

Lecture Notes for Math 210 – Monday, 3 Dec. 2007

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3 December 2007

Burton Malkiel: A Random Walk Down Wall Street

Page numbers will be written as xxx / yyy where xxx is the page number in 8th edition and yyy is the page number in 9th edition. (All boldfaced passages are direct quotations from Burton Malkiel's, "A Random Walk Down Wall Street", W.W. Norton & Company, Inc.)

Page 204/180: The Role of Risk

- 1: **Efficient market theory explains why the random walk is possible.**
- 2: **It holds that the stock market is so good at adjusting to new in-**
- 3: **formation that no one can predict its future course in a superior**
- 4: **manner. Because of the actions of the pros, the prices of individual**
- 5: **stocks quickly reflect all the news that is available. Thus, the odds**
- 6: **of selecting superior stocks or anticipating the general direction of**
- 7: **the market are even. Your guess is as good as that of the ape, your**
- 8: **stockbroker, or even mine.**

1: Hmmm. “I smell a rat,” as Samuel Butler wrote long ago. Money
2: is being made on the market; some stocks do outperform others.
3: Common sense attests that some people can and do beat the mar-
4: ket. It’s not all chance. Many academics agree; but the method of
5: beating the market, they say, is not to exercise superior clairvoyance
6: but rather to assume greater risk. Risk, and risk alone, determines
7: the degree to which returns will be above or below average, and
8: thus decides the valuation of any stock relative to the market.

What do these two passages mean?

Do you believe that stocks move according to a random walk?

Can you explain why or why not?

Is risk the whole story?

Do you have to take on more risk to make more money?

- 1: **Portfolio theory begins with the premise that all investors are like**
- 2: **my wife – they are risk-averse. They want high returns and guaran-**
- 3: **teed outcomes. The theory tells investors how to combine stocks in**
- 4: **their portfolios to give them the least risk possible, consistent with**
- 5: **the return they seek. It also gives a rigorous mathematical justifi-**
- 6: **cation for the time-honored investment maxim that diversification**
- 7: **is a sensible strategy for individuals who like to reduce their risks.**

Paraphrase of Malkiel's example:

Suppose there are two companies on a Carribean island.

One is a resort which makes a profit when it is sunny.

Another is an umbrella factory which makes a profit when it is rainy.

Suppose that the return rates are as follows:

Sunny: Resort = +50%, Umbrella = -25%

Rainy: Resort = -25%, Umbrella = +50%.

Suppose there is a 50% chance of rain when averaged over the year.

If you buy 1 stock in the resort and 1 stock in the umbrella factory, then you have a guaranteed return rate of 12.5% with no risk.

If you only buy 1 stock in the resort, or 1 stock in the umbrella factory, then your return rate is still 12.5% on average, but the standard deviation of the return rate is

$$\sqrt{\text{Var}(\text{return rate})} = [50\% - (-25\%)] \sqrt{0.5(1 - 0.5)} = 37.5\%.$$

Since you want to reduce risk, the first portfolio is better.

Extension of Malkiel's example:

Consider now, an example where one company is the resort and another company is a clothing manufacturer.

Suppose that, rain or shine, the return rate for the clothing manufacturer is -25% with probability $1/2$ and 50% with probability $1/2$.

Therefore, the return rate for the resort and the clothing manufacturer are independent random variables.

Q: If you buy 1 stock of the clothing manufacturer and 1 stock of the resort, what is your expected return rate? What is the standard deviation for the return rate?

A: The standard deviation for the return rate is $\frac{1}{\sqrt{2}}(37.5\%)$ which is approximately 26.5% .

Consider a third example where one company is the resort and another company is a restaurant.

During sunny days, the return rate for the restaurant is 50% with probability $2/3$ and -25% with probability $1/3$.

During rainy days, the return rate is -25% with probability $2/3$ and 50% with probability $1/3$.

So the correlation between the return rate of the restaurant and the resort is $\rho = 1/6$.

Even though these two companies are positively correlated, the standard deviation for the combined portfolio of the two is still reduced:

it is $\sqrt{\frac{1}{2}(1 + \rho)}(37.5\%)$ which is less than the total 37.5% risk involved in owning either stock alone.

- 1: **To paraphrase Shakespeare, can there be too much of a good thing?**
- 2: **In other words, is there a point at which diversification is no longer**
- 3: **a magic wand safeguarding returns? Numerous studies have demon-**
- 4: **strated that the answer is a resounding yes. Of course, economists**
- 5: **qualify this straightforward answer.**

Malkiel shows a graph demonstrating that, according to his study, by buying 50 different American stocks you can reduce your risk to practically 40% of that involved in a non-diversified portfolio.

But buying more stocks does not reduce risk further.

Similarly by buying 50 different International stocks, you reduce your risk to about 20% of that involved in a non-diversified portfolio.

But buying more stocks does not reduce risk further.

1: At the outset, I feel it important to review what I mean by the term,
2: “efficient.” I’d like to relate it to a well-known story that tells of a
3: finance professor and a student who come across a \$100 bill lying
4: on the ground. As the student stops to pick it up, the professor
5: says, “Don’t bother – if it were really a \$100 bill, it wouldn’t be
6: there.” The story well illustrates what financial economists usually
7: mean when they say that markets are efficient. Markets can be
8: efficient even if many market participants are quite irrational. Mar-
9: kets can be efficient even if stock prices exhibit greater volatility
10: than can apparently be explained by fundamentals such as earnings
11: and dividends. Many of us economists who believe in efficiency do
12: so because we view markets as amazingly successful devices for re-
13: flecting new information rapidly and, for the most part, accurately.
14: Above all, we believe that financial markets are efficient because
15: they don’t allow investors to earn above-average returns without
16: accepting above-average risks. In short, we believe that \$100 bills
17: are not lying around for the taking, either by the professional or
18: the amateur investor.

Can you think of any examples of potshots at efficient market theory that Malkiel mentioned that you particularly believe? Do you think Malkiel’s defense is sufficient?