1. |
   1. For this analysis we will use thirteen-week treasury bonds for our risk-free rate and the S&P 500 for our market return rate. In this analysis we will use the following stocks: Apple, Google, Exxon, and Chevron. The average daily return for our assets between 2010 and 2019 is the following: AAPL: 0.00108, GOOGL: 0.000694, XOM: 0.000199, CVX: 0.000402, ^GSPC: 0.000459, ^IRX: 0.000229.
   2. Using the CAPM model we can calculate the Alpha and Beta for Apple and Exxon. For Apple we find an Alpha of 0.0011 and a Beta of 0.893. For Exxon we find an Alpha of -0.0001 and a Beta of 0.903. This lines up with our previous beliefs given that Apple was a risky stock that had technological advances that gave it an edge and Exxon was a relatively safe oil stock that would have close to market returns.
   3. The following is a time graph of Apples risk premium (Green), their risk premium as projected by our regression model (Blue), and the associated residuals (Red). The high risk premium between 2010 and 2013 may be attributed to Steve Jobs death, and the low spike in 2013 may be from the ending of the global lawsuit with HTC.

Chart, line chart

Description automatically generated

* 1. No rejection of the null hypothesis a=0 would not invalidate the CAPM model because it would simply mean the stock is overperforming or underperforming compared to expectation. This could be because something happened that the market could not account for such as new technology or a change in the company.
  2. The 95% confidence interval for beta for Apple is 8.155390e-01 - 0.971205397 and for Exon Mobile is 0.8660435254 - 0.940843615. For both companies we reject the null hypothesis that beta equals 1 in favour of the alternative hypothesis that beta does not equal 1.
  3. For Apple their systematic risk is .1429 and for Exxon their systematic risk is .1445. Neither of the company’s risk aligns with Sharpe’s typical stock as Apples systematic risk accounts for 53.66% of the stocks total risk and Exxon’s accounts for 80.14% of their total risk. This is probably because both stocks are relatively safe so most of the risk is inherent to the market.
  4. Based on our two samples there seems to be little to no correlation between beta and R^2. The two stocks have a very similar beta but Apples R^2 is much higher than Exon Mobile’s R^2. Apple has a Beta estimate of .8931 and an R^2 of .2875. Exxon has an estimated Beta of .9034 and an R^2 of .6415.

1. |
   1. If the January premium effects both the market returns and the risk free returns by the same amount then the risk premium would not be effected since all elements would rise by the same amount: This shows that risk premium would not be effected by a January premium. This means that the CAPM model would not be affected by a January Premium. It would make sense, however, that the premium only applied to risky stocks because they would be most likely to be sold in December for tax purposes which means they would have the biggest swing from December to January.
   2. |
      1. Yes, the risk premium would be affected because .
      2. .
      3. Our left-hand side becomes
      4. Subtracting from both sides we get
      5. Given this result we cannot estimate a January premium with this result, So the CAPM model dose not hold.
   3. After running a regression of stock returns on our January dummy variable we can see if January is different based on the null hypothesis that the coefficient is equal to zero. For all three of our companies, we find that at a 95% confidence interval we fail to reject the null hypothesis in favour of the alternative hypothesis that the coefficient is not zero. This implies that January is not different.
   4. After setting the Beta parameter constant over all months and running a similar regression before we can test the null hypothesis that January is better. After doing so with a 95% confidence interval we reject the null hypothesis that January is better in favour of the alternative hypothesis that January is not better.
   5. From these tests we find that CAPM model is not as versatile as it initially seemed. We also found from our testing that the January premium theory does not seem to hold and that January does not seem to differ from any other month in the long run.
2. |
   1. For each of our stocks we find the following average daily returns.



Using this data we can plot our returns to compare each company and how prices changed during COVID.

Graphical user interface, chart

Description automatically generated

From this we can see that Costco, Walmart, Peloton, and Zoom seems to do well during the pandemic while the overall market, Burger King, Taco Bell, and McDonalds seem to have don poorly.

For McDonalds we can plot their abnormal and cumulative returns to see how the company did during lockdown.

Chart, line chart

Description automatically generatedChart, line chart

Description automatically generated

* 1. Using the market Model and rerunning our analysis we get the following graphs.

Chart, line chart, histogram

Description automatically generated

Chart, line chart, histogram

Description automatically generated

Our results do not seem to differ from our previous results. COVID dose seem to have a significant impact on cumulative abnormal results but except for a few days does not seem to effect abnormal returns.

* 1. We can now do the same analysis for Burger King, Zoom, Walmart, Costco, and Peloton and plot their cumulative abnormal returns.

Chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

Chart, histogram

Description automatically generated

Chart

Description automatically generated

Chart

Description automatically generated

Overall markets viewed COVID as a bad thing. However, some companies like Zoom and Peloton did well because they made products that were useful during the pandemic. Similarly, companies like Walmart and Costco who had delivery and sold things people needed did well during the pandemic like food and laptops. Alternately restaurants like Burger king and McDonalds didn’t do as well because people were cooking at home more. The Market broke up companies into those who could thrive under lockdown and those who were severely hindered during lockdown.