

UCI Project #1 - Team 4

Aaron Mahalik, Sukhyun Kim, Nandish Patel, Jacqueline Yi, Aaron (Min) Lee, Justin Pot

Summary of Findings

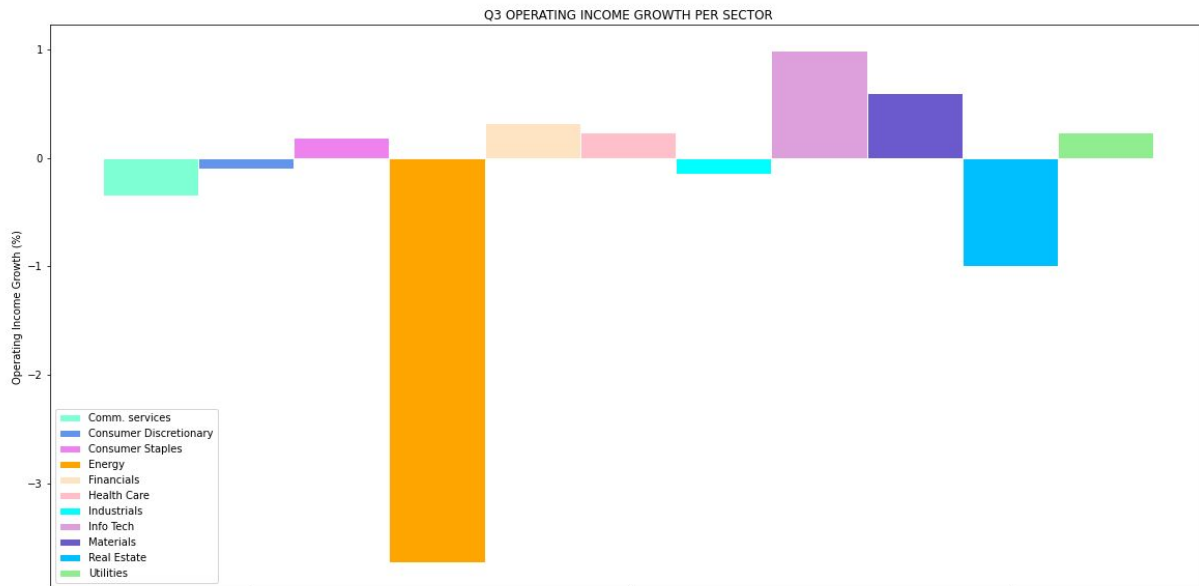
Our findings show that the average figures in terms of growth, valuation, and performance are not significant enough to support conclusions about the stock market. Our qualitative and quantitative analyses do support our hypothesis that we could potentially be in a tech bubble, but there are limitations that we have not analyzed that may impact our conclusion.

Limitations

Some of the limitations that we came across with our analysis is a lack of data on macroeconomic factors such as interest rates, unemployment rates, and per capita disposable income. The API data we used is also not the most recent, as it ends at Q2 (June 30 2020). Since we only analyzed up to the last quarter, the most recent market data is not included in our analysis. And finally, markets are impacted by qualitative factors, so valuation and profitability metrics are not enough to draw large conclusions

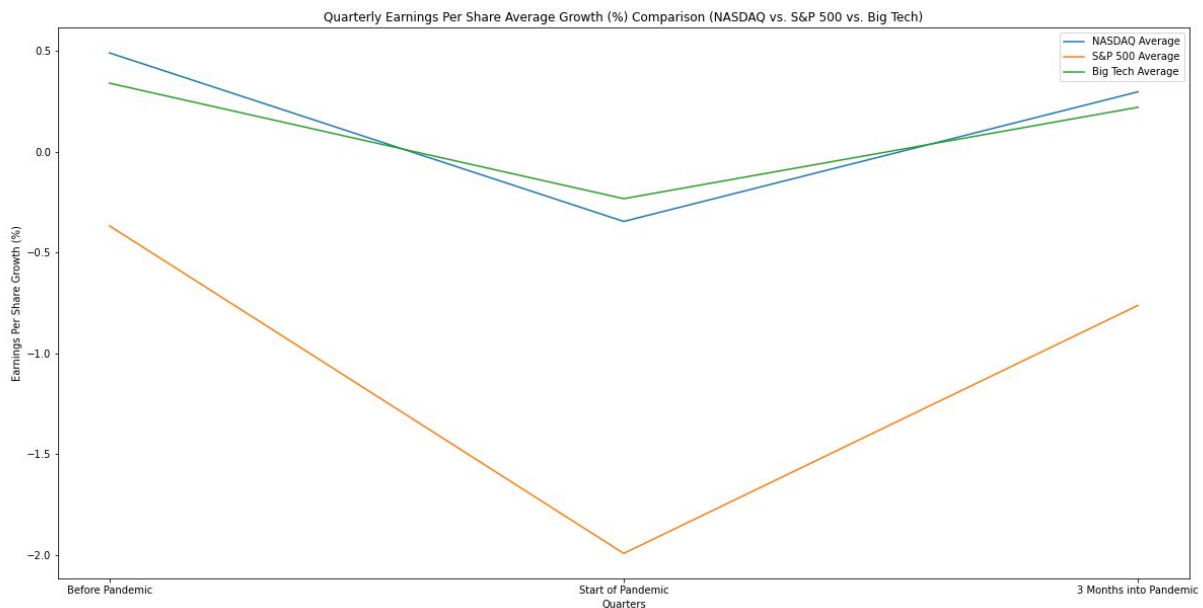
Answers to our questions

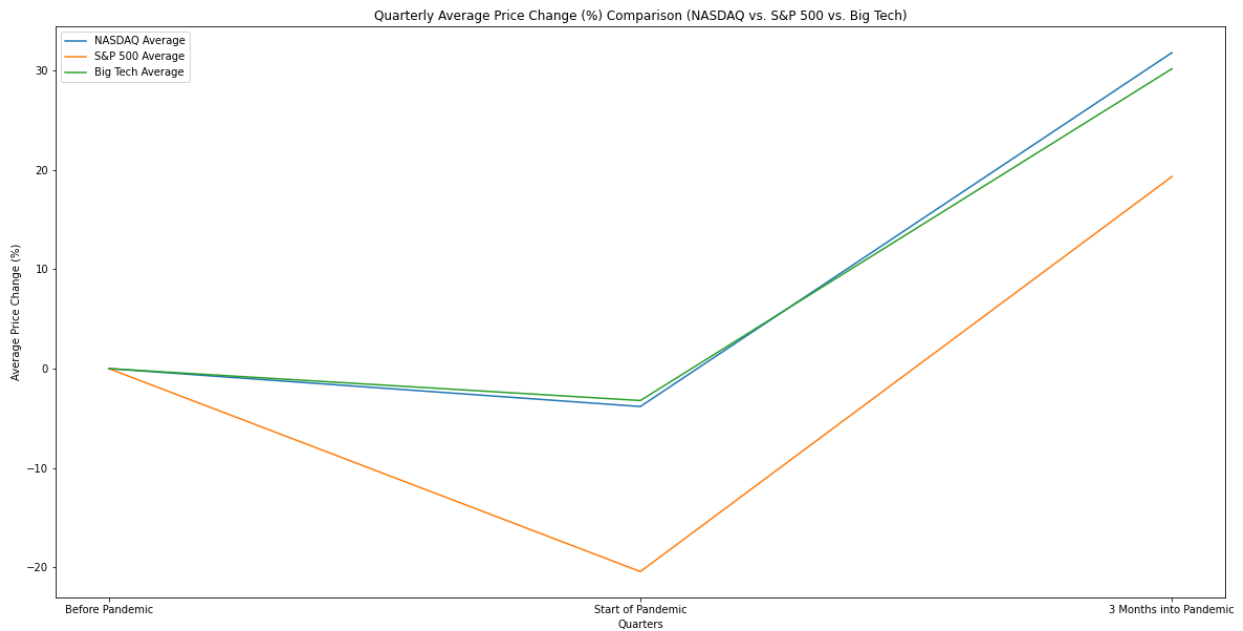
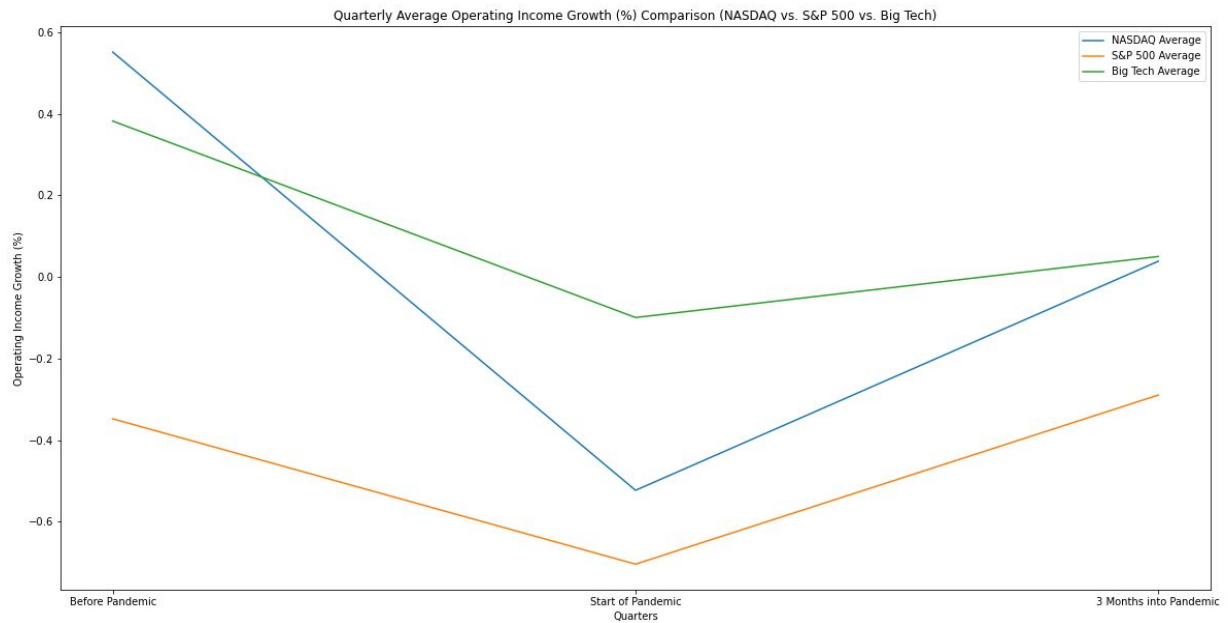
- 1. How did each sector perform leading up to and during the pandemic? Which sectors did worse? Better?**



Sectors that require incremental investments such as working capital performed worse than sectors such as information technology that do not require such investments in order to make their products and generate sufficient revenue. The strength and potential of tech leaders derives from their dominant market share and power based on average operating income growth in quarter 3 (3 months after the pandemic was announced in the United States).

2. How did the tech sector perform relative to the S&P 500 index?



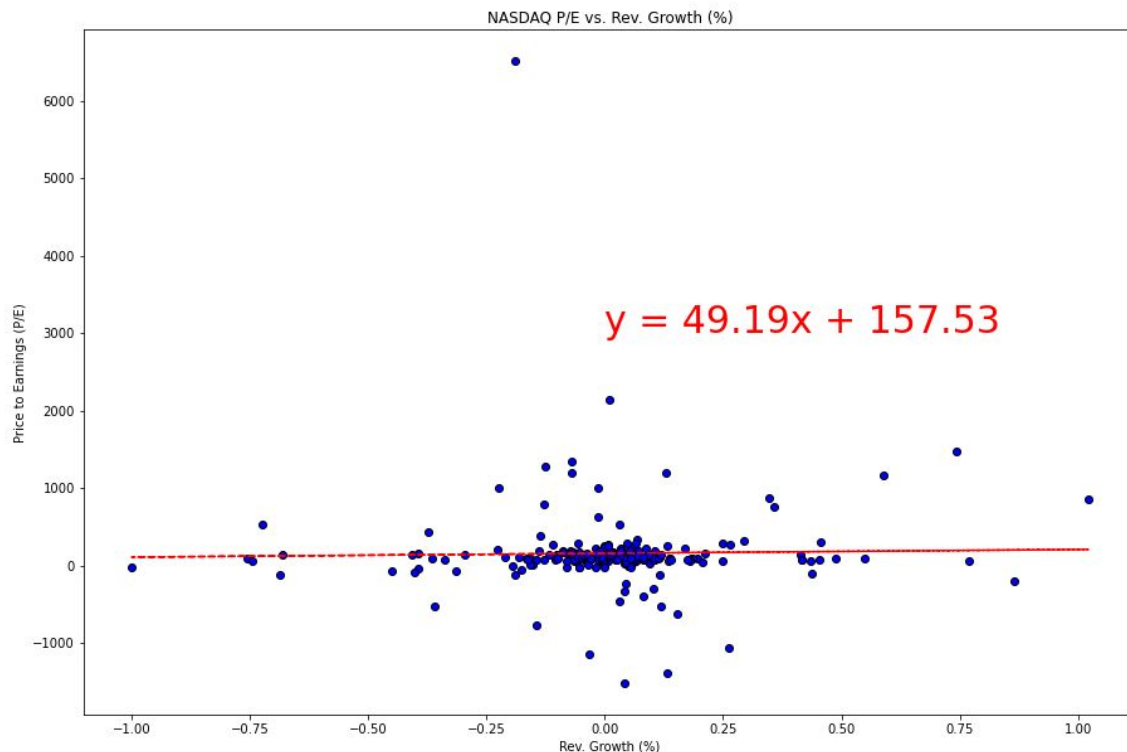


While technology companies outperformed both the S&P 500 and NASDAQ benchmarks, the sectors that fell behind underperformed and continued to suffer losses as a result of the pandemic. The graphs reflect that the adoption of technology was clearly pulled forward by the pandemic as use of e-commerce and online platforms have become more and more common for everyday consumptions in businesses, schools, and homes.

3. Do industry average P/E ratios align with revenue growth and current income?

To properly answer this question, we conducted a quantitative analysis by testing the correlation between the Price to Earnings Ratio and the Revenue Growth Rate of all NASDAQ companies. Ultimately what we were doing with this regression correlation was testing the relationship between the expectations of the stockholders and the actual performance of the companies in the tech sector.

We accomplished this by creating a scatter plot and plotting a regression line that would test the strength of these two metrics in the context of the pandemic. We then pulled the correlation coefficient, or the r-value, of said correlation. That r-value for the correlation between Price/Earnings ratio and Revenue Growth for the tech sector that we calculated was approximately 0.02077, which indicates a very weak relationship. This means that we can reject our null hypothesis, and that the high confidence of investors in the tech sector cannot be justified by the revenues that the tech sector is bringing in.



R-Value: 0.02077

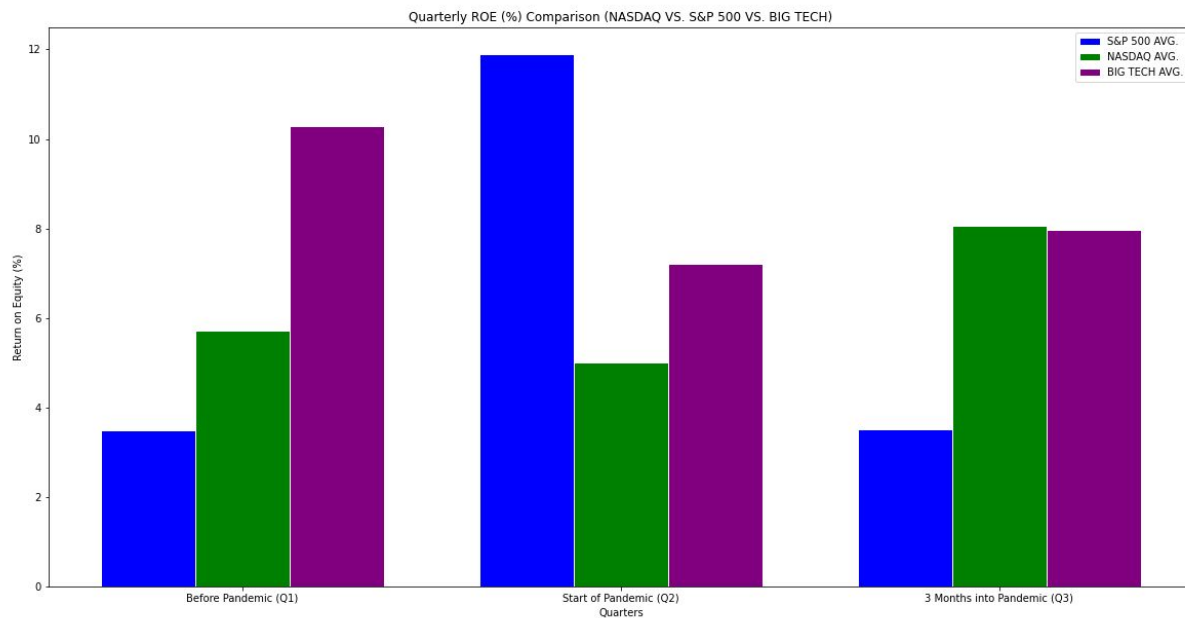
4. Finally, is this a bubble?

A tech bubble is signified by a multitude of different factors, certainly more than we were testing for in the scope of our analysis. The way that we tested for a bubble was by checking if the value of tech stocks were being overestimated based on revenue growth.

Our quantitative analysis does not for a fact say that tech stocks are overvalued, because the reason the tech sector is priced so highly could be attributed to a high valuation for future advancements, but it does support this idea that the tech sector of the stock market is in a bubble.

From the bar chart below, we can see that the Return on Equity (which is calculated by dividing a company's net income by shareholder equity) of the overall tech sector increased during the pandemic, along with a huge increase in its price, meaning that the increase in net income of the tech sector actually excelled past shareholder expectations, which shows the resilience and strength of the tech sector's ability to bring profitability.

This could be a qualitative sign that the tech sector is being valued properly and that the market is not currently in a tech bubble. To answer this question more accurately, we would need to take into account data from some of the limitations that go beyond the scope of our analyses, including macroeconomic factors and some more recent market data from Q3.



References

Financial Modeling Prep API

- <https://financialmodelingprep.com>

S&P 500 constituents: JSON database

- https://pkgstore.datahub.io/core/s-and-p-500-companies/constituents_json/data/8fd832966a715a70cb9cf3f723498e3b/constituents_json.json

The end points used (based on quarter end dates):

- Financial Ratios (priceEarningsRatio, returnOnEquity):
<https://financialmodelingprep.com/developer/docs/#Company-Financial-Ratios>
- Financial Growth (operatingIncomeGrowth, epsgrowth, revenueGrowth):
<https://financialmodelingprep.com/developer/docs/#Company-Financial-Statements>
- Historical Daily Prices - closing price for each quarter ends:
<https://financialmodelingprep.com/developer/docs/#Historical-stock-index-prices>
- Historical Stock Splits
<https://financialmodelingprep.com/developer/docs/#Historical-Stock-Splits>