



# A FiCycle Analysis of GameStop

## *Do the Math!*

During January 2021, there was a spectacular run up in the price of the stock of GameStop (stock market symbol: GME). The price rose from \$18.84 per share at the end of December 2020 to \$325.00 per share at the end of January 2021. Most of the discussion about GameStop at the time was about the relative power of individual investors and Wall Street hedge funds. While this is an important debate, at FiCycle, we want to dive deeper into determining the value of the stock to a long-term investor and “Do the Math.”

### Price to Earnings Ratios (P/E Ratios)

Investors often use ratios to compare different stocks since ratios allow us to compare things of different magnitudes. The ratio between the price of a share and the annual earnings of the company is called the **price to earnings ratio** (P/E ratio). It gives you a sense of how much a company is earning relative to the cost of their stock. The P stands for “price” and refers to the stock price, and E stands for “earnings” which refers to the earning-per-share of the company.

#### Relevant Terminology

- *Revenue*: Amount received from selling goods or providing services
- *Earnings*: Company profits after-tax
- *Revenue per share*:  
Revenue / # of shares
- *Earnings per share*:  
Earnings / # of shares

ABC

If the *price* of a share of a company is \$150 and they are *earning* \$10 for every share issued, then the P/E ratio would be 15 since  $\frac{\$150}{\$10} = 15$ .

What does 15 mean in this context? It is a unit rate that tells you that in order to own \$1 of the company’s earnings (per year), you need to spend \$15.

In general, a low P/E ratio is better since it costs less money to receive of the same amount of earnings (\$1). Having a high P/E ratio relative to other stocks could mean that investors believe the company will have a high rate of growth in the future or it could mean the company is overvalued.



1. Complete the table by calculating the P/E ratio for the following companies:

Company Name	Share Price	Earnings per Share	P/E Ratio
Vapor Games	\$22.00	\$2.00	
Banana Game Store	\$240.00	\$17.00	
Perfect Purchase	\$5.70	\$0.53	
GameGO!	\$25.50	\$3.78	

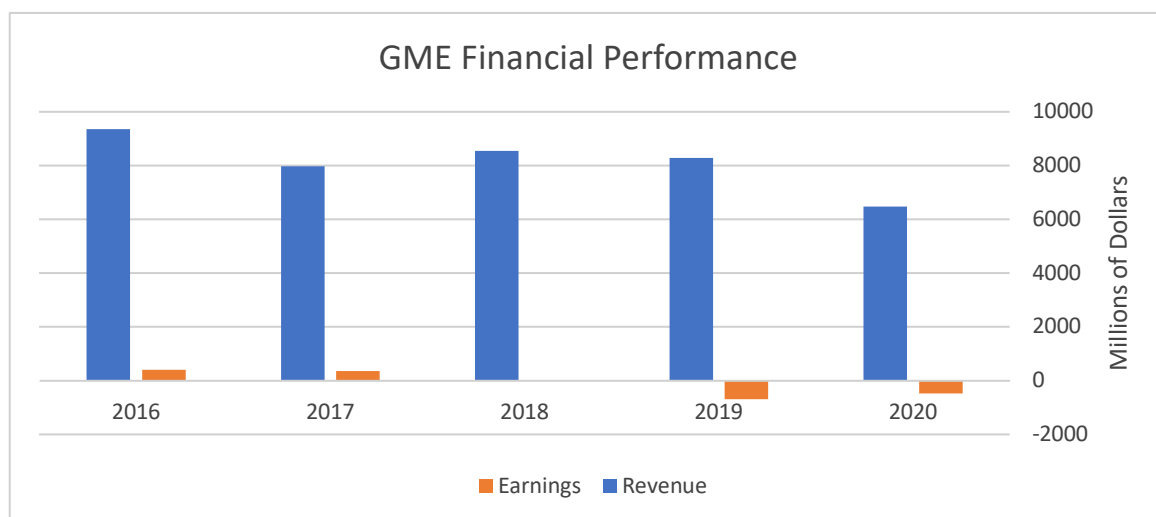
## Analyzing GameStop

Below is a table showing the financial performance of GameStop (GME) in the years leading up to 2021.

<b>GameStop Financial Performance</b>					
	2016	2017	2018	2019	2020
Revenue in millions	\$9364	\$7965	\$8547	\$8285	\$6466
Earnings in million	\$403	\$353	\$35	-\$673	-\$471
Shares in millions	107	104	102	102	88
Stock Price in dollars	\$20.22	\$19.92	\$14.69	\$10.96	\$3.84
Earnings per Share in dollars	\$3.78	\$3.40	\$0.34	-\$6.59	-\$5.38

Data is from 1/31 of each year. Source:

<https://www.macrotrends.net/stocks/charts/GME/gamestop/financial-statements>



From a financial perspective, this is not a pretty picture. From 2016 through 2020 GameStop's revenue had been falling by an average of about 9% per year and its earnings, which were a small percentage of revenue (4.3%) in 2016, became negative. The company was losing money.

In 2016, the earnings per share of GameStop (GME) was \$3.78 and the stock on 1/31/2016 was \$20.22. That would produce a price to earnings ratio, or P/E ratio, of  $\frac{20.22}{3.78} = 5.35$ . It's important to note that a P/E below 10 typically indicates that the market was expecting a little to no growth for the company.



2. In early 2017, GME's stock price was \$19.92 and the earnings per share was \$3.40. Using this information calculate GME's P/E ratio for early 2017.
3. In early 2018, GME's stock price was \$14.69 and the earnings per share was \$0.34. Using this information calculate GME's P/E ratio for early 2018.
4. In the period immediately following, revenue declined and the company was losing money. Given these factors would you expect the value of the company would go up or down?



GameStop was losing money in 2020 and as a result we cannot calculate a P/E ratio since E, the company's earnings, were negative. We must use a different tool to evaluate the stock. Another ratio that financial analysts use to compare stock prices is the **Price to Revenue Ratio (P/R Ratio)**.

Just like the P/E ratio the P/R ratio compares the stock price of a company to its revenue-per-share. In a sense, a lower P/R ratio again indicates you are getting more for your money. In this case, it doesn't correspond to money you are entitled to, since it doesn't take into account the costs the company must pay. However, it may be that a company with negative earnings can alter its business model so that a proportion of it

Relevant Terminology

- *Revenue*: Amount received from selling goods or providing services
- *Earnings*: Company profits after-tax
- *Revenue per share*: Revenue / # of shares
- *Earnings per share*: Earnings / # of shares

revenue becomes profit – therefore, a company with higher revenue has more *potential* for future earnings.

<b>GameStop Financial Performance</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Revenue in millions	\$9364	\$7965	\$8547	\$8285	\$6466
Earnings in millions	\$403	\$353	\$35	-\$673	-\$471
Shares in millions	107	104	102	102	88
Stock Price in dollars	\$20.22	\$19.92	\$14.69	\$10.96	\$3.84
Revenue per Share in dollars	\$87.76	\$76.73	\$84.21	\$81.15	\$73.90

Data is from 1/31 of each year. Source:

<https://www.macrotrends.net/stocks/charts/GME/gamestop/financial-statements>

We can see from the table that the revenue per share declined from \$87.76 in 2016 to \$73.90 in 2020 while revenue declined drastically.

In general, the average price to revenue ratio for a company is about 1.5 or 2.0. In 2016, the price to revenue ratio of GameStop was  $\frac{20.22}{87.76} = 0.23$ . This is considered very low.

5. In early 2017, GME's stock price was \$19.92 and the revenue per share was \$76.73. Using this information calculate GME's P/R ratio for early 2017.
6. In early 2018, GME's stock price was \$14.69 and the revenue per share was \$84.21. Using this information calculate GME's P/R ratio for early 2018.
7. In early 2020, GME's stock price was \$3.84 and the revenue per share was \$73.90. Using this information calculate GME's P/R ratio for early 2020
8. Look at the example for 2016 and compare it to the 2020 P/R ratio you calculated above. If GameStop had the same price to revenue ratio in 2020 as it did in 2016, what would its price have been?

## Dream Big

By 2020 GameStop was not doing well as a company. Their earnings had been in the negative for two years and their revenue was declining at 9% per year. Let's pretend that GameStop could abruptly turn its fortunes around.

Suppose that GameStop suddenly became profitable and its earnings went from negative to 20% of its revenue. Then, the *earnings per share* would be 20% of \$73.90 or \$14.78. Additionally, suppose also that it could go from revenue *declining* at 9% per year to revenue *growing* at 10% per year.

9. What would you expect to happen to the GME's stock price if this were to suddenly happen?
  
10. GME's stock price at the beginning of 2020 was \$6.31. What would be GameStop's P/E ratio if their earnings per share had been \$14.78?
  
11. GME's stock price at the end of 2020 was \$18.84. What would be GameStop's P/E ratio if their earnings per share had been \$14.78?
  
12. What would GME's stock price have to be to support a P/E ratio of 15 with an earnings per share of \$14.78?
  
13. What would GME's stock price have to be to support a P/E ratio of 20 with an earnings per share of \$14.78?

## Understanding Valuation of a Stock

When you purchase a stock you are actually purchasing a fraction of a company. You can see how much the market values a company by taking the stock price and multiplying it by the number of stocks issued – this is called **Market Capitalization** (often abbreviated to Market Cap).

A  
B  
C

Suppose you had to hold every stock you bought forever. The value of that stock would be determined by the cash flows, paid as dividends by the company to you the investor. Imagine now that the company pays a dividend equal to their earnings every year. We could add up those dividends to get the value of the stock.

However, we also know that money we receive sooner is worth more than money we receive later so we would need to reduce the value of the cash flows (money) received in the future based on the time value of money. This is called **discounting**.

A  
B  
C

Let's examine this situation to see how we should value those future cash flows in the present:

*See Unit 2 Topic 5 of the FiCycle course for more details.*

Let  $P$  be the sum of the discounted value of future cash flows (the sum of the present value of the dividends).

Suppose

- $c$  is the cash flow at the end of year one
- $r$  is the discount rate.

Then, the value of the cash flow we receive at the end of one year is  $\frac{c}{1+r}$ .

The value of the cash flow we receive at the end of the second year is discounted for two years, so its value would be  $\frac{c}{(1+r)^2}$ . Where  $(1+r)^2 = (1+r)(1+r)$ .

We can repeat these payments out into the future, and we get the sum of all of the discounted payments far into the future. In math notation we can write this using the Greek letter Sigma to represent this sum as:

$$P = \sum_{n=1}^N \frac{c}{(1+r)^n}$$

Normally we do not expect the cash flow of a company to stay constant. Let's assume we expect it to grow. If the cash flow increases each year at a growth rate of  $g$ , then next year we expect the cash flow to grow from  $c$  to  $c(1+g)$ , at the end of second year, and then to  $c(1+g)^2$  at the end of the third year. Fill in the table below and determine what it will be in year 4, year 5 and year  $n$ .

Year 1	$c$
Year 2	$c(1 + g)$
Year 3	$c(1 + g)^2$
Year 4	
Year 5	
⋮	⋮
Year $n$	

In mathematical notation we can write this as:

$$P = \sum_{n=1}^N c \frac{(1 + g)^{n-1}}{(1 + r)^n}$$

While this formula may look quite complex to calculate, it can be simplified using the mathematics of geometric series (See *Unit 3 Regular Payments* in the FiCycle course for more details). Assuming that  $n$  (the number of years in the analysis) is a very large number we can take the limit of the above formula to get a formula that is much easier to compute and is often called the dividend discount model.

$$\text{Dividend Discount Model: } P = \frac{c}{r-g}$$

*Formula Key:*

$P$  = the sum of the discounted value of future cash flows

$c$  = the cash flow at the end of year one

$r$  = the discount rate

$g$  = the growth rate



The **Dividend Discount Model** allows us to predict the price of a stock. Let's apply the formula to a fictional company to see how it works.

Suppose:

- $c$ , the earnings per share of the company, is \$10 per year
- $r$ , the discount rate, is 15%
- $g$ , the growth rate, is 5%

Then, using the formula, the value of the company's stock would be \$100.

$$\frac{\$10}{15\% - 5\%} = \frac{\$10}{.15 - .05} = \frac{\$10}{.1} = \$100$$

If we continue to assume the company's earnings per share ( $c$ ) are \$10 per year and that we have a discount rate ( $r$ ) of 15% but instead assume that the growth rate ( $g$ ) is 10% per year (instead of 5%), then the value of company would be \$200.

$$\frac{\$10}{15\% - 10\%} = \frac{\$10}{.15 - .1} = \frac{\$10}{.05} = \$200$$



For the next three questions assume the company's earnings per share ( $c$ ) are \$10 per year and that we have a discount rate ( $r$ ) of 15%:

14. What would be the value of the company if the growth rate was 7%?

15. What would be the value of the company if the growth rate was 1%?

16. What would be the value of the company if the growth rate was 14%?

## Keep Dreaming

Back to game stop, let's pretend that GameStop could abruptly turn its fortunes around.

Returning to our earlier example, suppose that GameStop suddenly became profitable and its earnings went from negative to 20% of its revenue. Then, the earnings per share would be \$14.78 per share. Additionally, suppose also that it could go from revenue *declining* at 9% per year to revenue *growing* at 10% per year. Using this information we can now predict the price of the stock based on the Dividend Discount Model described above:

$$P = \frac{c}{r - g} = \frac{\$14.78}{15\% - 10\%} = \frac{\$14.78}{0.15 - 0.10} = \frac{\$14.78}{0.05} = \$295.29$$



## Back to Reality

The closing stock price on January 29<sup>th</sup> 2021 for GME was \$325.



17. Which is more likely to reflect the value of the stock to a long-term investor?

- The December 2020 year-end price of \$18.84
- The January 2021 end of the month price of \$325

Explain why? What factors that contributed to your evaluation of the long-term value of GameStop

## One year after the headlines

In the year that followed the events of January 2021 GameStop was covered in the press extensively as a prime example of a new phenomenon of a meme stock. Since then, the price of the stock has gyrated widely with the price falling to about \$100 per share.

Figure 1. A year-long view of the stock price of GME from Jan 2021 to Jan 2022<sup>1</sup>



<sup>1</sup> Graph and data from MSN money.

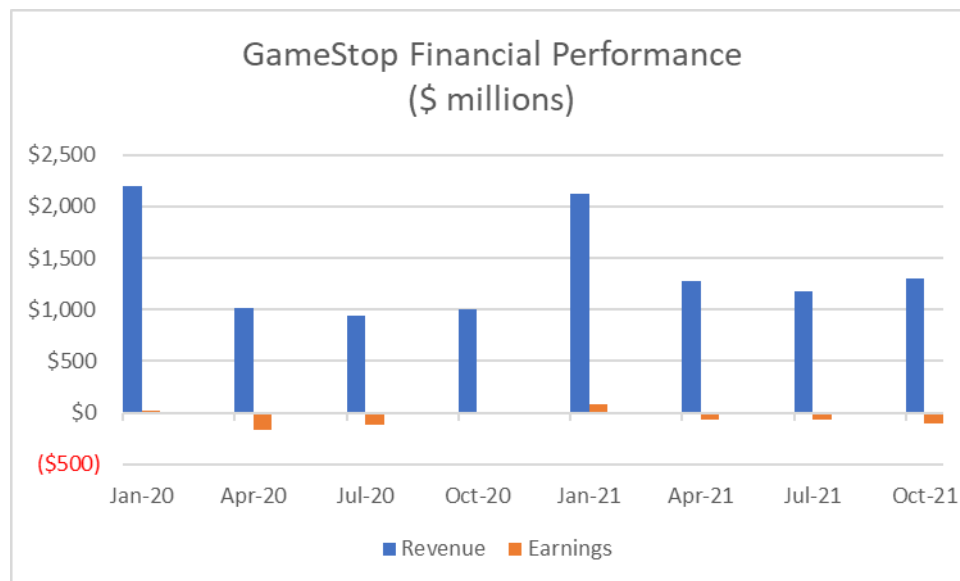
From a long-term valuation point of view, we would like to see if there has been any significant change in the financial performance of the company.

Table 1 below shows the quarter revenue and earnings of GameStop. For this analysis we look at quarterly, rather than annual performance to see if there has been a significant change during the year following the initial run up in stock price.

Table 1. Game Stop Financial Performance (in millions of dollars)

Date	Revenue	Earnings
1/31/2020	\$2,194	\$21
4/30/2020	\$1,021	(\$166)
7/31/2020	\$942	(\$111)
10/31/2020	\$1,005	(\$19)
1/31/2021	\$2,122	\$81
4/30/2021	\$1,277	(\$67)
7/31/2021	\$1,183	(\$62)
10/31/2021	\$1,297	(\$105)

Figure 2. Quarterly Revenue and Earnings of GameStop (in millions of dollars)



One common way to look at a company's financial performance is to compare a quarterly result for this year from a quarterly result for the previous year.



18. What is the change in revenue from the quarter ending October 2021 to the same quarter the ending October 2020?

19. Why would analysts compare to a quarter from *a year ago* rather than the previous quarter in the *same year*?

20. What pattern do you see in the graph of revenue in Figure 2? What is a possible explanation for this pattern?

Although the revenue for GameStop has increased, its earnings were still negative and it was still losing money. The loss for the quarter ending October 2021 is larger than the loss in 2020.

<b>GameStop Financial Performance</b>					
	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Revenue in millions	\$8547	\$8285	\$6466	\$5089	\$6010
Earnings in millions	\$35	-\$673	-\$471	-\$215	-\$381
Stock Price in dollars	\$19.92	\$13.07	\$6.31	\$17.25	\$108.93
Revenue per Share in dollars	\$84.21	\$81.15	\$73.90	\$78.30	\$82.34

Stock Prices are year open prices. Source:

<https://www.macrotrends.net/stocks/charts/GME/gamestop/financial-statements>



21. In early 2021, GME's stock price was \$17.25 and the revenue per share was \$78.30. Using this information calculate GME's P/R ratio for early 2021.

22. In early 2022, GME's stock price was \$108.93 and the revenue per share was \$82.34. Using this information calculate GME's P/R ratio for early 2022.

23. What stock price does the dividend discount model predict if we pretend the GameStop was profitable in 2022, that its earnings were 20% of its revenue, that

we have a discount rate of 15% and that instead of its revenue declining, Gamestop's revenue was growing at 10% per year?

24. What stock price does the dividend discount model predict if we pretend the GameStop was profitable in 2022, that its earnings were 20% of its revenue, that we have a discount rate of 15% and that instead of its revenue declining, Gamestop's revenue was growing at 5% per year?

25. What stock price does the dividend discount model predict if we pretend the GameStop was profitable in 2022, that its earnings were 10% of its revenue, that we have a discount rate of 15% and that instead of its revenue declining, Gamestop's revenue was growing 5% per year?

Many media outlets reported that some investors saw investing in GameStop and other meme stocks as a way to punish hedge funds who have shorted these stocks; however, GameStop is still a real company with real operations. The result of the higher stock price meant GameStop was able to raise a substantial amount of money in the market.

Providing funding is an important role of the stock market. Companies can raise money by selling more stock and this is exactly what GameStop did. In June of 2021, GameStop had a stock offering where they issued and sold five million shares of stock and raised one-billion one-hundred-twenty-six million dollars. In the next section we will assess the value the stock that they sold to see how it performed for those who chose to invest in GameStop.

## Evaluating GameStop's Stock Offering

We would like to compute the value of the shares at the time of the sale. When performing calculations with millions and billions it isn't always easy see the answer. One solution to this problem is to convert all of the numbers to a common

basis (such as millions or billions). In this case it makes sense to convert all of the numbers to millions. We know that there are 5 million shares but we need to convert the proceeds of the offering to millions. If we keep in mind that a billion is 1000 million, then we can convert 1 billion to 1000 million and add the 126 million for a total of \$1126 million.

26. Convert each of these numbers to millions:

- a. 500,000,000
- b. 23,000,000,000
- c. 500,000
- d. 125,700,000

To calculate the offering stock price, we compute  $\frac{\$1126 \text{ Million}}{5 \text{ Million Shares}} = \$225.20$  per share.

We can reverse that process to determine the current value of those five million shares.



27. For parts a-e, assume that GameStop had an individual share price of \$96.31 on January 27, 2022.

- a. The five million shares were originally sold for \$1125 million in June 2021. What was the value of 5 million shares on January 27, 2022?
- b. How much did the value of the 5 million shares change from when they were offered till January 27, 2022 (in millions of dollars)?
- c. What was the percent change in the value of the 5 million shares from when they were offered till January 27, 2022?
- d. Does the percentage change based on if you are measuring in dollars or billions of dollars? Why?

The January 2021 run-up in the stock price of GameStop, which was not directly related to the actual earning power of the company, may have led to a situation where the investors who purchased shares of the company may never get a good

return on their investment and over a billion dollars of investor money might not have been invested productively for the investors or for the economy.

## A Historical Note

One of the most famous modern economists, John Maynard Keynes wrote about this type of phenomenon almost 90 years ago before the internet or meme stocks even existed.

It happens, however, that the energies and skill of the professional investor and speculator are mainly occupied otherwise. For most of these persons are, in fact, largely concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the conventional basis of valuation a short time ahead of the general public.

They are concerned, not with what an investment is really worth to a man who buys it “for keeps”, but with what the market will value it at, under the influence of mass psychology, three months or a year hence.

Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done.

(The General Theory of Employment, Interest and Money, 1935)

A long-term investor needs to find a way to see through the “bubbles of speculation” and find investments that will produce long-term value.

A meme from 2022 shows the risk of ignoring this advice. To understand the meme, you need to know that the original buyers of GameStop in January 2021 who were trying to demonstrate their power over the hedge funds called themselves Apes.

Equipped with financial education and a willingness to “do the math”, the Apes may have viewed the later price drops as a likely outcome. Expecting to continuously maintain a high stock price independent of the revenue and earnings of a company is a risky proposition at best.

## Conclusion

While the Reddit inspired investors in GameStop may have other goals in mind, they might have something greater in value at the end of the story if they had bought games from GameStop rather than shares of GME.



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Risks associated with 'hot stocks':

There are significant risks when short-term trading based on social media.

The SEC and FINRA have each issued a notice outlining the risks:

<https://www.sec.gov/oiea/investor-alerts-and-bulletins/risks-short-term-trading-based-social-media-investor-alert>

<https://www.finra.org/investors/alerts/following-crowd-investing-and-social-media>

## About FiCycle

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