Nasdaq's Funny Math, or How 22 Can Sometimes Be 50

The Nasdaq 100 index has been the undisputed winner lately among the well-known American stock indexes. Often referred to simply as QQQ (based on a popular ETF which tracks the index), the Nasdaq 100 has handily beaten the S&P 500 index, the Dow Jones Industrial Average, and the Russell 3000 index over just about any recent time frame through the end of the most recently completed quarter:

	Total Return Through June 30, 2017 for Most Recent…				
Index	3 Months	6 Months	1 Year	3 Years	5 Years
Nasdaq 100	4.2%	16.8%	29.4%	52.2%	130.5%
S&P 500	3.1%	9.3%	17.9%	31.7%	97.9%
DJIA	4.0%	9.3%	22.1%	36.8%	87.9%
Russell 3000	3.0%	8.9%	18.5%	29.9%	97.5%

source: Marketwatch.com

Unless you have not been paying attention to the stock market, you probably already know the reason for this strong performance. The largest companies of the technology-heavy QQQ have been some of the best stocks to own over the last few years. Just four companies—Apple, Amazon, Facebook, and Google—comprise over one-third of the index, so their superior performance has been doing the lion's share of lifting the index to new heights.

Curiouser and Curiouser

The P/E ratio of a stock is a quick and easy way to do a first cut of the valuation of a given company. Just take the price of one share of stock in the company, divide it by the earnings per share, and you have the P/E ratio. For example, Apple shares have been recently trading around $160 each, and Apple is earning about $9 in profits per share. Divide the first number by the second and you see that Apple's P/E ratio is about 18.

If you do that same math for the next biggest companies in QQQ, you'd see that Amazon's P/E is about 250, Facebook's 38, Google's 34, and Microsoft's 27. These five companies make up about 43% of the entire value of the Nasdaq 100, meaning that the other 102 (yes, that's right—there are currently 107 companies in the Nasdaq 100 index, go figure) comprise the remaining 57%. If you do a weighted average of the top five companies' P/E ratios you would get a figure of 62.

Therefore, you might find it strange that on the QQQ website the P/E ratio for the Nasdaq 100 index as a whole is listed as 22.19:

Fund Characteristics	as of 06/30/2017
Price/Earnings Ratio[1]	22.19
Price/Book Ratio[1]	5.01
ROE[2]	21.92%
Avg Market Cap[2]	$288,292MM

[1] Weighted Harmonic Average
[2] Weighted Average

source: Invesco

After all, if 43% of a given group has an average P/E of 62, even if the remaining 57% had a P/E of an impossibly low level of, say, 1, then the overall P/E for the index would be 27. That is, 43% of 62 plus 57% of 1 is mathematically equal to 27. But the QQQ website says the average P/E is 22, so something is not computing.

Perhaps we should be looking at the expected value of next year's earnings, and not this year's. Sometimes referred to as the forward P/E (since the denominator takes next year's number as opposed to the current year's), this figure is generally lower than the current P/E since most companies increase their earnings year by year.

If we do that calculation instead, the weighted average forward P/E for just the top five companies is only 36 instead of 62. In this case, the weighted average forward P/E for the remaining 102 companies must only be 12 to get a total value for the entire index of 22. But to think that a 12 P/E would apply to such great companies as Priceline, Starbucks, Netflix, or ADP stretches the imagination. So something else must be going on here.

Read The Footnotes

One of the most important tasks for any investor is to always read the fine print. In the case of a company's annual report, this would mean that an investor should not be satisfied just by examining the financial statements as they are presented, but they should dig into the footnotes which offer further detail and information backing up the headline numbers. And in the case of trying to figure out an appropriate valuation yardstick for the best-performing stock index right now, it would mean simply looking at footnote number 1 in the image above.

Next to the text "Price/Earnings Ratio," there is a superscript numeral 1, which is clarified in the footnote as "Weighted Harmonic Average." This term was a new one for us. We know what an average is. We know what a weighted average is. But "weighted harmonic average"? We have been in the investment business for over a decade, we have studied finance in both a two-year MBA curriculum and the CFA exam process, and one of us has an undergraduate degree in math,

yet neither of us was able to precisely state the definition of "weighted harmonic average" without consulting an Internet search engine.

So let us save you the time of looking it up yourself. In a harmonic average, first you take the *inverse* of each number in the data set, then you average those, then you take the inverse of that average. Here is a quick example:

5 Numbers		Inverse of 5 Numbers		
4		0.2500		
36		0.0278		
150		0.0067		
19		0.0526		
41		0.0244		
Total	Average	Total	Average	Harmonic Average
250	50.0	0.3615	0.0723	13.8

The simple average of 50 seems to overstate the case, since it is higher than 4 of the 5 data points. Likewise, the harmonic mean of about 14 seems to understate the case, since it is lower than 4 of the 5 data points. It's the two outliers (4 and 150) that are throwing off the results. If we look just at the 3 data points in the middle (19, 36, and 41), the simple average of 32 is quite close to the harmonic average of 29.

Will the Real P/E Please Stand Up?

So which number should an investor use to evaluate the valuation of the Nasdaq 100? Is it the 22 claimed on the QQQ website? Is it the 42 that one would get if they took a simple non-weighted average of the 96 profitable companies in the index? Or is it the 50 that one would get if they took a weighted average of that same group?

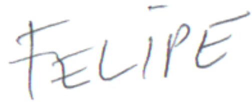
Depending on how you look at it, any of these figures could be construed as the "right answer." One final method is to think of the Nasdaq 100 as a collection of privately owned businesses. If you owned all 107 companies in the index, the way you would value them would be to add up the profits generated by all of them over the course of the year. In this case, if our math is right, that figure is about $250 billion. Then compare that to their aggregate market value, which we calculate to be a little under $6.75 trillion, which gives a ratio of about 27.

In our view, it's not important to definitively say that the Nasdaq 100 is trading at a P/E of 22, or 27, or 42, 50, or even 62. The most important lesson to come out of this exercise is to not buy something unless you understand it.

Conclusion

Tread carefully while investing your hard-earned money when the markets are reaching all-time highs. Be sure you understand how highly valued an index may be before committing your capital to it. That is the specific advice which emerges from this discussion.

But in a more general sense, in investing you should never accept the headline numbers as presented. Always look under the hood and try to figure out what the underlying fundamentals are. Dig deeper until you get to the source numbers. And when your homework is complete, proceed with caution.



Felipe Garcia, CFA
Chief Investment Officer
INKWELL CAPITAL LLC

Aaron Byrd, CFA
President
INKWELL CAPITAL LLC