Research on Enterprise Valuation Method Based on P/E Ratio: Taking Amazon as an Example

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Abstract. With the rapid growth of the e-commerce market, Amazon.com, INC. (Amazon) is one of remarkable firms. The general financial condition is worth analyzing to observe how Amazon makes money, and how it operates. Yahoo Finance and Macrotrends, which are platforms to search for financial and stock information of published companies, are main data resource websites in this article. Also, the financial report of Amazon is a channel to get detailed information and data. This paper mainly uses Price-to-Earnings Ratio (P/E ratio), which gives a brief view to show the anticipation of the company itself and the market based on analyzing stock prices. By comparing Amazon and its comparable firms' data from 2019 to 2020, the stock price of Amazon is overvalued. The author forecasts that this trend will be continued, but the company faces both opportunities and challenges. This article provides investors and those interested in e-commerce or Amazon with a reference for present and future value of Amazon.

Keywords: Amazon; P/E ratio; Corporate valuation; E-commerce; Coronavirus.

1. Introduction

The popularity of the Internet makes the e-commerce industry popular. People begin to rely on various platforms and services for working, studying, and relaxing. It not only changes the daily lifestyle but also lets more people see business opportunities. Small retailers are trying to track out ways of online shopping and online coupons to attract consumers and some investors are holding positive views on e-commerce. What follows is fierce market competition. Companies with large market shares continue to develop new lines to make profits. While, smaller retailers face bigger challenges to survive, in other words, they have to think twice about the traditional business models, or face closing.

The global economy, including the retail industry, has been hit and changed by shortages of raw materials and rising unemployment due to the Coronavirus. However, this pandemic forced consumers to shop online and increased the demand for new online shopping platforms. New techniques and shopping experience might increase the “shopping-buying conversions” in e-commerce [1]. The number of online shopping deals was increasing these years. According to data from The International Trade Administration, a U.S. Department of Commerce manages global trade site, the global retail e-commerce sales worldwide increased from 3,354 billion USD to 4,280 billion USD from 2019 to 2020. The increasing sales show that the pandemic is one factor to boost retail e-commerce globally [2]. In addition, the proportion of the e-commerce section in global retail sales increased. Global retail e-commerce sales of 2020 had an 18% share of total global retail sales, and analysts forecast that it will have an over 1% annual growth rate to achieve a nearly 22% share of the total by 2024 [2]. The growth makes this field more worthy of attention and research. Some published articles about Amazon could be searched, involving Amazon's changes during the pandemic, the role of Amazon plays in the e-commerce industry, and the comparison with other e-commerce giants. However, the company valuation analysis of P/E ratio in recent years seems to be lacking. This paper takes Amazon, a comprehensive e-commerce firm, as an example to discuss its company value in the past three years based on P/E ratio. This paper analyzes Amazon's financial statements, covering operating performance, net sales, profitability indicators, and valuation multiples. The analysis is also looking for three comparable companies in the same field as Amazon. Then following P/E ratio analysis method to determine whether its stock price is overvalued compared with Amazon’s stock prices and those of comparable companies.

2. Methodology

2.1 Data Collection

Amazon is a large e-commerce company based in the United States, selling books on the Internet from the beginning to providing a variety of products and services nowadays. According to the 2021 annual report of Amazon, its main products divide into online stores, physical stores, and Amazon Web Services (AWS) [3]. In detail, online stores mainly include orders of diverse goods online, Kindle, Music, and Games; Physical stores include Amazon Go, Whole Foods Market, and Amazon Fresh; AWS is a data storage and cloud computing platform. In addition, Amazon's service not only limits to the United States but also expands to Germany, the United Kingdom, Japan, and some other regions [3,4].

Years of accumulated experience in operating management and supply chain improve Amazon’s products and services extensively and can handle them maturely. Based on data from Statista, which is a German company focused on collecting and processing data, Amazon’s market share of e-commerce gross merchandise volume (GMV) in the United States in 2022 is 50% [5]. Even though occupying half of the market on GMV, Amazon is expanding and maintaining more product lines. For instance, Project Kuiper is one plan in recent years, which will offer “fast, affordable broadband” to poor community areas based on a “low Earth orbit (LEO) satellite constellation” [6]. At the same time, Amazon is beneficial in purchasing household, food, clothing, health care products, electronic devices, and other aspects. Multi-brand, discounts, fast logistics, and convenient payment processes all attract the attention of consumers. As the mission mentioned, it aims to be “Earth's most customer-centric company” [4]. Analyzing indicators about the financial situation and profitability of Amazon itself is a way to observe if result the company on a positive way.

E-commerce could be defined as doing business online, selling goods and services by delivering offline, and paying online [7]. The number of completed e-commerce deals increased in these years, and let more businesses forecast opportunities, and increase investment in the field of e-commerce. The e-commerce industry is saturated. Presumably, the continued growth of e-commerce giants will dominate smaller platforms to the point that they exit the market. Mature companies refer to owning relatively stable revenue and cash flow as Amazon does. Thus, they are more likely to provide stable financial and stock data. P/E ratio is suitable to be used when evaluating the value of Amazon. Moreover, the company's operating risk and expectation of future earnings are taken into account in P/E ratio. Usually, sales revenue continues to increase but at a decreasing rate. The data of Amazon and the rule is mismatched, probably because one reason of the revenue fluctuation is Coronavirus. The same situation existed on several other e-commerce companies. While, comparing with comparable companies could be justified as undervalued, fair, or overvalued based on the average and median price per share of comparable by utilizing following formulas:

$$\text{P/E ratio} = \frac{\text{Stock Per Share}}{\text{Earnings Per Share (EPS)}} \tag{1}$$

$$\text{Price Per Share}_{\text{average}} = \text{EPS}_{\text{the firm}} * \text{Average P/E}_{\text{comparable firms}} \tag{2}$$

$$\text{Price Per Share}_{\text{median}} = \text{EPS the}_{\text{firm}} * \text{Average P/E}_{\text{comparable firms}} \tag{3}$$

On chosen comparable firms in this article to evaluate Amazon more accurately, competitors need to stay in the same industry, and have comparable market capital and market share. Walmart has a strong price and category competitiveness in e-commerce. Similar to Amazon, Alibaba Group is involved in fields, like online stores, digital media, supply chain companies, and the digital storage platform. eBay is an online auction and shopping site that allows people to buy and sell things online.

2.2 Data Screening

According to the 2021 financial report of Amazon, and Yahoo Finance, the operating performance of Amazon in 3 years, and years are all ended with December 31 is shown in Table 1 [3].

Table 1. Operating Performance of Amazon
(Currency in million USD, except EPS, which is in USD)

	2019	2020	2021
Net Sales	280,522	386,064	469,822
Operating Income	14,541	22,899	24,879
Net Income	11,588	21,331	33,364
Net Profit Margin	4.13%	5.53%	7.10%
EPS	1.15	2.09	3.23

For Amazon, net sales are divided into online stores, physical stores, third-party seller services, subscription services, advertising services, AWS, and others, detailed data are listed in Table 2 [3]. Plus, the data of each year was ended at December 31.

Table 2. Net Sales of Amazon (Currency in million USD)

	2019	2020	2021
Net Sales	280,522	386,064	469,822
Online Stores	141,247	197,346	222,075
Physical Stores	17,192	16,227	17,075
Third-party Seller Services	53,762	80,461	103,366
Subscription Services	19,210	25,207	31,768
Advertising Services	12,625	19,773	31,160
AWS	35,026	45,370	62,202
Other	1,460	1,680	2,176

Return on assets (ROA), return on equity (ROE), return on invested capital (ROI), and EBITDA margin, as Table 3 shows, is profitability ratios that are used by companies and investors to access financial performance and forecast future conditions of the business. These data are searched from Macrotrends (http://www.macrotrends.net).

Table 3. Amazon's Profitability Indicators (%)

	2019	2020	2021
ROA	5.84	7.88	8.98
ROE	21.07	27.07	27.98
ROI	14.83	19.55	20.29
EBITDA margin	12.95	12.47	12.6

Valuation multiples are one of common ways to value a company. They can also be used to compare companies in similar fields. Table 4 shows Amazon's price-earnings ratio, price-to-book ratio (P/B ratio) and price-to-sales ratio (P/S ratio) for the past 3 years from Macrotrends.

Table 4. Amazon's Different Valuation Multiples (%)

	2019	2020	2021
P/E ratio	80.31	77.86	51.45
P/B ratio	14.83	17.54	12.27

P/S ratio	3.32	4.30	3.65

In Table 5, which is used for comparing companies with Amazon, stock indicators and the location of the company are shown. These data are collected on Aug 26, 2022, at Yahoo Finance.

Table 5. Comparison Between Amazon and comparable companies on E-commerce (Currency in USD), Trailing Twelve Month (TTM)

	Amazon	Walmart	Alibaba Group	eBay
Market Capital	1.355T	366.053B	265.299B	24.741B
EPS (TTM)	1.11	5	2.16	18
P/E (TTM)	119.82	26.71	46.31	18.50
Stock Price Per Share	107.95	$5.34	$21.44	$1.03
Geography	USA	USA	China	USA

2.3 Data Analysis

2.3.1 Operating performance

According to Table 1, the growth from 2019 to 2020 is significantly greater than the growth from 2020 to 2021. On average, these increases are substantial.

Table 6. Growth Rate of Amazon Operating (%)

	2019-2020	2020-2021	Average
Net Sales	37.62	21.70	29.66
Operating Income	57.48	8.65	33.06
Net Income	84.08	56.41	70.24
Net Profit Margin	33.76	28.53	31.14
EPS	81.74	54.55	68.14

2.3.2 Net sales

Net sales are total revenue of a company, excluding sales returns, allowances, and discounts. This data is often be used when making decisions about the business or analyzing company's income growth. The three pie charts in Figure 1 show the proportion of each category in net sales for recent 3 years.

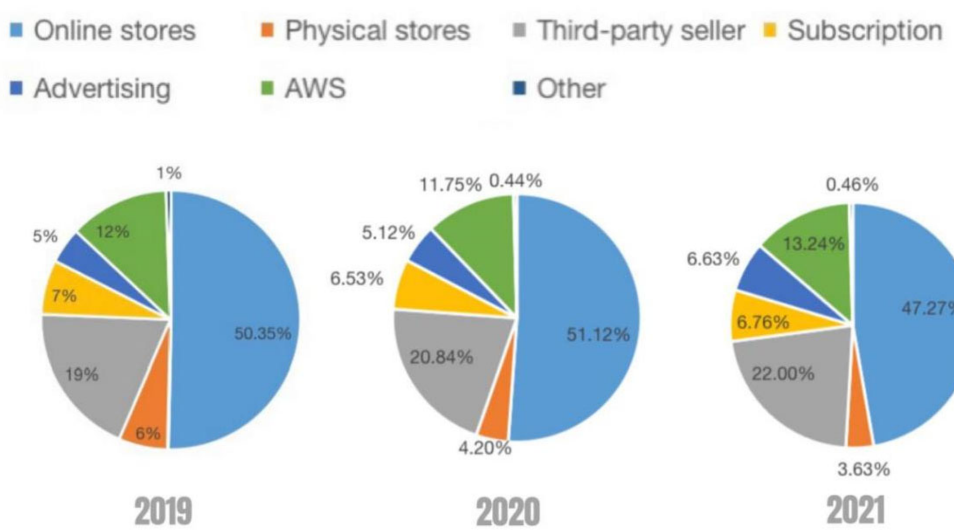

Fig. 1 Net Sales Distribution of Amazon

The growth rate of net sales of Amazon during these three years could be calculated by formula 4.

$$\text{growth rate} = \frac{\text{Value}_{\text{new}} - \text{Value}_{\text{old}}}{\text{Value}_{\text{old}}} * 100 \quad (4)$$

Combining Figure 1 with Table 7, the percentage change of profitability of these branches can be found.

Table 7. Growth Rate of Net Sales of Amazon from Year 2019 to 2020 (%)

	Growth Rate
Online Stores	57.22
Physical Stores	-0.68
Third-party Seller Services	92.27
Subscription Services	65.37
Advertising Services	146.81
AWS	77.59
Other	49.04
Total	67.48

From 2019 to 2020, the proportion of online stores in net sales decreased, but the revenue of online stores increased by 57.22%. This shows that other segments are growing faster over the years, such as revenue of third-party seller services nearly doubling; revenue of advertising services increasing by more than 146%; income of subscription services increasing 65.37%; AWC's revenue growth is 77.59%. Revenue of physical store is the only category which decreased in this period. This might because of company strategies and the pandemic. The rise of Coronavirus avoids people to go out [8]. However, the shifting from physical to online retailing because of the pandemic, so that growth in online-related revenues such as online stores and advertising has become reasonable [9].

2.3.3 Profitability indicators

Based on formula, ROA is used to measure how much net profit a company creates per unit of assets. More net profit of Amazon could be created per unit of asset during recent 3 years.

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} * 100 \quad (5)$$

ROE is an indicator shows the ability of a company to make profits for shareholders by using the capital invested. From 2019 to 2021, there was also a small and sustained increase in the value the company created for shareholders. Moreover, ROE is a comprehensive measure of a company's profitability. The factors affecting ROE include net profit margin on sales, asset turnover and leverage ratio. Companies with ROE around 10-20% can reflect better profitability.

$$\text{ROE} = \frac{\text{Net Income}}{\text{Shareholder's Equity}} * 100 \quad (6)$$

ROI refers to the value obtained through investment, that is, the economic return an enterprise gets from investment activities. This is used to measure the level of profit a company makes by investing capital. Through investment, Amazon's profit increased significant. From 2019 to 2020, it has increased by 36.82%, the specific value is 5.46% (20.29%-14.83%=5.46%).

$$\text{ROI} = \frac{\text{Total Revenue} - \text{Total Cost}}{\text{Total Cost}} * 100 \quad (7)$$

EBITDA includes net income, taxes, interest expense, depreciation, and amortization. EBITDA margin is a performance measure of a company's operating profitability. Relatively, higher EBITDA margin is better sales and efficient cost. The operating cost of Amazon in 2021 might not efficient as 2019 and 2020 did. The increase in operating costs is common in recent years. In Liz Young's words, who is a reportor on The Wall Street Journal, U.S. business logistics costs increased to 1.85 trillion USD in 2021, representing 8% of the country's overall economic output. This is the "highest share of logistics spending relative to gross domestic product since 2008" [10].

$$\text{EBITDA Margin} = \frac{\text{EBITDA}}{\text{Total Revenues}} * 100 \tag{8}$$

2.3.4 Valuation multiples

Through different valuation methods, P/E ratio and P/B ratio showed a downward trend from 2019 to 2021. P/S ratio increased in 2020, but decreased in 2021, but did not fall back to the value of 2019. In general, the higher ratio of valuation, the higher stock price does. Higher P/E means longer payback time. This result might come from high cost. To fix this storage, as the 2021 financial report mentioned that they are "seek to reduce our variable costs per unit and word to leverage fixed costs" [3]. A stable P/S represents a healthy operation.

2.3.5 Comparable companies

Industry classification is the first consideration when choosing Amazon's comparable companies. Having similar business characteristics is also a consideration, although many e-commerce companies have similar businesses. Then, companies with negative P/E or EPS in previous 12 months were excluded. Because a negative P/E means that the company's stock is in the red, while Amazon has a higher P/E. As a result, Walmart from the United States, Alibaba Group from China, and eBay from the United States are selected as comparable companies for Amazon on e-commerce field.

According to database of Yahoo Finance, Macrotrends and GuruFocus, P/E Ratios of Amazon, Walmart, Alibaba Group, and eBay are listed on Table 8. In order to better compare Amazon with other e-commerce companies, the median and average P/E Ratios of companies except Amazon are also reflected in the table.

Table 8. P/E analysis of Amazon and Comparable Firms (%)

	P/E (2019)	P/E (2020)	P/E (2021)
Amazon	80.31	77.86	51.45
Walmart	23.72	20.83	50.59
Alibaba Group	22.64	27.48	30
eBay	16.7	20.27	3.21
P/E (median) of Comparable Firms	22.64	20.83	30
P/E (average) of Comparable Firms	21.43	22.35	28.45

EPS of the firm is an indicator when calculating Price Per Share by utilizaing Formula (2) and (3). According to Macrotrends, the EPS of Amazon in 2019-2020 is shown in Table 9.

Table 9. Amazon's EPS (Currency in USD)

	EPS (2019)	EPS (2020)	EPS (2021)
Amazon	1.15	2.09	3.24

Likewise, this paper uses equations (2) and (3) to calculate the median and average share prices of comparable companies, as shown in Table 10.

Table 10. Price Per Share Comparison Between Comparable Firms and Amazon (Currency in USD)

	Price Per Share (2019)	Price Per Share (2020)	Price Per Share (2021)
Median Price of Comparable Firms	26.036	43.5347	97.2
Average Price of Comparable Firms	24.63875	46.716725	92.178
Stock Price of Amazon	92.39	162.85	166.74
Conclusion	overvalued	overvalued	overvalued

If actual stock price of Amazon is lower than stock price of comparable firm, Amazon is undervalued; otherwise, Amazon is overvalued. By comparison the first three rows of Table 10, Amazon's share price was overvalued in all three years of 2019-2020.

3. Results

Amazon has entered daily life on a large scale in many areas, which is a success in some ways. Financially, Amazon had shown significant revenue growth across most of its divisions. Net sales fell in physical stores, which had something to do with the pandemic. Relatively, the pandemic also caused other parts of earnings increasing. Some index analyses, such as changes of net sales, ROA, ROE, and P/S ratio, indicated that Amazon has relatively healthy profitability and operating conditions. However, operating costs and maintaining costs utilized inefficiently, and need long term to pay money back, which could be reflected in high P/E ratio and decreasing EBITDA margin. Profitability could be determinant of stock prices, but it is not the only ones. Managers need to create more value for the company and stockholders. Under a strong competitive environment, Amazon has to take more actions and innovation to keep existing activities going and “at least not to lose their current state” in e-commerce market [11]. It is worth mentioning that the rise of discussion about influence and drive Amazon to change. On Amazon's official website, special introductions about the world-class environment and digital Entertainment products are shown. This action may have an impact on the company's value and share price.

When compared to similar companies, Amazon has demonstrated strong capabilities and leadership in the industry, not only in market capital but also in sectors and stock prices. Thus, Amazon is overvalued when compared to these comparable companies.

4. Discussion

In this article, the SWOT analysis model is used to make discussion. Amazon has strength as the leader in e-commerce because of its strong technology, large market share, and diversified channel coverage. But because it is already in many areas by expanding itself and mergers and acquisitions, it needs more momentum to open up new markets, like satellite communication technology, green Finance, and acquisition, as Whole Foods was acquired in 2017. The threat of the external environment is also a challenge for Amazon, such as the change in customer preferences and the development of competitors. In addition, the epidemic of Coronavirus in recent years has challenged Amazon's supply chain. According to the new report, Amazon improved the speed of increase storage and delivery to normal rather than under the pressure of “a pandemic-driven flurry of online orders”. Consumers seemed to notice this improvement and increased the number of orders to purchase more goods. Brian Olsavsky, CEO of Amazon, referred that the demand for the second quarter of 2020 increased [12]. Also, managing a multinational company is not an easy thing to adopt different business atmosphere. Complicated problems need to consider, like marketing, sales, operations, technology, policy, and culture.

5. Conclusion

The valuation of Amazon is studied and estimated in this paper. The background of the development of e-commerce and the impact of the Coronavirus is considered. Amazon's growth has led to growth in e-commerce. By analyzing Amazon's financial reports, it is found that Amazon, as an e-commerce leader, has influential advantages. High market share, multi-domain involvement, and mature operation systems make the company profitable and valuable. In the past three years, the net sale growth rate reached 67.48%; the changes in financial indicators, such as return on assets and return on equity, show the relatively healthy economic situation of Amazon. At the same time, the long payback time and new moving-on ways are two of the problems it faces. Utilizing P/E ratio valuation method, the author found that Amazon's stock price is overvalued from 2019 to 2021, based on stock prices of its comparable companies, Walmart, Alibaba Group, and eBay. P/E ratio considers the company's operating risks and expectations for future earnings, which is a tool for investors and those interested in Amazon. Moreover, quantity profitability is not the only factor that determines the stock price and company valuation. Aspects of company culture and development are difficult to calculate precisely, but cannot be ignored. Amazon creates value for society, for example, creating thousands of jobs and opportunities, initiating Project Kuiper, and joining the discussion of Environmental, Social, Governance (ESG) and green finance.

This paper mainly studies the valuation method of P/E ratio. Limitations of this method are existed, for example EPS comes from the company itself, which could be manipulated. In addition, this method ignores effect of debt on expected equity return. Thus, other valuation methods can be used to conduct detailed valuation research on Amazon in combination with P/E ratio for further study. In the future, research on Amazon will be diverse and deep.

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