

Lecture 22- Pre-lecture reading

The stock market: how share price is determined and why the CEO cares

For strategic planning we have been assuming that investors seek a certain return on their stock purchases like 10% profit per year. This seems to imply that when they buy a share of stock, they should be willing to pay $1/10\% = 10$ times the current earnings per share of that company. Formally, the price-earnings (PE) ratio, also known as P/E ratio, P/E, or PER, is the ratio of a company's share price to the company's earnings per share. Surprisingly, the average share price that investors have paid for all companies over more than a century is almost 17 times earnings per share, which seems to imply that they are accepting a return of $1/17$, or about 6%. On the other hand, we have read that investors in the stock market have seen an average return of about 10% for the last century. How can that be?

As we will discuss later in this lecture, the key to the 10% return for investors is that companies have consistently been able to increase their earnings in ways that don't require new investment, and share prices increase as a result. The dividends paid to shareholders by companies (about 3% on average), plus increases in the value of their shares through growth and efficiency (about 7% on average), has resulted in an average return of about 10% per year. Most investors reinvest their dividends in additional shares, so the total value of their holdings in a given company increases (on average) by about 10% a year.

As we will also see, the value of those shares may vary dramatically from year to year, and from day to day, and even from minute to minute. Unlike bank interest, nothing is guaranteed. Based on historic data, it is reasonable to expect a return of about 10% over a lifetime of investing in many companies, but there are big differences between the performance of different stocks, and big differences in the performance of the whole stock market from one year to another. The stock market can be frightening, but as we will see, it is the only way that an average person can accumulate significant wealth. We will consider that viewpoint in the last five lectures of this course, but for now, we will consider the stock market from the viewpoint of the CEO (and other top managers) of a company.

From the strategic discussions we have had in previous lectures, we might assume that top management is primarily concerned with profit and loss (providing the promised return on the investment that stockholders have made), but this is not generally the case. For top management, most compensation comes in the form of bonuses, which are often based on increases in the price of their shares, so they care about share price even more than they care about profit. They also know that investors care a lot about share price, and that angry investors can get them fired (recall that Ron Sommer, CEO of Deutsche Telekom, lost his job when the company's share prices crashed in 2000). Share price is influenced by earnings (particularly in the long term), but as we will discuss below, many things can influence share price (and bonuses) in the short term.

In the remainder of this lecture, we will focus on how the stock market works (how share prices are set, why bubbles and crashes happen, why long-term results are more

predictable than short term results, and why the long-term return in stock investments has been about 10%.

How stock prices are actually set

The shares of public companies are “traded” on “stock exchanges” like the New York Stock Exchange and the Nasdaq, but some sort of brokerage account is needed. Investors have access to a lot of public information about a company when they decide to buy or sell shares (news stories, annual reports, some guy in the gym) and they have personal preferences as well. They may prefer exciting growth or safe dividends, and they may “love” Apple based on past performance or be angry at Verizon because of a lack of recent growth.

The resulting buy/sell process is a bid/ask process where potential sellers say what price they are willing to sell for, and potential buyers say what price they are willing to pay. In general, the sellers “asked” prices are higher than the buyers “bid” prices, but when a match occurs, a sale results. That specific price becomes the assumed value for all company’s shares at that moment (until another sale happens). Multiplied by the total number of shares, it creates what is called the “market capitalization” or “market cap” of the company, which is thought of as the current value of the company. The portfolios of millions of people change in value when you set a new price (even by a penny). It gives other investors an idea of what price they could get for their shares but does not guarantee that anyone else can get the same price. Each sale is the result of a single buyer and a single seller. If you buy one share of Verizon stock, then for a few seconds (or minutes on a slow day) you have defined the value of Verizon for the world.

The number of transactions per day for a given company depends on the size of the company and what might be happening at that moment. Usually, the price doesn’t change by much, but what if something important happens? If a company announces an important new invention (or claims to be leading the way in 5G), there may suddenly be more buyers than sellers, and those buyers might offer a higher price. If the chief financial officer is arrested for embezzlement, there may suddenly be more sellers than buyers, and they may be willing to accept a lower price. An increasing price will attract more buyers, and some owners may offer to sell at an even higher price. Eventually a new “equilibrium” will be reached at a higher price, with fewer investors interested in buying or selling. Investors would love to know what price will be achieved, and books have been written in how to predict such things. One might suspect that anyone who could predict the movement of stocks would be buying and selling stocks rather than writing books, but gamblers tend to be optimistic.

What is more likely is that future stock prices cannot be predicted. They are simply the result of an imbalance between the numbers of buyers and sellers (and perhaps in their eagerness to buy or sell). If earnings are announced that are 10% higher than expected, that doesn’t mean the share price will rise 10%. If a respected analyst suggests on the same day that earnings will not continue to grow, the price could end up falling, despite the good earnings.

Some news can push whole sectors of the market up or down. An article claiming that “5G is the growth opportunity of the decade” can increase the share prices of all service providers and equipment sellers (or not). There are also factors that affect the entire market. A pandemic may lead to increased selling across many types of companies

and cause the whole stock market to “fall”. In 2020 the market fell 30%, but then investors decided that covid was a temporary problem and the market soon went back up. Investors who did nothing were not affected. Investors who panicked and sold all their stock investments when the market was down 30% and missed the recovery lost 30% of their “wealth.”

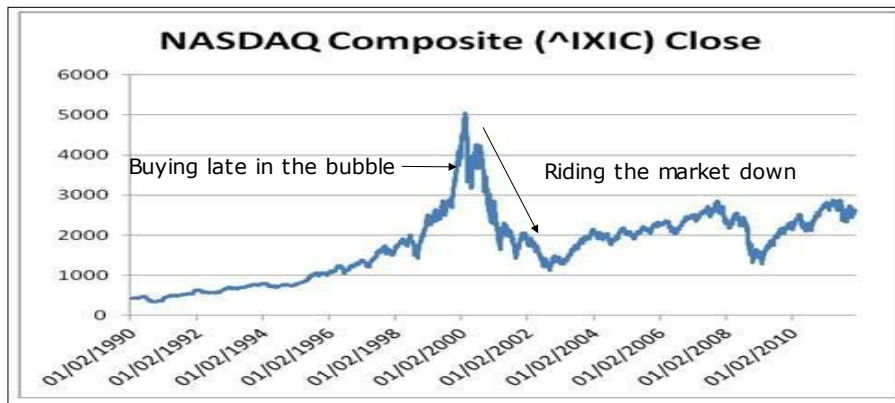
A reduction in corporate taxes will increase profits for all companies, and therefore the whole market will probably go up (but maybe not). A reduction in interest rates offered by banks and bonds will cause more money to flow into stocks and share prices will probably increase (but maybe not). Interest rates have been very low for more than a decade, first because the government was trying to offset the economic problems caused by the mortgage crisis and more recently to offset business problems caused by the pandemic. As a result, the stock market has been at record highs despite the pandemic. Unfortunately, the low interest rates are causing inflation to rise which is also a problem. What will happen to stock prices when the government lets interest rates to go back to “normal” and some money flows back to bonds and bank accounts? The bottom line is that no one can possibly be sure that the whole market, or a market sector, or a single stock will go up or down, or by how much, or when. Tips from “the guy who predicted the last crash” are not reliable. Every transaction has a buyer (who thinks the price will go up) and a seller (who thinks it won’t). The CEO’s bonus is affected by things that are far beyond her control.

Overshooting and Bubbles

Ironically, rising share prices for a company or the whole stock market can produce more optimism that fuels more increases and more optimism. Prices often overshoot what a reasonable person might think is the “right” price, and in extreme cases, this “positive feedback” can lead to “bubbles” in which share prices lose all logical relationship to real business performance. Bubbles will eventually burst with dramatic losses (as shown in Slide 4, below, for the “dot-com” bubble and crash).

The “dot.com” “bubble” and crash

Notice the “overshoot” in the crash



Investors were hurt if they bought late in the bubble and “rode the market down.” Investors with stable, long-term investments weren’t hurt.

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This “overshooting” behavior is the result of what is called “greed and fear.” When the market is going up investors get greedy. They buy too much, and the market goes too high. When it starts to fall, they get scared and sell too much, and the market goes too low. This behavior adds to the short-term risk associated with the stock market, but as we will see, long-term investors with diverse investments are less affected than short-term speculators who try to “game” the market. Looking at Slide 4, in 1999 such investors would have seen dramatic increases in the value of any “tech stocks” they owned. Perhaps they were thinking about early retirement. Then the market crashed, and they “lost” a lot of money (on “paper”). By 2002, their tech stocks had over-corrected and fallen to 1996 levels, but if you look at their long-term results (1990-2010) they did rather well. Investors who rushed into tech stocks in 1999 (because they got greedy) and sold in 2002 (because they panicked), were hurt very badly.

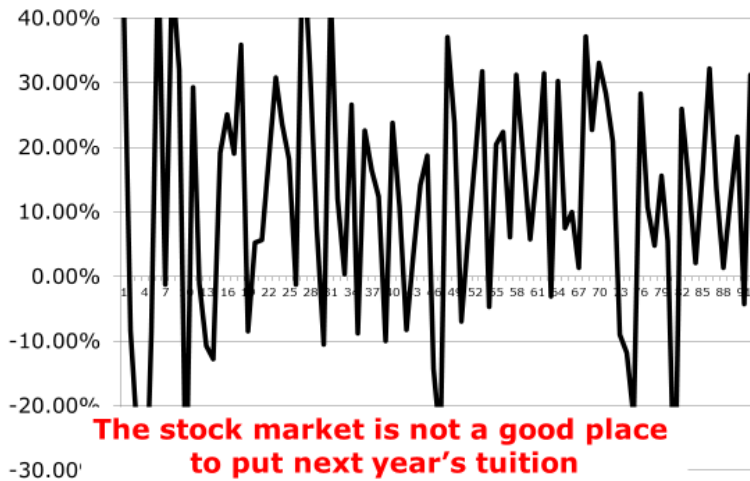
The dot-com bubble was an exciting time for investors, but from the perspective of top management, it was a stressful time. It put pressure on CEOs like Ron Sommers to take big risks. If he didn’t, they would say he had “no vision” – that other CEOs were assuring a great future for their companies through the technical wonders of cellular systems and the Internet, while he did nothing. He could have been forced to resign (either way).

The effect of time on risk

If we look at the results for stock owners over the last century, we see an average annual return of about 10%, but in some years, they have returned much more than 10% and in a few bad years they have lost as much as 30-50% (a frightening experience for investors which we can see in Slide 5 below). We wouldn’t want to invest next year’s tuition (or our emergency fund) in the stock market, as tempting as that might be in a good year. [The data for the next three slides is from *Historical stock and bond returns 1928-2019* which can be found with the CTIA data. Note that the

variations shown in the following slides are based on year-end data. Data for daily prices would show even more variation.]

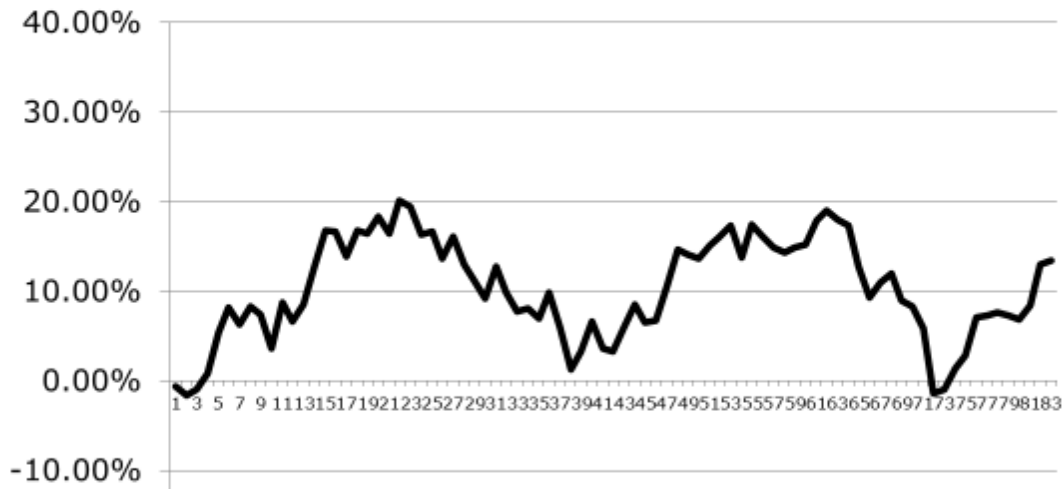
The annual stock market return averages about 10% but is very variable



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Slide 6 shows “rolling” returns for all 10-year periods (1928-1937; 1929-1938; etc.). They are still variable but less frightening. They have averaged from about -1%/year in the worst decade to +20%/year in the best decade. If we are saving for a down payment for a house in ten years, we might take the risk, since we could delay the purchase if we had to (and it’s hard to save enough without the stock market).

The 10-year “rolling” return on stock market investments is less variable



But it is still variable. You might have made 20% in the best 10-year periods or lost 1-2% in the worst 10-year periods.

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If we look at rolling returns for all 40-year periods (slide 7) we see much more predictable results. The 40-year periods have varied from about 9% to about 12%. The difference between earning 9% and 12% on your stock investments for 40 years is actually very significant (a variation of \$2M in your “wealth,” as we will discuss in a later lecture), but what is important is that even the poorest 40-year results have been much better than other options like bank interest or bonds. It is essentially impossible to save enough for a comfortable retirement without investing in stocks, so it’s important to understand how they behave, and that time matters. Smart investors think of the stock market as the long-term path to wealth. Foolish investors worry about making a “killing”

this month (or this week, or today) on some stock that they read about on the web or heard about in the gym. If you ask them what their average annual return has been (which is what matters) they won’t know, but they will remember some great investment they once made. It is also important to understand that long-term investors do not get 9-12% every year. They will experience those frightening variations that we see in slide 5, but they have a long-term viewpoint. They don’t panic and sell in those bad years, which can take some courage. More on this when we discuss personal finance.

Top management, on the other hand, isn’t foolish, but they can’t afford to plan for forty years, or ten years, or (sometimes) even one year. Profits are reported quarterly, and they affect bonuses (and sometimes jobs). As strategists, top managers doesn’t worry

very much about the long term. Rewards and survival are short-term things, and press releases are easier to create than profits. That's what 5G is often about.

The 40-year “rolling” return on stock market investments is much less variable



But it's not like a bank account with 10% interest. The annual return is scary in some years (see slide 5), and a 1% difference in the 40-year average produces a 50% difference in results

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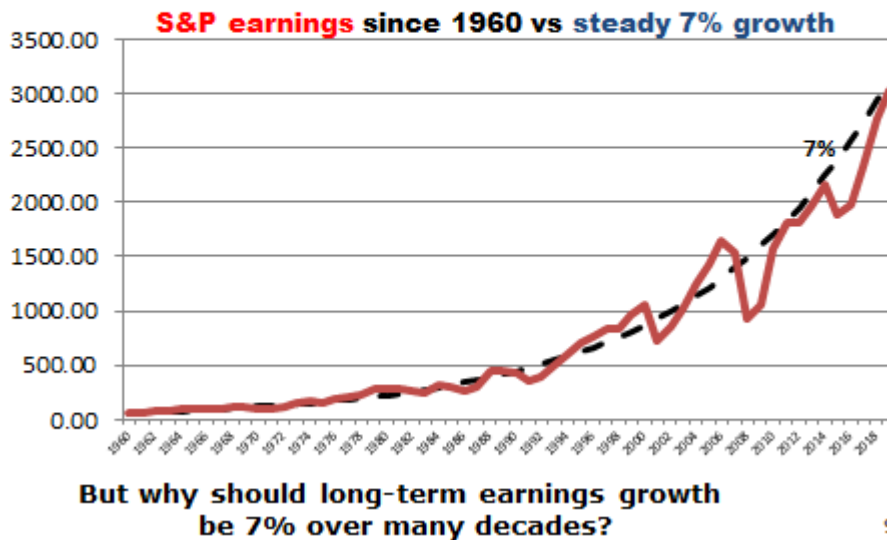
Another look at those “near-term” and “long-term” behaviors

Throughout this course, we have implied that share price is related to profit (often called “after-tax earnings” or just “earnings.”). In this lecture we have shown that share prices are actually determined by a minute-to-minute process of buying and selling, which in turn is based on both short-term events and long-term factors. Which is correct? It turns out that both are correct.

Slide 9 shows the combined **earnings** of the S&P 500 (the 500 largest companies in the US) for more than 50 years. We often use the S&P 500 data because it is widely available and includes about 75% of the value of the US stock market (it doesn't include

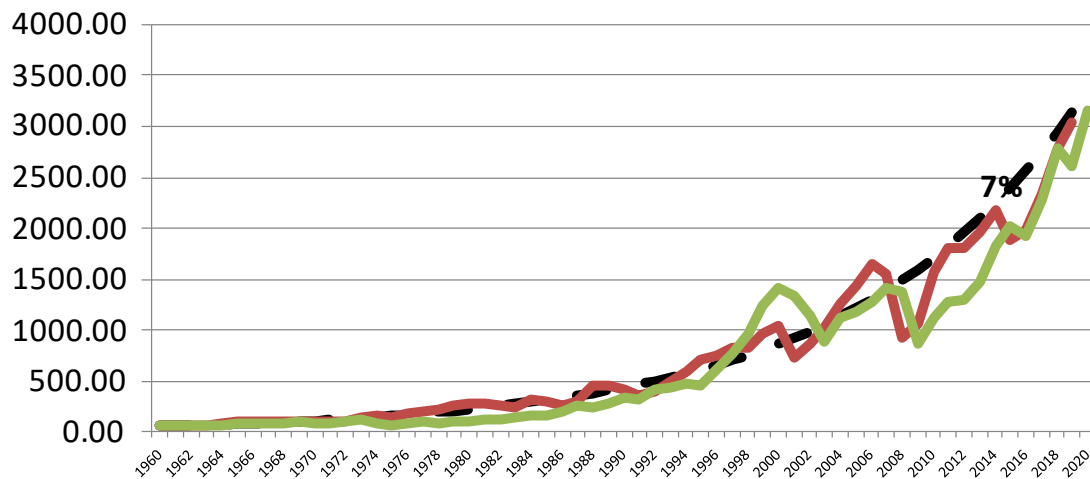
thousands of medium-sized and small companies, but the “total market” returns and the S&P 500 returns are usually similar). Looking at slide 9, we can see that in the short term, earnings are quite variable, but we also see that in the long term they follow a 7% growth curve that is surprisingly consistent. In fact, we might wonder why that 7% should be so consistent over many decades. We will return to that question later.

Earnings for S&P 500 1960-2019 compared to steady growth at 7%



Slide 10 (below) adds **share price** to the earnings curve shown above for the S&P 500 (share price is “normalized” for comparison to earnings). It shows that share price for the average company is quite varied in the short term, with only a loose connection to earnings. In the long term, however, price seems to follow the same 7% as earnings (and would yield the expected 10% for investors who reinvest their 3% dividends).

And **stock Prices** follow **Earnings** in the long term but with even bigger variations in the short term.



**7% annual growth over the long -term
(10% with reinvested dividends)
but some scary moments**

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It seems unlikely that this is a coincidence. A reasonable explanation is that share price is driven by many short-term factors (as we have discussed), but those factors are both positive and negative over different time periods, so there isn't an upward or downward bias in the long term. The earnings effect also varies from year to year, but it varies around an average of plus 7%. For a given year, or even a few years, the short-term effects can dominate, making it seem that price is not related to earnings, but in the long term that steady +7% growth in earnings will dominate, and in the long-term share price will follow earnings, increasing at 7% while paying 3% in dividends. Our data shows that long-term investors who reinvest their dividends will tend to get a return of about 10% on their stock investments (+/- about 1.5%). But if that is the result of a consistent increase of 7% in earnings over decades, we might want to ask where that reliable long-term growth in earnings comes from. We could just believe the data over the last 90+ years, but it would be nice to have some supporting logic as well.

Why might earnings grow at about 7% over many decades?

Based on the above discussion, companies have showed an increase in earnings that has averaged about 7% over many decades, but why should this continue? Why should we bet our retirement on these numbers? No answer is provably correct, but there is a logic that might account for this predictability.

For most companies, expenses represent about 90% of revenues and earnings are therefore 10% of revenues. If a company can reduce expenses by a small amount (say 1%) earnings will therefore increase by 10%. We have seen that companies reinvest about 7% of earnings (to produce growth) and we know that growth increases efficiency (it reduces SG&A per customer). Even companies that aren't growing are constantly looking for ways to save money. It is not unreasonable to assume that all this investment in growth and searching for cost reduction, for thousands of companies over decades, produces a relatively predictable and consistent increase in earnings. The short-term results are influenced by many factors and are highly unpredictable and sometimes frightening, but if companies (overall) demonstrate long-term earnings growth of 7% based on operational efficiency, stock prices could match that 7% in the long term. If they have returned another 3% in dividends, investors will see a long-term gain of 10% in their results by reinvesting their dividends in the stock market.

This is not provable, but it might explain the predictable long-term performance of the stock market, despite its short-term variability. No one loves the short-term losses, but we tolerate them for retirement planning because there is no other way to create significant wealth with bonds or savings accounts. Perhaps the focus of top management on short-term results (for thousands of companies) produces that average long-term gain of 7% per year (while passing 3% back to the investors for reinvestment). Unfortunately, it seems that the cellular service providers are reducing their earnings in recent years. We can therefore understand all the talk about 5G and "trillions of dollars" in "future growth".

In summary: The effect of the stock market on management behavior

Corporate managers (especially at the highest levels) make a significant fraction of their personal incomes based on the performance of the company's stock. Stock options, for example, allow managers to buy the company's stock at a particular past price, so any future price that is higher represents a (possibly large) bonus. An unchanging stock price can cost managers their bonuses, and a falling stock price can cost them their jobs. As we have seen, any number of events can affect stock prices (even things that are outside of management control) so it becomes a stressful job. Annoyed stockholders who like growth may sell their shares if the company stops growing, and any increase in selling makes the share price drop. In cellular, the end of growth was achieved through amazing success (everyone has a cellphone) but if it causes growth-seeking investors to sell their shares, then share prices (and bonuses, and even jobs) will be affected. It is important to run the company well when growth is impossible, but management may go to great (and dangerous) lengths to achieve continuing growth, even if they have no idea how to achieve that result. This includes creating or buying new businesses, attracting customers from competing businesses, and just saying optimistic things about the future. The end of growth (as we have seen for cellular in the last decade) is stressful for management. This may explain the press releases about the wonderful possibilities of "5G". We will continue this discussion in the next lecture.