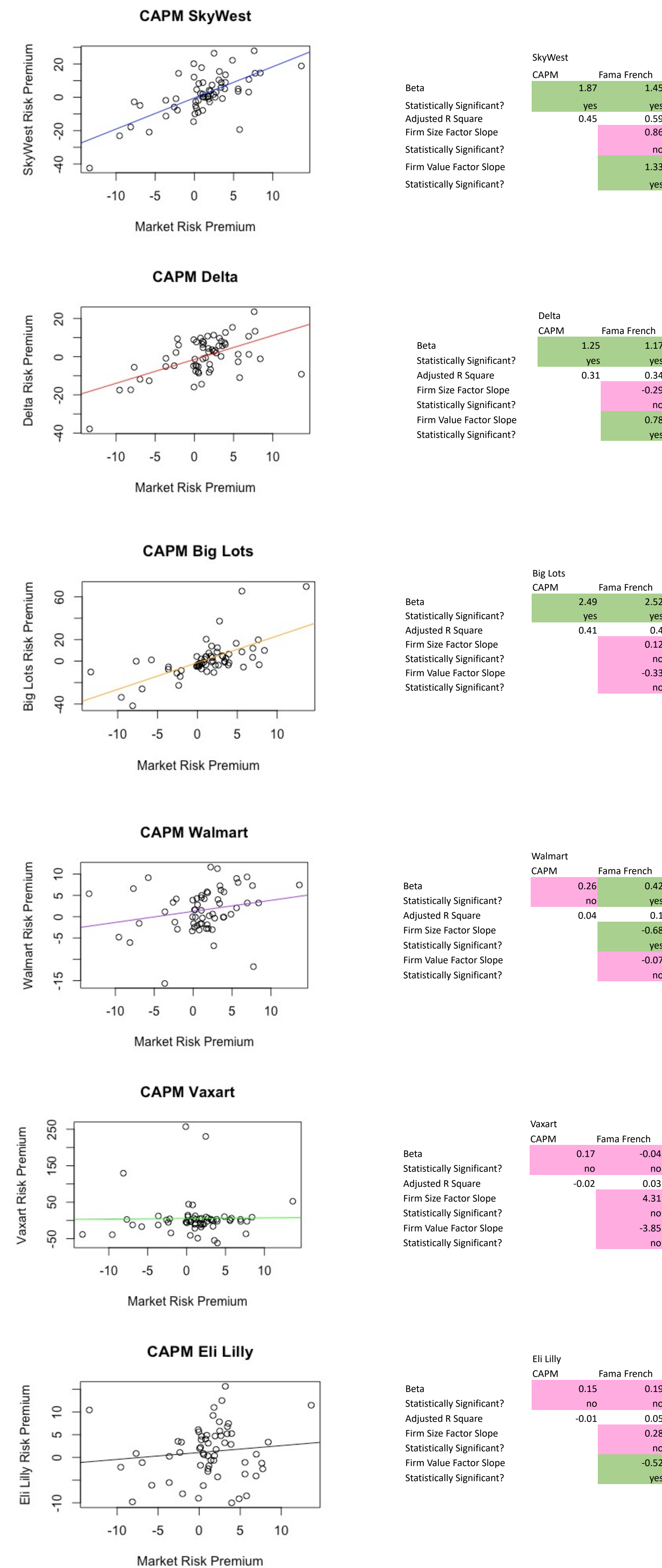
While the CAPM model may be seen as simplistic because it uses just one independent variable, market excess returns, Fama and French, two prominent men in the history of the finance world, added two additional factors to create a 3-factor model. Along with predicting an individual asset's beta for market excess returns, this model adds in a size factor, called SMB which takes the return of small stocks in excess of the return of the portfolio on large stocks. The model also adds in a value factor, called HML which takes the return of a portfolio with a high book to market ratio in excess of stocks with a low book to market ratio.

In each of these regressions, the data being used in my data file is from the past 60 months leading up to the month of September 2020. As a benchmark, 60 months of data will give me a large number of observations that will hopefully make my results more significant.

I will be including the plots I obtained from running the CAPM model for each company, then I will explain any changes that occurred when I ran the 3-factor model.

Regarding statistical significance, I will refer to a variable's slope as being statistically significant if the particular variable has a p-value of < 0.05. Likewise, a variable with a p-value > 0.05 will not be considered statistically significant according to my interpretation of these models. I will also be using adjusted R Square, and including this term in my data table with the results of each regression, because adjusted R Square will be particularly relevant in analyzing the 3-factor model, since this number will only increase if the new variables improve the model.

## Results



## Interpretation

In the airline industry, the results show that the smaller firm, SkyWest has a much higher beta than Delta's beta, but both are cyclical stocks. Further, the 3-factor model shows that both firms are affected by the value factor, but not the size factor.

In the retail/wholesale industry, Big Lots clearly has a high beta and is a cyclical stock, while Walmart's beta became statistically significant only in the 3-factor model and its beta shows it is definitively a defensive stock. The size factor also negatively impacted Walmart's returns, indicating unsurprisingly that Walmart can be considered a large firm.

In the pharmaceutical industry, the models did not explain much about the betas for Vaxart or Eli Lilly, with both coming out to be statistically insignificant estimates in each model. While the value factor explains some of the change in excess returns for Eli Lilly, it is evident based on the low R square values for both of these stocks that there may be other factors that are not modeled in this paper that are explaining most of the changes in these companies' returns.

## References

- French, Kenneth R. Kenneth R. French - Data Library. Accessed December 10, 2020. [https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).
- "Yahoo Finance - Stock Market Live, Quotes, Business & Finance News." Yahoo! Finance. Yahoo! Accessed December 12, 2020. [https://finance.yahoo.com/?guccounter=1&guce\\_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlMnVvbS8&guce\\_referrer\\_sig=AQAAADcX4TUTkxWNUJR1UKGY5iSkMdL5V-pDuNOd0ccQFaw7ModgQ7FebG-UbmdGPKLYL8pi-SXBlltkfNRuWd5EtL86JXUF2cnyxPCYROcF-CtnZGXB08wELGVJy3fC7xtET64jM1adz41ZJMeL3v-NJbYMIjSedM4ytcQlfVusH-jx](https://finance.yahoo.com/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlMnVvbS8&guce_referrer_sig=AQAAADcX4TUTkxWNUJR1UKGY5iSkMdL5V-pDuNOd0ccQFaw7ModgQ7FebG-UbmdGPKLYL8pi-SXBlltkfNRuWd5EtL86JXUF2cnyxPCYROcF-CtnZGXB08wELGVJy3fC7xtET64jM1adz41ZJMeL3v-NJbYMIjSedM4ytcQlfVusH-jx).