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CHAPTER 1

A Brief History of Risk and Return

Anyone can retire as a millionaire! Consider this: If you invest \$2,500 per year while earning 12 percent annual returns, then after 35 years you will have accumulated \$1,079,159. But with annual returns of only 8 percent you will have just \$430,792. Are these investment returns realistic over a long period of time? Based on the history of financial markets, the answer appears to be yes. For example, over the last 75 years the Standard and Poor's index of large company common stocks has yielded almost a 13 percent average annual return.

The study of investments could begin in many places. After thinking it over, we decided that a brief history lesson is in order, so we start our discussion of risk and return by looking back at what has happened to investors in U.S. financial markets since 1925. In 1931, for example, the stock market lost 43 percent of its value. Just two years later, the market reversed itself and gained 54 percent. In more recent times, the stock market lost about 25 percent of its value on October 19, 1987, alone, and it gained almost 40 percent in 1995. What lessons, if any, should investors learn from such shifts in the stock market? We explore the last seven decades of market history to find out.

The primary goal in this chapter is to see what financial market history can tell us about risk and return. One of the most important things to get out of this discussion is a perspective on the numbers. What is a high return? What is a low return? More generally, what returns should we expect from financial assets such as stocks and bonds, and what are the risks from such investments? Beyond

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this, we hope that by studying what *did* happen in the past, we will at least gain some insight into what *can* happen in the future.

The history of risk and return is made day by day in global financial markets. The internet is an excellent source of information on financial markets. Visit our website (at www.mhhe.com/~finance/cjlinks) for suggestions on where to find information on recent financial market events.

Not everyone agrees on the value of studying history. On the one hand, there is philosopher George Santayana's famous comment, "Those who do not remember the past are condemned to repeat it." On the other hand, there is industrialist Henry Ford's equally famous comment, "History is more or less bunk." These extremes aside, perhaps everyone would agree with Mark Twain who observed, with remarkable foresight (and poor grammar), that "October. This is one of the peculiarly dangerous months to speculate in stocks in. The others are July, January, September, April, November, May, March, June, December, August, and February."

Two key observations emerge from a study of financial market history. First, there is a reward for bearing risk, and, at least on average, that reward has been substantial. That's the good news. The bad news is that greater rewards are accompanied by greater risks. The fact that risk and return go together is probably the single most important fact to understand about investments, and it is a point to which we will return many times.

1.1 Returns

We wish to discuss historical returns on different types of financial assets. First, we need to know how to compute the return from an investment. We will consider buying shares of stock in this section, but the basic calculations are the same for any investment.

(marg. def. total dollar return The return on an investment measured in dollars that accounts for all cash flows and capital gains or losses.)

Dollar Returns

If you buy an asset of any type, your gain (or loss) from that investment is called the *return* on your investment. This return will usually have two components. First, you may receive some cash directly while you own the investment. Second, the value of the asset you purchase may change. In this case, you have a capital gain or capital loss on your investment.¹

To illustrate, suppose you purchased 100 shares of stock in Harley-Davidson on January 1. At that time, Harley was selling for \$37 per share, so your 100 shares cost you \$3,700. At the end of the year, you want to see how you did with your investment.

The first thing to consider is that over the year, a company may pay cash dividends to its shareholders. As a stockholder in Harley, you are a part owner of the company, and you are entitled to a portion of any money distributed. So, if Harley chooses to pay a dividend, you will receive some cash for every share you own.

¹ As a practical matter, what is and what is not a capital gain (or loss) is determined by the Internal Revenue Service. Even so, as is commonly done, we use these terms to refer to a change in value.

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In addition to the dividend, the other part of your return is the capital gain or loss on the stock. This part arises from changes in the value of your investment. For example, consider these cash flows:

	Ending Stock Price	
	\$40.33	\$34.78
January 1	\$3,700	\$3,700
December 31	4,033	3,478
Dividend income	185	185
Capital gain or loss	333	-222

At the beginning of the year, on January 1, the stock is selling for \$37 per share, and, as we calculated above, your total outlay for 100 shares is \$3,700. Over the year, Harley pays dividends of \$1.85 per share. By the end of the year, then, you received dividend income of

$$\text{Dividend income} = \$1.85 \times 100 = \$185$$

Suppose that as of December 31, Harley was selling for \$40.33, meaning that the value of your stock increased by \$3.33 per share. Your 100 shares are now worth \$4,033, so you have a capital gain of

$$\text{Capital gain} = (\$40.33 - \$37) \times 100 = \$333$$

On the other hand, if the price had dropped to, say, \$34.78, you would have a capital loss of

$$\text{Capital loss} = (\$34.78 - \$37) \times 100 = -\$222$$

Notice that a capital loss is the same thing as a negative capital gain.

The *total dollar return* on your investment is the sum of the dividend and the capital gain:

$$\text{Total dollar return} = \text{Dividend income} + \text{Capital gain (or loss)}$$

In our first example here, the total dollar return is thus given by

$$\text{Total dollar return} = \$185 + \$333 = \$518$$

Overall, between the dividends you received and the increase in the price of the stock, the value of your investment increased from \$3,700 to $\$3,700 + \$518 = \$4,218$.

A common misconception often arises in this context. Suppose you hold on to your Harley-Davidson stock and don't sell it at the end of the year. Should you still consider the capital gain as part of your return? Isn't this only a "paper" gain and not really a cash gain if you don't sell it?

The answer to the first question is a strong yes, and the answer to the second is an equally strong no. The capital gain is every bit as much a part of your return as the dividend, and you should certainly count it as part of your return. That you decide to keep the stock and don't sell (you don't "realize" the gain) is irrelevant because you could have converted it to cash if you had wanted to. Whether you choose to do so is up to you.

After all, if you insist on converting your gain to cash, you could always sell the stock and immediately reinvest by buying the stock back. There is no difference between doing this and just not selling (assuming, of course, that there are no transaction costs or tax consequences from selling the stock). Again, the point is that whether you actually cash out and buy pizzas (or whatever) or reinvest by not selling doesn't affect the return you actually earn.

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(*marg. def.* **total percent return** The return on an investment measured as a percent of the originally invested sum that accounts for all cash flows and capital gains or losses.)

Percentage Returns

It is usually more convenient to summarize information about returns in percentage terms than in dollar terms, because that way your return doesn't depend on how much you actually invested. With percentage returns the question we want to answer is: How much do we get for each dollar we invest?

To answer this question, let P_t be the price of the stock at the beginning of the year and let D_{t+1} be the dividend paid on the stock during the year. The following cash flows are the same as those shown earlier, except that we have now expressed everything on a per share basis:

	Ending Stock Price	
	\$40.33	\$34.78
January 1	\$37.00	\$37.00
December 31	40.33	34.78
Dividend income	1.85	1.85
Capital gain or loss	3.33	-2.22

In our example, the price at the beginning of the year was \$37 per share and the dividend paid during the year on each share was \$1.85. If we express this dividend as a percentage of the beginning stock price, the result is the *dividend yield*:

$$\begin{aligned}\text{Dividend yield} &= D_{t+1} / P_t \\ &= \$1.85 / \$37 = .05 = 5\%\end{aligned}$$

This says that, for each dollar we invested, we received 5 cents in dividends.

The second component of our percentage return is the *capital gains yield*. This yield is calculated as the change in the price during the year (the capital gain) divided by the beginning price.

With the \$40.33 ending price, we get:

$$\begin{aligned} \text{Capital gains yield} &= (P_{t+1} - P_t) / P_t \\ &= (\$40.33 - \$37) / \$37 \\ &= \$3.33 / \$37 = .09 = 9\% \end{aligned}$$

This 9 percent yield means that for each dollar invested we got 9 cents in capital gains.

Putting it all together, per dollar invested, we get 5 cents in dividends and 9 cents in capital gains for a total of 14 cents. Our *total percentage return* is 14 cents on the dollar, or 14 percent.

When a return is expressed on a percentage basis, we often refer to it as the *rate of return* on the investment.

To check our calculations, notice that we invested \$3,700 and ended up with \$4,218. By what percentage did our \$3,700 increase? As we saw, we picked up $\$4,218 - \$3,700 = \$518$. This is an increase of $\$518 / \$3,700$, or 14 percent.

Example 1.1 Calculating Percentage Returns Suppose you buy some stock for \$25 per share. After one year, the price is \$35 per share. During the year, you received a \$2 dividend per share. What is the dividend yield? The capital gains yield? The percentage return? If your total investment was \$1,000, how much do you have at the end of the year?

Your \$2 dividend per share works out to a dividend yield of

$$\begin{aligned} \text{Dividend yield} &= D_{t+1} / P_t \\ &= \$2 / \$25 \\ &= 8\% \end{aligned}$$

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The per share capital gain is \$10, so the capital gains yield is

$$\begin{aligned}\text{Capital gains yield} &= (P_{t+1} - P_t) / P_t \\ &= (\$35 - \$25) / \$25 \\ &= \$10 / \$25 \\ &= 40\%\end{aligned}$$

The total percentage return is thus $8\% + 40\% = 48\%$.

If you had invested \$1,000, you would have \$1,480 at the end of the year. To check this, note that your \$1,000 would have bought you $\$1,000 / \$25 = 40$ shares. Your 40 shares would then have paid you a total of $40 \times \$2 = \80 in cash dividends. Your \$10 per share gain would give you a total capital gain of $\$10 \times 40 = \400 . Add these together and you get \$480, which is a 48 percent total return on your \$1,000 investment.

CHECK THIS

- 1.1a What are the two parts of total return?
- 1.1b Why are unrealized capital gains or losses included in the calculation of returns?
- 1.1c What is the difference between a dollar return and a percentage return? Why are percentage returns usually more convenient?

1.2 The Historical Record

We now examine year-to-year historical rates of return on three important categories of financial investments. These returns can be interpreted as what you would have earned if you had invested in portfolios of the following asset categories:

1. Large capitalization stocks (large-caps). The large company stock portfolio is the Standard and Poor's index of the largest companies (in terms of total market value of outstanding stock) in the United States. This index is known as the S&P 500, since it contains 500 large companies.

2. Long-term U.S. Treasury bonds. This is a portfolio of U.S. government bonds with a 20-year life remaining until maturity.
3. U.S. Treasury bills. This a portfolio of Treasury bills (T-bills for short) with a three-month investment life.

If you are now not entirely certain what these investments are, don't be overly concerned. We will have much more to say about each in later chapters. For now, just take it as given that these are some of the things that you could have put your money into in years gone by. In addition to the year-to-year returns on these financial instruments, the year-to-year percentage changes in the Consumer Price Index (CPI) are also computed. The CPI is a standard measure of consumer goods price inflation.

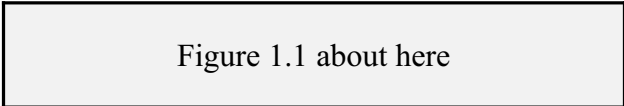


Figure 1.1 about here

A First Look

Before examining the different portfolio returns, we first take a look at the "big picture." Figure 1.1 shows what happened to \$1 invested in these three different portfolios at the beginning of 1926 and held over the 72-year period ending in 1997.

To fit all the information on a single graph, some modification in scaling is used. As is commonly done with financial time series, the vertical axis is scaled so that equal distances measure equal percentage (as opposed to dollar) changes in value. Thus, the distance between \$10 and \$100 is the same as that between \$100 and \$1,000, since both distances represent the same 900 percent increases.