Advances in Economics, Business and Management Research, volume 215
Proceedings of the 2022 7th International Conference on Social Sciences and Economic Development (ICSSED 2022)

COVID-19's Impact on the Computer Industry during the Pandemic

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ABSTRACT
Covid-19 was first discovered on December 12, 2019 in Wuhan, Hubei Providence, China according to the CDC. It has, more or less, dramatically affected our society as a unity, and also individual daily lives. This paper analyzes the impact of the pandemic on the industry of electronics, specifically the computer industry. Four leading enterprises are analyzed in the industry, Lenovo, Apple, HP and Dell, to help understand the overall impact of the pandemic on the entire industry. This paper uses 2021 10-K forms to analyze their sales growth, financial performances, turnover rate and many other matrices to highlight that the pandemic is causing enterprises vulnerability but also an opportunity. This paper may offer some personal insights about COVID-19 on the perspective of computer and electronics industry: accelerator or reducer.

Keywords: *COVID-19, Economy, Electronics, DCF*

1. INTRODUCTION

Previous studies have explored that the outbreak of COVID19 had a major impact on the global economy, society and many other sectors. Sharif and partners' study have proven that "COVID-19 is expected to have a long-term negative effect on the geopolitical risk levels and economic uncertainty" [1]. During the pandemic, from January to July 2020, "the unemployment rate rose from 3.6% to 10.1%, industrial production fell by 9%, and nonfarm employment fell by more than 12.5 million people" [2]. Stock market has been fluctuating dramatically during the pandemic causing panics and chaos. More specifically, plentiful industries are affected, injured, by COVID-19 as it creates abundant number of obstacles for nearly everything. For instance, as a student, I have been deeply impacted as lockdown blocks the connection between students and teachers, and "substantial issues with a reliable Internet connection" was a nightmare [3]. This paper will explain and go through the computer industry's current situation and prospects during the COVID 19 pandemic through analyzing four global leading enterprises. Through analyzing key data in each's financial statements, matrices, the use of DCF model to calculate the present value of each enterprise with comparison to the present market value. Additionally, this paper will highlight the performances in the computer industry compared to the others during the pandemic.

2. HYPOTHESIS

Under the current situation in the pandemic, it is obvious that electronics reached a new level in sales and importance. Because of the distance of communication trend, laptops and computers are now a necessity for people in order to educate and work during the pandemic all over the world. It is reasonable for computer industries to perform much better than most other industries in the United States. (1) Computer industries should have a larger growth than the U.S. Economy overall; and (2) Computer industries should have a promising future. Computer industries may develop rapidly as COVID drives the societies into remote or hybrid conditions and accelerates the digital era represented by metaverse and some other immature technologies. All the following method analysis will be based on the following Table 1.

Table 1. Annual Report Statistics (Millions)

	APPLE	DELL	LENOVO	HP
Net Income	$94,680.00	$3,250.00	$1,313.00	$6,503.00
Total Sales 2020 - 2021	$365,817.00	$94,224.00	$60,742.31	$63,487.00
Total Sales 2019 - 2020	$274,515.00	$92,154.00	$50,716.35	$56,639.00
Operating income	$108,949.00	$5,144.00	$2,180.41	$5,302.00
Total current assets	$134,836.00	$43,567.00	$23,335.35	$22,170.00
Total current liabilities	$125,481.00	$54,132.00	$27,372.64	$29,096.00
Total Asset	$351,002.00	$123,415.00	$37,991.63	$38,610.00
Shareholder's Equity	$63,090.00	$7,553.00	$1,336.07	-$1,650.00
Shares Outstanding	57,365.00	1,789.81	656.00	1,220.00

3. METHODS/ANALYSIS ON THE IMPACT OF COMPUTER INDUSTRY DURING PANDEMIC

3.1. Sales Growth

In the start of the COVID pandemic, everything looked like end of the world. According to Dr. Rodousaki, there was "a reduction in GDP of about 3.4% for the year 2020" [4] in the U.S. economy due to the spread of the virus. Later on, the government became familiar with the COVID gradually and the economy started to defrost. The U.S. Economy encountered a recovery as the COVID is slowly getting under controlled, perhaps, and real GDP increased 5.7% in 2021. All industries have recovered during 2021 and they are getting on the right track.

Conversely, the computer industry did not seem to decline as much as others, and they are sprinting during the pandemic. The 10-K forms from the four leading enterprises, Apple, Dell, Lenovo, and HP, demonstrate the mighty growth. Sales growth is one of the perceptual intuition metrics that shows the growth of the enterprise over a period of time. It is calculated through formula (1):

$$(\text{Current Year Revenue} / \text{Prior Year Revenue} - 1) * 100 \quad (1)$$

The sales growth numbers for each enterprise, demonstrated by Figure 1, are 33.26%, 2.25%, 19.77%, and 12.09% for Apple, Dell, HP, and Lenovo respectively. The sales growth are more than two times of the economy's growth on average. According to the sales growth presented, an assumption can be made in which the computer industry is growing its market size and numbers of customers during the pandemic in a more efficient way than most other industries.

Since they are decent sized enterprises, with 50% of companies in the S&P 500, a comparison of these enterprises with S&P 500 sales growth will be much more visualizing. According to multpl.com, the S&P 500 sales growth for year 2021 is 10.77%, comparing to the average of four selected companies' sales growth of 16.84%, the four enterprises on the list obviously have done 56.38% better than the average S&P 500. This demonstrates that computer industry, or the entire electronics industry, is well-performed for recovery during the year 2021 and they are welcomed by the market and customers.

Although Apple experiences a much higher growth than the others, Apple is playing the role of outlier in this research because the main market of Apple is iPhone instead of PC. Its purpose is for comparison as Apple is a profitable and popular enterprise.

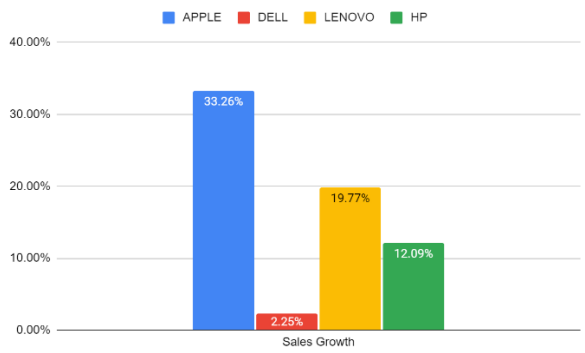

Figure 1. Sales growth numbers for each enterprise

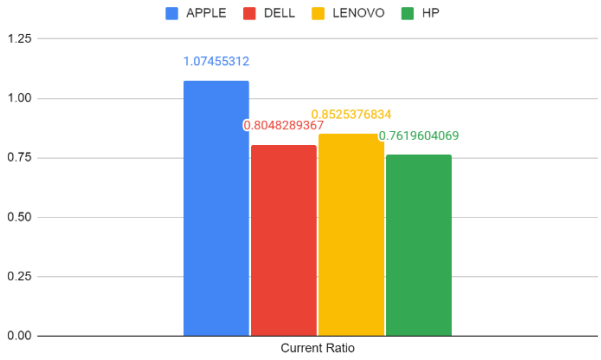

Figure 2. Current ratios for Apple, Dell, Lenovo, HP

3.2. Liquidity

Liquidity is a critical factor that measures enterprises' performance during a period. A corporation with a higher liquidity measurement can repay its liabilities with its assets. These kinds of corporations usually expect an increase in their stock price in return for recognition by the investors [5]. In this research, the current ratio is being used to measure the enterprises' short-term liquidity, the width of one financial year, to analyze if they have the potential ability to pay back the current liabilities. As stated by Kasmir (cited by Nuryani) that "Current ratio is a ratio to measure the ability of companies to pay short-term liabilities or debt that are due immediately when billed as a whole" [6]. In other words, measuring the number of assets used to pay the immediately due liabilities. The current ratios are being calculated using the formula (2):

Current ratio = Current Asset/ Current Liabilities (2)

Suppose the current ratio number is larger and equal to 1. In that case, it represents that the corporation can pay back all the current liabilities with its current assets if the firm declares bankruptcy. While being above 1 with the current ratio is the target for firms, being too much above 1 is not a good sign for enterprises. Generally, a firm with a current ratio much above 2 is abnormally high, representing the corporation is holding too much cash and short-term assets and not utilizing them efficiently. By analyzing the data from the corporations' balance sheet, The current ratios for Apple, Dell, Lenovo, HP are 1.07, 0.80, 0.85, 0.76, respectively, for the financial year 2021, as shown in Figure 2. The data represents that the firms maintain perfect cash and assets/liabilities ratio. Apple has the ratio closest to 1 because they have been giving out dividends back to their stockholders as a return when they have an excess amount of cash on the account. Beyond that, the numbers also represent that they can maintain healthy cash flow even during the pandemic and can benefit the stakeholders. Compared to other S&P 500 firms, the average current ratio rose from 1.24 in 2020 Q1 to 2.26 in 2021 Q3. The ratio has constantly been increasing due to the uncertainty during the pandemic. These corporations hold much more cash in hand as preparation for short scenes. The computer industry is financing thoroughly and is also more stabilized. The leading firms hoard less cash and make investments. They are confident about their ability to repay current liabilities even during the pandemic, and thus they return the extra amount of cash to the equity holders through dividends.

3.3. Profitability

Profitability is one of the most significant factors to measure if an industry is in great shape or needs a transition during the pandemic. As stated by Dr. Hofstrand from Iowa State University, "measuring profitability is the most important measure of the business's success" [7]. To measure profitability, Asset Turnover, Return on Equity, Return on Asset, Profit Margin will be used as matrices as the measurements.

Asset turnover measures a corporation's ability and potential to generate revenue with existing assets as input, reflecting the corporation's asset occupation; the profit margin measures a corporation's ability to control and minimize the cost of inputs of producing revenue, reflecting the corporation's operating efficiency [8]. A high asset turnover rate represents that the enterprise utilizes its assets efficiently to generate revenue and sales. Additionally, it's exceptionally remarkable for firms to maintain a healthy asset turnover rate during the pandemic. The calculation of the asset turnover is as shown in formula (3):

Asset turnover = Total Revenue / Average Total Asset (average of previous and current year total asset)

(3)

After calculation, the asset turnover for each firm is 1.08, 0.78, 1.73, 1.73 for Apple, Dell, Lenovo, and HP, respectively. While Dell performed a much lower asset turnover rate than the other three firms, it still performed fair during the quarantine using its assets. It is possible to assume that Dell was a bit more conservative over their asset than the other three firms. The rest of the firms

leveraged well throughout the year and efficiently used their assets. According to CSIMarket, the asset turnover ratio for the S&P 500 is 0.3. They are representing that the computer industry is generating revenue much more efficiently. However, considering the computer industry belongs to retailing industries, the asset turnover ratio of 1 is not satisfactory. Retailing industries are constantly in a cycle of producing and selling products. An asset turnover ratio above 2 will be remarkable due to high transactions. Thereby, although the industry is much more liquidized, there is still room for improvement for the enterprises and possibly the computer industry after the pandemic.

On the other hand, the computer industry performed exceedingly prominent in the other two matrices: ROA and ROE. ROA is a metric that "shows how much assets contribute to creating net income" [9]. Similarly, ROE is another metric that measures similar aspects but with the value equity as input. ROA's connection with a firm's profitability is that the higher the ROA ratio is, stated by Humana, "the better the profitability ratio, the better it is to describe the company's high profitability." Thereby, Return on Asset is calculated using Formula (4):

$$ROA = \text{Net Income} / \text{Total Asset} * 100 \quad (4)$$

The equation of ROE is the same except that it's the net income dividing the shareholder's equity. Through calculation, ROA for the four firms is 26.97%, 2.63%, 3.46%, and 16.84% for Apple, Dell, Lenovo, and HP, respectively. Within these four enterprises, Apple demonstrated a relatively high rate compared to the rest of the firms, and this is because of Apple's high profit for a unit of product. Apple is considered a luxury brand in the electronics industry, and therefore it seems to have a much higher return on assets than the other three brands. Meanwhile, the ROA for S&P 500 is 21.85% for the year 2021, and the retailing industry's ROA is 16.6%. In comparison, the entire retailing sector anticipates a lower ROA value than the whole market. Moreover, the computer industry has an even lower ROA value because of its low profit. Their income is mainly based on sales numbers instead of earnings per product unit. The computer industry is experiencing with operating margin of roughly 7-8%, which means they earn 7 cents per dollar in revenue. Correspondingly, the ROE values for the computer market demonstrate a much lower level compared with the S&P 500 average. Although the computer industry have low ROA and ROE values, it also reveals that the customers welcome the firms. They earn considerable net income when their operating margin is sparse. A significant volume of purchases was made during the period, which is an optimistic sign.

3.4. DCF Prediction Price Per Share V.S. Market Price

Anticipations about firms may have changed during the period of the pandemic. Many corporations, especially retailing industries, went bankrupt during the pandemic, and thus people's expectations of certain corporations may have changed during the year. The market value of shares is one way that reflects people's expectations of the corporation's return. It represents people's and the capital's attitude towards the specific company. Comparing the market price to the theoretical price calculated using models and compare can reflect the difference and anticipation from the market. DCF (Discounted Cash Flow) is a widely used method to calculate the present value through assets' estimated future cash flows [10]. It uses discounted rate (WACC%) to discount the firm's future value in terms of present value, and commonly, in value per share. Although not exactly precise, the DCF model gives a relatively close estimation of the reasonable market price. To estimate the present value of a firm, the DCF model calculation separates into parts: before the terminal stage and after the terminal phase.

The DCF model estimates the present value of the next five years. A firm would take to enter the terminal stage. The firm is considered in a developing period with high yearly growth. After five years of high-speed development, the equation assumes the business will enter its terminal stage where the growth will be the same as the overall economy. As firms get dense and mature in size, it's much harder to achieve rapid growth. Therefore, discounting the terminal stage with the discounted rate will provide the present value for the firm's value after five years.

Since the DCF model is a comprehensive model that calculates the present value of the potential in the firm's future, plentiful critical and necessary variables are in the model. WACC discounted rate, tax rate, cash flow 5-year growth rate, and the economic growth rate are the required rates to predict the firm's growth and discount it to present value. EBIT, current liabilities, and other quantities in Table 1 are all used to calculate the firm's value of Equity and Price per share.

For example, Apple's WACC is 8.3%, which means the future values are discounting at the rate of 8.3%. Its cash flow growth rate is 29.6%, exceptionally high in the market, demonstrating the estimation of growth in Revenue and EBIT for the upcoming years. The market growth rate incorporated in the model is 2019's GDP growth rate (2.2%) because of the unsustainable annual growth rate in 2020-2021. Apple's DCF price per share is $209 after inputting all the necessary variables, and the estimation is slightly above the market value of Apple's common stock price of 176 (02/09/2022). This difference between estimation and actual value of stocks is caused

by the drastic increase in money supply in the computer industry during the pandemics, which lifted the five-year average cash flow growth rate. Consequently, the estimation of the revenues depends on the rate. This phenomenon also occurred in the other three firms, in which all four firms have cash flow growth rates that are 2-3 times the average rate (around 14%).

Similarly, the other three are also experiencing DCF prices per share beyond expectation. Dell has a DCF price per share of $126, and its market price is $56. Similarly, for HP and Lenovo, their DCF price per share to market price per share are 144:52, 6:1 respectively. These firms have excessive DCF price per share compared to the market value because the entire industry is performing much better in sales during the pandemic. People relied on technology to work, educate, communicate, and everything during the pandemic, and thus they had a dramatic increase during the last year. High DCF can also illustrate that the investors are not confident enough in the statistics and the rebound from these firms during 2021 because of uncertainty. Their stock price skyrocketed during the year, but the investors are uncertain about the actual growth behind the sudden increase. However, the DCF model still reveals that the computer industry developed decently during the pandemic with an insanely high cash flow growth rate for 2021 (some of them reached over 70%). In other words, the market overall recognizes its growth and product as reflected on the stock price changes. Also, some uncertainties struggled the investors to invest at a higher price.

4. CONCLUSION

This paper uses three measurements to evaluate the computer industry's performance during the pandemic. These are the liquidity, profitability, and the DCF model pricing, which measure different aspects of the firms and industry.

Liquidity measures the business's ability to pay current debt obligations, using its current assets without raising any external capital. High liquidity means that the firm can quickly pay back its loans; low liquidity represents bankruptcy. The current ratio is a standard measurement used to measure firms' liquidity. The four leading enterprises demonstrated a healthy current ratio. Representing the firms constructed stable and efficient asset management and simultaneously ensuring they have some excess reserves for liabilities.

Next, profitability measures the ability to generate income through its current assets. Operating margin (also profit margin), return on equity, and return on the asset are used to measure profitability in this case. With the calculation, the trend reveals that the retailing industry usually has a relatively low-profit margin, and their revenue is based on an abundant amount of sales. Therefore, these three matrices are relatively low for the computer industry compared with others in the S&P 500. Nonetheless, the entire computer industry revealed a low margin rate caused by hyper-competitive within the industry.

Lastly, the DCF model estimates potential value, usually in terms of price per share. It describes the reasonable price per share of the firm with the current development, operating statistics, and other data provided by the firm. In this section, all four firms performed with high DCF price per share, mainly caused by the recovery and growth during the economy's recovery period. They all have a higher DCF price per share than the market value per share, representing that the value of current growth is more than the market price. The cause of the difference is the uncertainty in the growth.

Overall, the computer industry encountered a great mass fervor in sales and growth. Because of the pandemic, people consumed more computers, laptops, and other electronics in 2021. The phenomenon is demonstrated by a fair return on assets with nearly 0 operating margins. Because of that, these firms can pay off a large amount of their debt during the year and increase their cash flow. Consequently, leading to DCF price per share that's much above the market price. Therefore, COVID-19 may have pushed the computer industry and played a role of an accelerator. It helped transition working and learning into a remote era and increased hybrid work productivity simultaneously. However, there are plentiful assumptions made in the paper due to lack of knowledge and experience; I hope the later research can reduce bias.

AUTHORS' CONTRIBUTIONS

This paper is independently completed by Baimin Wang.

ACKNOWLEDGEMENTS

First, I would like to thank my professors and teachers with my gratitude and respect. They taught me plentiful new jargon, methods and ideas in this area that I never heard of before. They supported me with valuable insights and guidance throughout this paper to ensure that I am on the right path. The feedback from them often causes me to ruminate over my ideas and polish them. Secondly, I would show my gratitude to all of my friends who supported me physically and mentally. They are patient and kind whenever I express my annoyance and confusion to them. They motivate me deeply to proceed forward.

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