

# Stock Valuation and Investment Prospects of Digital-Product Industry in the Post-Pandemic Era

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**Abstract.** The coronavirus outbreak brought the economy to a standstill, and now the worst of the pandemic period is over. Capital markets are also trying to regain their former prosperity. So how to choose the appropriate industry to invest in the post-epidemic era is a problematic issue worth thinking about. Digital manufacturing is a shot. This article will explore three questions. The prior thing is to figure out the characteristics of the digital-device stocks by analyzing the finance ratios. And the second problem is how the digital-manufacturing corporates performed comparing with the whole US stock market. The same kind of financial parameters will be calculated for the overall market in order to position the status of digital enterprises were in. Finally, how much risks would be laying out in digital maker and how to adjust the investment strategy accordingly. This query will be measured by other financial tools to offer a clear impression of future prospects. Eventually, the study has found out that even though mismatch between spending and earnings are possible to occur, the steady output is fulfilled in digital-making field. Meanwhile, it is better to be a long-run shareholder. As the appreciation of fixed assets takes time to polish, this coincides with the business strategy of digital products companies. The direction of the research is purposeful as in the post-pandemic era the capital world needs strategy makers to make right choices under the inferior situations.

**Keywords:** Profitability, Valuation, Payout, Beta, Risks.

## 1. Introduction

In the early stages of the outbreak, daily operations in many industries came to a screeching halt. Now, as the epidemic has been normalized, many firms were gradually returning to the original track. Financial capitalists began to enthusiastically participate in funding activities and stock markets again, actively hunting for new investment objects. However, the reality backfired. The coronavirus outbreak has led to the worst global recession since 1930 [1]. At the same time, due to the quarantine policy, the mobility of the population had sharply declined, which had weakened the consumption power and led to economic stagnation [1]. The Figure 1 lets this idea unarguable. The international transactions for main countries had been cut markedly comparing with the pre-pandemic era, proved by information collected from Eurostat [2].

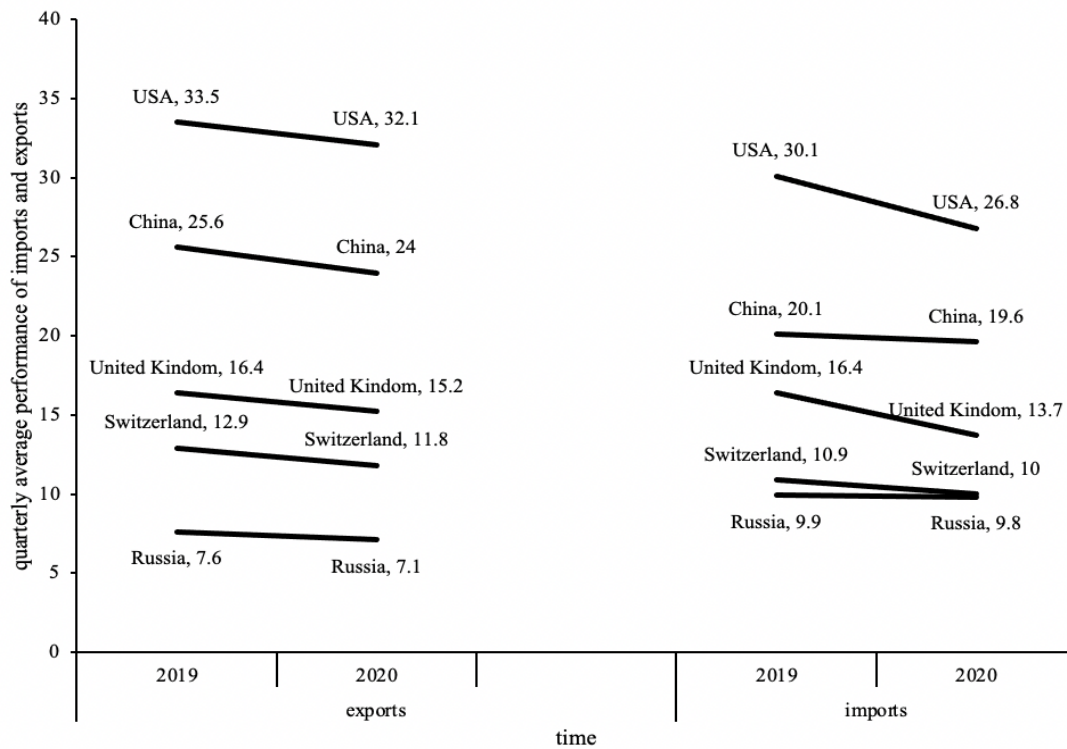


Figure 1. Quarterly average performance of imports and exports (in billions) for five main countries in 2019 and 2020.

There is a non-recession target for investors to choose. The pandemic is quietly changing the way people work and live for a long time. An obvious feature is the social distancing among people. The importance of long-distance communication emerged. Online meetings, live lectures, and computer games have all become routine. Investigation from Statista better illustrated the phenomenon by sending questionnaires about frequency of weekly days of remote working in United States in 2020 [3].

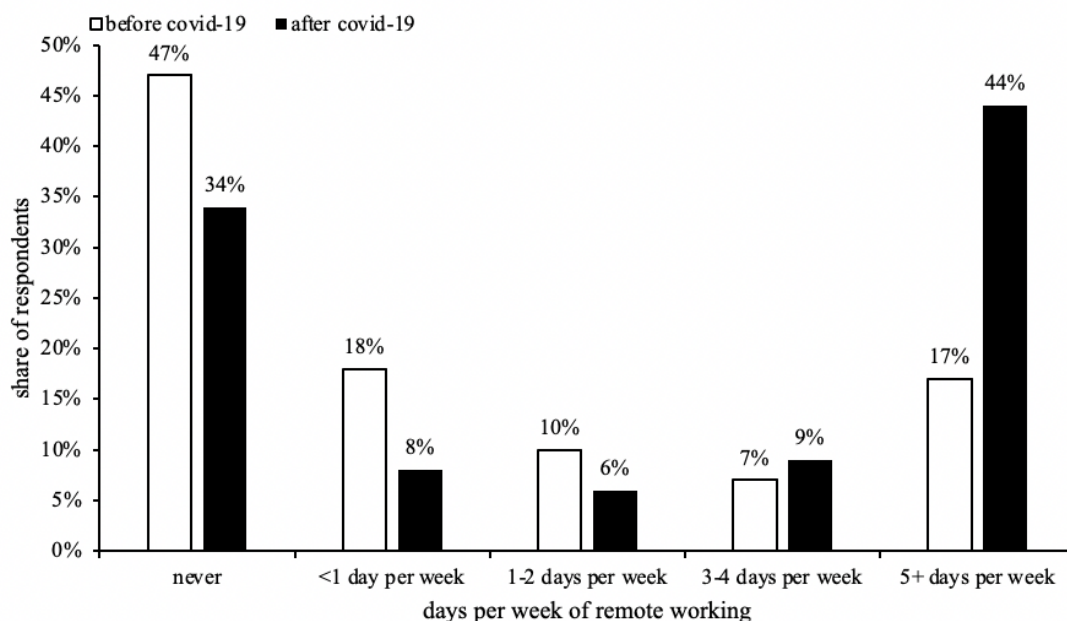


Figure 2. Responses of days per week of remote working after pandemic.

Interviewees spent more than 5 days working in distance stood out. The Figure 2 demonstrated that telecommunication was a must for nearly half of the people. Hence, a good device could guarantee the process goes smoothly. The demand for digital products will escalate as a result, providing a new opportunity for investors. Thus, giving a shot for stocks of digital makers may be a feasible action. This study will choose seven samples as the objects. Which are (hereafter referred to as seven target companies): Apple Incorporated (APPLE), Dell Technologies Incorporated (DELL), Garmin Limited (GARMIN), Microsoft Corporation (MICROSOFT), Koninklijke Philips (PHILIPS), Qualcomm Incorporated (QUALCOMM) and Sony Group Corporation (SONY). As they are world-renowned and at the forefront. Their business scope covers the whole process from manufacturing to selling digital products. The discussion will be conducted by using the financial information of the representative organizations from 2018 to 2020 to evaluate the stock value and investment prospect of the digital-device area. Eventually, the conclusion is that this investment is well-suited with non-aggressive capitalist and long-term strategy maker. The stocks for digital field are somewhat inflated, making it a less cost-effective decision. The trend of the industry was not the only center attention, providing investors with a visionary idea was another concern. Stand in a higher position to see the big picture. This made it easier to discover the strengths and weaknesses of the favorite stocks. In addition, this study paid attention to the potential risks and whether the chosen investing target was compatible with the unknown risks in future, peacefully answering to the worst-case scenario. Looking at the overall environment, the epidemic has made the national economy backward. For the economy to achieve steady growth in the post-covid-19 era, the first step is to invigorate stagnant financial activities. Well-functioning stock market and accumulation of capital could activate the liquidity of financial services and productivity, Furtherly, playing a catalytic role in economic recovery [4]. For the next sections, data and methodologies which will be applied to analysis are introduced in the second part. The corresponding results according to section 2 will be deducted in the third section. Finally, in the fourth section, the critical conclusions of top three priority among several findings will be summarized. Meanwhile, supportive advices are integrated to assist decision making. The sentences of self-reflection and future vision is the icing on the cake

## 2. Data and research method

This section is divided into two parts, the first part will state the sample object and sources of data. The second part will show computation of stock-related and risk-related parameters respectively.

### 2.1 Data

The samples are world-famous digital-device companies: APPLE, DELL, GARMIN, MICROSOFT, PHILIPS, QUALCOMM and SONY. They sell or produce electronic products such as television, camera, sound equipment etc. Additionally, the sample period spanned from June-2018 till March-2021. The data comes from Center for Research in Stock Price (CRSP) and Standard & Poor's Global (SPG) [5, 6].

### 2.2 Methodology

This part focuses on computation of three kinds of stock-related parameters. Which is: profitability ratio gross profits to assets (GP/A); Valuation ratios enterprise value to sales (EV/S), price to earnings per share (P/E); Payout ratio dividend yield. These statistics are essential to later stages to dig out numerical meanings behind the statistics and integrate to results.

- (1) The gross profit is the difference between total sales and cost of goods sold
- (2) GP/A ratio illustrates how the assets of each unit could directly transferred into profits
- (3) An enterprise value contains the total value of shares outstanding and all forms of liabilities, excluding cashes on hand.
- (4) EV/S ratio seeks the relationship between how valuable the company will be corresponding to the revenue.

- (5) P/E ratio better explains the price shareholders spend and the benefits they obtain.
- (6) Dividends yield effectively shows the proportion of income in the stock price.

$$\text{Gross profits} = \text{total sales} - \text{cost of goods sold} \tag{1}$$

$$\text{GP/A} = \text{gross profits} / \text{total assets} \tag{2}$$

$$\text{Enterprise value} = \text{price per share} * \text{common shares outstanding} + \text{long-term liabilities} + \text{short-term liabilities} - \text{cash}. \tag{3}$$

$$\text{EV/S} = \text{enterprise value} / \text{total sales} \tag{4}$$

$$\text{P/E} = \text{price per share} / \text{earnings per share} \tag{5}$$

$$\text{Dividend yield} = \text{dividend paid} / \text{common shares outstanding} / \text{price per share} \tag{6}$$

### 3. Empirical results

This section is divided into three parts. The first part is to apply the method in 2.2 and try to excavate meaningful information behind profitability, valuation, payout performance. Then, comparisons will be made between digital-production industries and whole US stock market. It is clear that every industry had somewhat been blocked by covid-19. But how the shock differed from digital areas to other business will be discussed. Furthermore, the new changes of risk brought by global pandemic is another concern for investors. Hence, beta and expected returns will be introduced and applied to quantify probable risks. The information used for measurement sourced from Yahoo Finance, Ychart and Finbox [7-9].

#### 3.1 Profitability, valuation and payout analysis

Gross profit is considered to be very supportive to operating expense, income taxes, and net earnings. Even in some business, a reasonable combination of price and cost will make the firm to be elusive [10]. Thus, how much gross profit is occupied in total assets is a convincing way to show the ability of making profits.

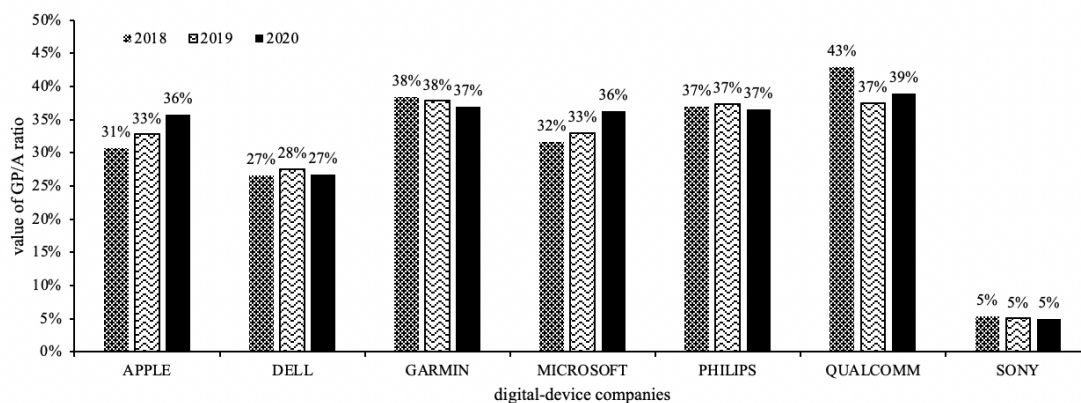


Figure 3. Performance of profitability for seven target companies from 2018 to 2020.

From the data shown in Figure 3, two companies experienced constant increasing in profitability between 2018 and 2020. On the other side, two companies suffered constant decreasing during the same time period. While the rest of the three companies were fluctuating before and after covid-19 happened. DELL and PHILIPS were becoming more profitable at the first year and the percentage of

profitability reduced later. But QUALCOMM had been shrinking 5.5 percentages initially. And rebounded 1.48 percentages from 2019 to 2020.

The modern business world is complex, especially covid-19 blocked some transactions globally, the situation was even harder. Companies must mobilize their strengths to achieve goals objectives in order to survive. Increasing corporate value was the way of being available to survive in such a global-epidemicly harsh background [11]. So, continuously keeping an eye on the EV/S ratio is a valid way to value whether a firm is positioned properly or not.

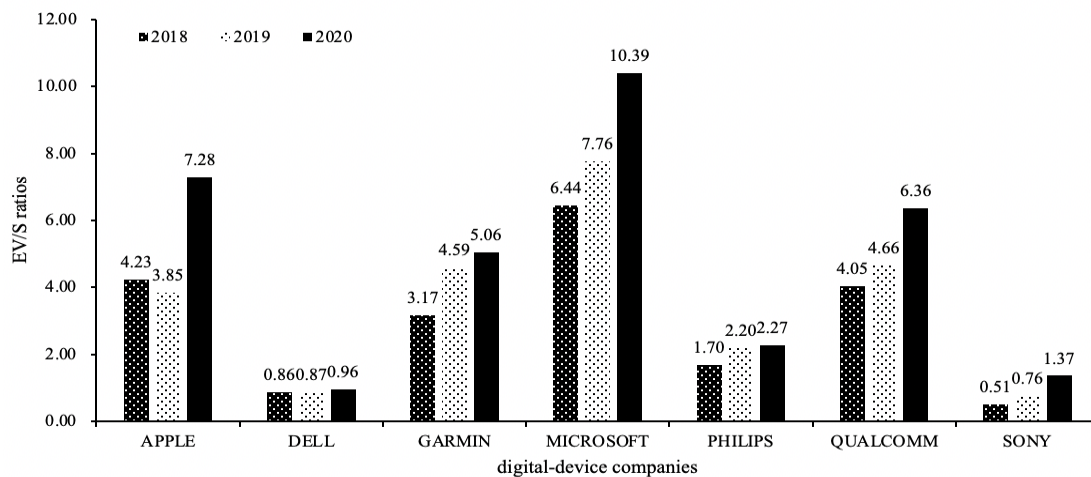


Figure 4. Values of EV/S ratios for seven target companies from 2018 to 2020.

From Figure 4, it is obvious to see that all of seven target companies realized appreciation of EV/S, even though APPLE's EV/S ratio reduced 0.38 in 2019, but soon this data doubled one year later.

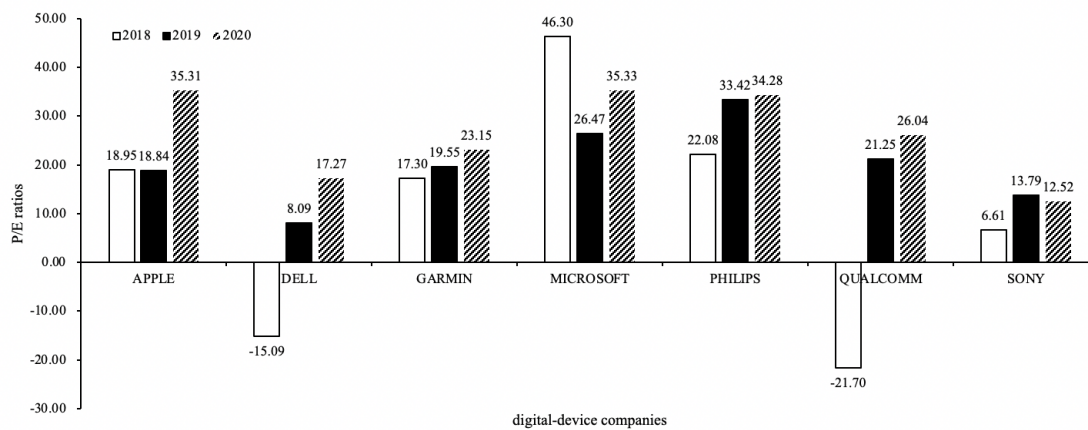


Figure 5. Values of P/E ratios for seven target companies from 2018 to 2020.

Investors always want their decisions are cost-effective, and there are many tools to estimate their decisions. However, researchers, market analysts, fund managers mostly replied on P/E ratio to analyze whether equity investments were attractive or not, integrating with stock market [12]. P/E ratio is an inescapable topic when stock valuation is processed. From the data shown in the Figure 5, unlike situation of profitability, the performance of seven target firms were relatively consistent. The P/E ratios for them were varied. The most striking results came from DELL and QUALCOMM. Their P/E ratios were negative in 2018. Meanwhile, the value of P/E ratio for MICROSOFT in 2018 was 46.30, which was the highest among all the firms from 2018 to 2020. Additionally, from 2019 to 2020, as well as the year for the outbreak of covid-19, only SONY's P/E ratio had reduced, while the rest of the firms became bigger on this parameter.

Bajaj and Vijh had claimed that if investors' preference was in highly-yield stocks, the price reaction to a dividend change should be more obvious, with the higher the anticipated yield of the stock. Dividend directly affects the interests of shareholders [13]. Accordingly, financial analysts usually pay special attention to the dividend information revealed by their intended companies.

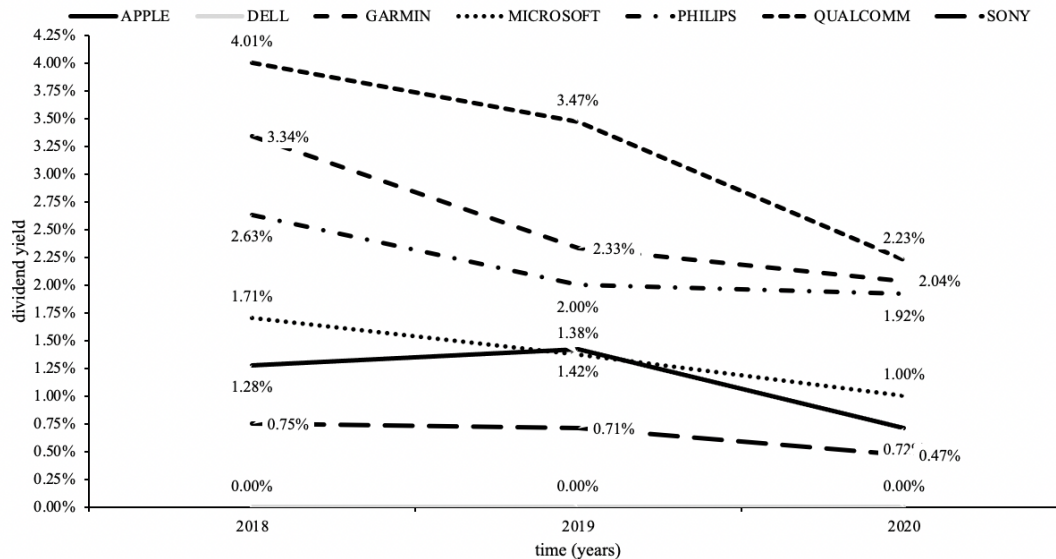


Figure 6. Changes and tendencies of dividend yield for seven target companies from. 2018 to 2020.

Interestingly, all of the seven target firms had experienced a dividend decline when getting through the pandemic period. Even if the dividend yields of SONY, QUALCOMM and GARMIN rose slightly over the three-year period, they ultimately could not offset the impact of COVID-19. Also, it's worth noting that, the line representing the changes for DELL was overlapping with the X-axis from beginning to end, showing a symbol of paying no dividends to its shareholders.

### 3.2 Results for profitability, valuation and payout

From the prospective of profitability of the seven digital-related companies, although their profitability varies widely, the pandemic did not have a significant impact on their profits based on timeline. According to figure 1, all of the seven target companies had controlled the changes within 6% before and after global epidemic, no matter increasing, decreasing or fluctuating. Helpfully, aids and subsidies from government will not only help individuals, but also corporates. In this way, increasing demand in digital products due to telecommunication in covid-19 and benefits from government ensured the stability of making profits for digital makers [14]. When it came to value the digital-related stock, all the seven target firms had made some degree of growth in EV/S ratios. The growth was due to either expansion of enterprise value or shrinkage of sales volume. Considering the pleasant profitability, the growth of EV/S ratios were likely due to greater enterprise value rather than sales loss. This was a demonstration that the feedback of the seven target companies were highly positive from the general public. This idea will be more convinced combining with the situations reflected by P/E. Five of seventh of them turned to be more expensive in stock prices. Dramatically, DELL and QUALCOMM were suffering loses in 2018, but after covid-19 their operating and stock statues developed to the opposite way very well. For the dimension of payout, a striking feature was that under the circumstance of anti-uncertainty ability, all the seven target firms decided to pay less money to their shareholders from 2018 to 2020. Hopefully, these manufacturers will use the capital saved from dividends to do reinvestment. The strategy was using money to generate money. But this action will experience a long-term investing cycle.

### 3.3 Results for horizontal analysis

For thoughtful stock managers, they will not easily make investment decisions only in one industry. Good financial workers will lift horizons to the whole market, carefully checking out promising and recessing fields. Thus, putting the digital manufacture into the entire market is worth acting. Accordingly, section 3.3 is made up of horizontal comparisons and findings generated by comparing with the market standards.

#### 3.3.1 Horizontal comparisons

The data used here had same sources with section 2.1. Meanwhile, the parameters to make comparisons are similar as well. Which are: profitability ratio gross profits to assets (GP/A); Valuation ratios enterprise value to sales (EV/S), price to earnings per share (P/E); Payout ratio dividend yield. The different aspects are that the average value for whole US stock market is added and the performance in 2020 is the main focus instead of a 3-year time series.

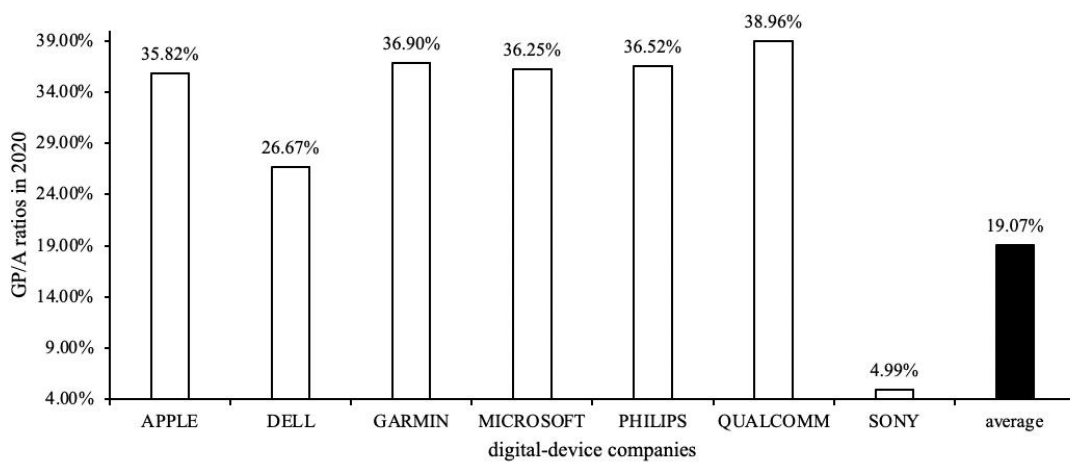


Figure 7. Performance of profitability for seven target companies in 2020 and average level of US stock market.

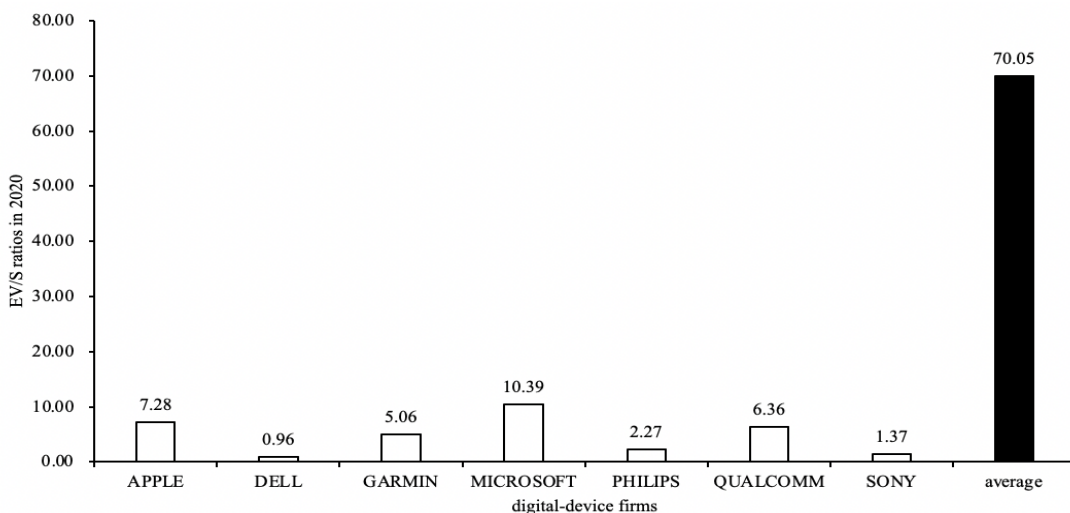


Figure 8. Values of EV/S for seven target companies in 2020 and average level of US stock market.

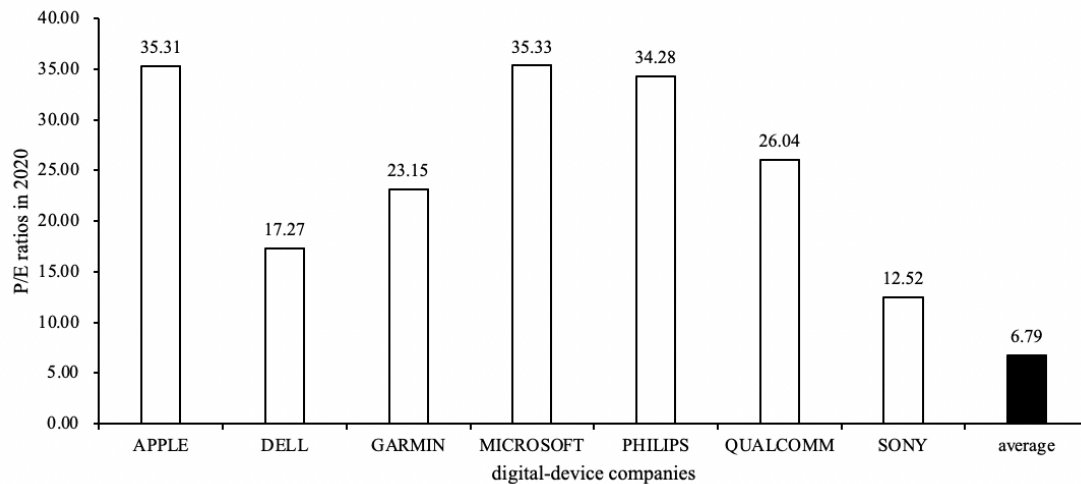


Figure 9. Values of P/E for seven target companies in 2020 and average level of US stock market.

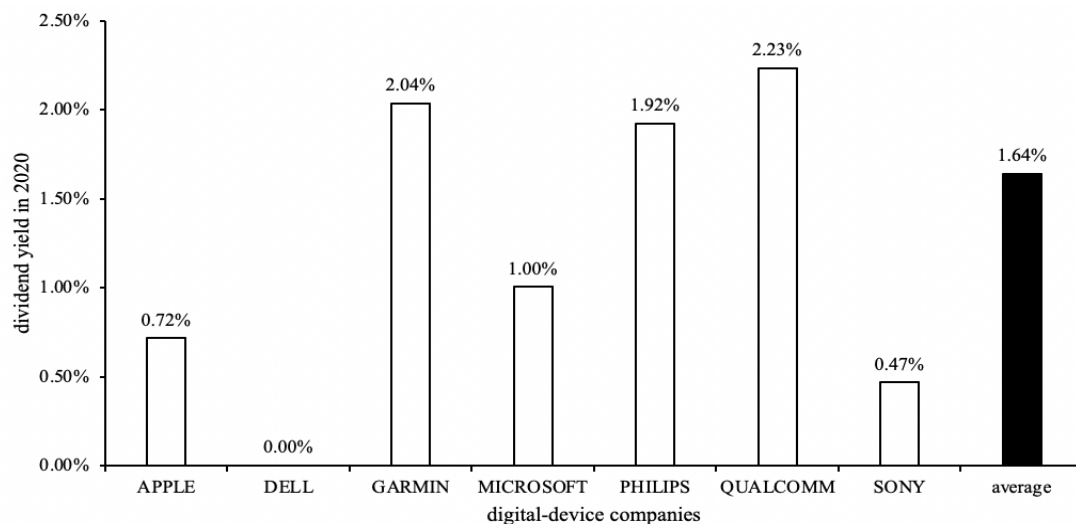


Figure 10. Payout ratios for seven target companies in 2020 and average level of US stock market.

According to figure 5, the situation for digital-device manufacturing industries seemed relatively optimistic than other business. Because six of them exceeded the average level. Only SONY performed poorly, with 4.99% of its asset turned over to profitability, comparing with a market average of 19.07%. In fact, this result was consistent with the reasoning of some financial experts. That was the covid-19 pandemic caused substantial changes, leading to high digital use. Which enabled people to communicate easily with others and provided marketers varied ways to build customer relationship [15]. But when it turns the valuation prospects. For EV/S values, the margin became markedly huge comparing with the average standards. The highest EV/S belonged to MICROSOFT in 2020, which was 10.39. But that was still only one-seventh of the industry average. This may not be a bad thing. For that a high EV/S value suggested that a firm's value was likely to be overstated [16]. High EV/S could also be a sign that the sales for a company was not outstanding. It became valuable because of other non-financial reasons. As another valuation parameter in this article, P/E ratio had the same feature that it is not the higher the better. But as the statistic shown in the figure 7, the numbers were moving in the opposite direction than stock marketer's expectation. The P/E values for all seven target digital giants had exceeded the average level in 2020. Even the thinnest one: SONY (12.52), was approximately doubled comparing with the average value (6.79). This was something the investors do not prefer. That was they needed to pay more money. Facing with globally epidemical crisis, all activities between people including economic, financial, commercial and social ones had transferred to the digital world through digital channels communication [17]. This will be a

mainstream trend. Correspondingly, the companies which sold telecommunication goods and digital products, will encounter a boom in stock price. When it came to the payout, also directly connected with the interests of shareholders. The strategies of seven target companies were different, emerging varied statistics as results referring to figure 8. Three digital-producers' dividend yield were greater than the stock market average. They were GARMIN, PHILIPS and QUALCOMM. The outbreak of covid-19 had made the financial world much more volatile. Two experts Mazur and Vo pointed out that a great majority of firms either maintain or increase the level of dividend payment during this special covid-19 time. More importantly, the relationship between the dividend payout and lowest level of acceptance of earnings for common shareholders was markedly negative. This was the way for some corporates to prevent shareholders losing. But this was a short-term fix only, not valid for long-run sustainability [18].

### 3.3.2 Findings

Many transactional channels had been blocked because of covid-19, this would seriously influence the supply chain among countries, making global trade even harder [23]. But the ability for digital firms to make profits was still highly above the average under such a harsh case. This would become attractiveness for coming investors, for demonstrating convinced profitability in worse scenarios. More interestingly, even though these digital companies were profitable, they had not been pushed into a hot position by stock market traders. This could be seen from the fact that EV/S in Figure 6 was much lower than the average. In other words, the shares of the seven target companies were still undervalued and had great potential to become more valuable in the future. But one thing needed to be cautious after checking statistics from figure 7. The logic of P/E ratio is similar as EV/S ratio, that is people expect their chosen stock to be lower in these two ratios. In fact, the two figures told the opposite story. Because the P/E ratios for all of the seven target companies had exceeded the standards. This reflected mismatched prices with returns. As mentioned before, the profitability for digital producers were still optimistic even in the outbreak of pandemic. Combined with the high P/E ratio, it can be explained that the profits generated are not directly related to shareholders' equity. So, while digital shares were valuable, buying them was not a cost-effective decision. Especially for investors with limited budgets and expectations of quick returns, it may not be suitable. Furthermore, information reflected in figure 4 could enhance the persuasion of this deduction. The dividend yield for the seven target companies were shrinking constantly since 2018 to 2019, both before and after the covid-19 pandemic. Meanwhile, Dividends paid by digital companies were also volatile compared with the average. Stocks that moved this way were actually better for long-term investors looking for stability.

### 3.4 Results for quantifying stock risks by beta and expected returns

As the internet and digital economy enter the traditional finance industry. Although investments are more diversified, risks are more unpredictable as well. However, market risk directly affects value of equity instruments [19]. The beta coefficient is one of the principal indicators to quantify market risk. Tursunkhodjaeva also emphasized that beta provided clear indication of average stable returns to assist marketers. Furthermore, beta was capable to eliminate the negative consequence to the firms [19]. Therefore, section 3.3 will interpret meanings for different beta values and derived expected returns from beta, associating these two coefficients with performance of the seven target companies.

#### 3.4.1 Quantifying stock risks by beta and expected returns

Most financial studies reported that there was a significant positive relationship between expected returns and risks [20]. For fund managers who have aggressive investing strategy, they share great return and risk at the same time. But uncertainties make volatility hard to quantify, thus beta is an ideal choice to evaluate potential problems for a stock. In order to connect beta and expected return, two more financial index are needed, which are risk-free rate and risk premium. According to Damodaran, risk-free rate belonged to long-term government bond. And there could be no default and reinvestment risk [21]. Because of this feature, risk-free rate is usually used as a benchmark to

measure returns for other investments. Moreover, a risk premium is the expected return of risky assets minus risk-free rate. If beta, expected return, risk-free rate and risk premium are correlated together. The formula is:

$$\text{Expected rate of return} = \text{risk-free rate} + \text{beta} * \text{risk premium} \quad (7)$$

With the information on Yahoo Finance, Finbox and Ychart [7-9], the risk-related parameters for seven target companies could be synthesized as following:

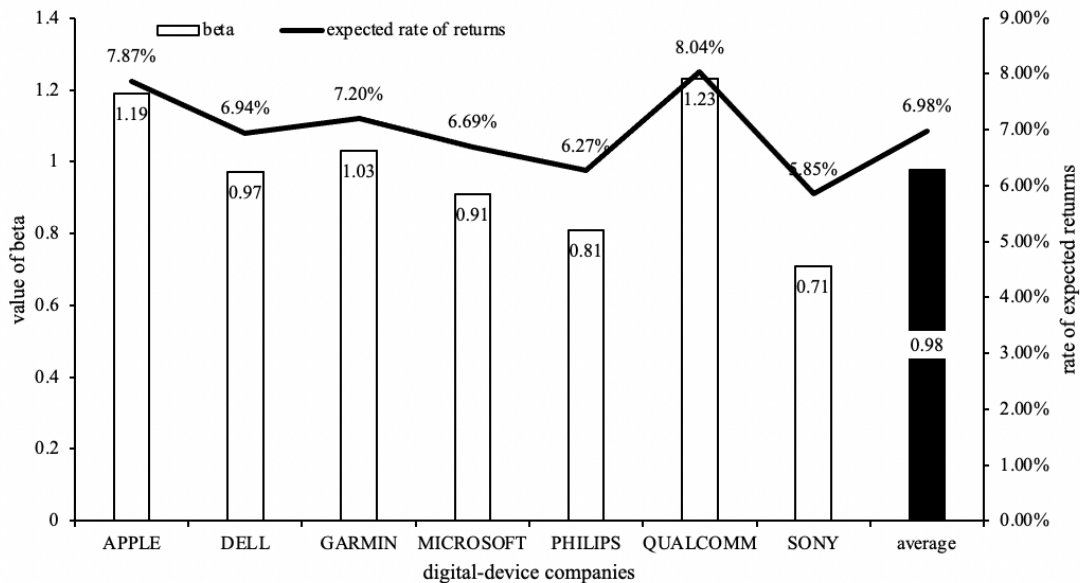


Figure 11. Values of beta and expected rate of returns for seven target companies from 2020 to 2021.

If beta is less than one, it implies the assets have less systematic risk than the overall market; if beta is greater than one, it implies the assets have more systematic risk than the overall market; and a beta of one implies the assets have the same systematic risk as the overall market [22]. In addition, Hillier and his colleagues defined systematic risks as risks factors that affected a large number of assets, such as changes in GDP, inflation, interest rates, etc [22]. Referring to the figure 9, there were three enterprises greater than one in value of beta, which were APPLE, GARMIN and QUALCOMM. The rest of four DELL, MICROSOFT, PHILIPS and SONY were below one. In fact, the beta of all the seven target firms were not far from one, for that the average was 0.98. This was a symbol that the development of digital-device companies was approximately corresponding with the tendency of the whole market. Facing with a long-lasting and rapid-spreading pandemic globally, almost every industry got shocked. This index indicated that although the digital industry had suffered some losses, it was not out of control. It will gradually get back on track as the market pushes it along.

### 3.4.2 Findings

Even though financial experts know that beta and risk directly connect with each other, Chakrabarti and Das wanted to find out the relationship among beta, pressive market and volatility. Finally, they concluded that stress market environment will not significantly influence the volatility. Those firms with lower value of beta could performed stably under burden as well. But pressive situation for market required fund managers to consider more dimensions as making investing strategies [24]. Referring to figure 9, the seven target companies actually demonstrated fine stability and flexibility to adjust to systematic risks such as covid-19. Moreover, by 2022, the worst of the COVID-19 pandemic had gone through and production order will be restored in almost all industries. But post-

pandemic people will undoubtedly rely more on telecommuting and working in digital way. Even in a bad situation, the digital producers were achieving favor of capitalists by rapid adaption and offsetting pandemic-caused losses by scale advantages. When the risk is going to be smoother in the future, the positions for digital-device companies will be more popular in stock market.

#### 4. Conclusions

This article studied a combined method of judging an investment by stock-related factors profitability, valuation, payout and risk-concerned coefficient beta. The samples used to assist analysis were seven digital-product giants APPLE, DELL, GARMIN, MICROSOFT, PHILIPS, QUALCOMM and SONY. The financial data was integrated from CRSP, SPG, Yahoo Finance, Ychart and Finbox. Furthermore, the study had experienced in making peer and cross-industry comparison, evaluating the potential risks for a single financial activity sequentially. There were three key findings. First of all, the biggest advantages illustrated was the non-vulnerable stability of stocks for digital companies. The term stability referred two aspects: stability of returns and stability of unforeseen events adjusted. In terms of profitability and benefits to shareholders, these digital product makers will neither attract attention with exceptionally high amounts of money nor discourage investors with ultra-low returns. But it was reassuring to have a relatively stable output all the time, making people less upset when challenge came. Persuasively, the epidemic had greatly affected the supply chain, distribution channels, offline shopping stores and many other parts of digital product vendors. Investment risks arose as well. But the digital industry could quickly adjust and get back on track. Their decisive actions presented by the values of beta that they were trying to minimize the harm caused by system risk. Secondly, the value of stock for digital-making companies were probably overestimated after the public get through the global pandemic. This idea was proved by the high EV/S and P/E ratios demonstrated. One of the reasons a stock was overvalued was due to the rising popularity among investors. And in the pandemic era, many people were more conservative in doing business than ever, seeking stability rather than high returns. Thirdly, the seven target companies paid few dividends to their shareholders, despite of positive operating situations. Which was a manifestation that the digital industry would not decide to benefit investors temporarily. They preferred to use money saved from dividends to do more reinvestments, in order to generate more profits. Meanwhile, these firms hoped that shareholders did not initially mind how much in hand right now, but appreciation of fixed assets actually mattered.

Capitalists could learn something constructive from findings extract from this research. First, stocks for digital companies are not suitable for gamblers. Referring to people who are willing to accept high risk but expect high returns are not going to get the job done by spending money on shares in digital companies. This type of stock is also not ideal for investors on a tight budget, as it is not a cost-effective option. Meaning that every dollar spent did not transfer efficiently into a return. Second, if the fund managers precisely know their strategy is focusing on long term and decided to purchase the stock issued by digital-device makers. Patience is needed to witness the appreciation of the stock value. Besides, when the tendency of the stock fluctuates, avoid abandoning it immediately. Because the digital-firm stocks are likely able to go through a tough time period and develop towards an oppositely bright way.

Although stock valuations and investment prospects analysis had been processed in dept, the study could be more full-scale if two shortcomings are fixed. Firstly, the limitation of beta is that it could measure systematic risks only. Although the unsystematic risks are less harmful than systematic one, it's not negligible. Then, by the time this paper was written, the coronavirus pandemic was not completely over. Therefore, it is particularly important to continue to pay attention to the development of the research object in this paper in the next few years.

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