

# Lecture Notes for Math 210 – Wednesday, 28 Nov. 2007

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## **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.

### Page 24/24: What is a Random Walk?

“A random walk is one in which future steps or directions cannot be predicted on the basis of past actions. When the term is applied to the stock market, it means that short-run changes in stock prices cannot be predicted. Investment advisory services, earnings predictions, and complicated chart patterns are useless. On Wall Street, the term “random walk” is an obscenity. It is an epithet coined by the academic world and hurled insultingly at the professional soothsayers. Taken to its logical extreme, it means that a blindfolded monkey throwing darts at a newspaper’s financial pages could select a portfolio that would do just as well as one carefully selected by the experts.”

There is a more general term for the mathematical property that Malkiel is describing. Mathematicians call this a Markov process. A Markov process is a stochastic process  $(X_t : t \geq 0)$  such

that, for any time  $t > 0$ , and any time  $T > 0$ , and any set  $E \subseteq \mathbb{R}$ , we have

$$\mathbf{P}(\{X_T \in E\} | \{X_s : 0 \leq s \leq t\}) = \mathbf{P}(\{X_T \in E\} | X_t).$$

So, even if you have all the information about the stochastic process before time  $t$ , all that matters is what happens at time  $t$ . In taking the conditional probability you are trying to make your best guess for the future value of  $X_T$ , at time  $t$ . But the Markov property says that all the information you need is encoded in  $X_t$  itself. You cannot do any better by looking backwards at  $X_s$  for any  $s < t$ , once you know  $X_t$ . In other words

Conditional on the present, the future is independent of the past.

Incidentally, Malkiel himself will contradict his last statement about a monkey and a dart, even though the picture on the front of the 8th edition is presumably exactly the outcome of such an experiment, a dart in the stock pages of a newspaper. The reason is that, he will later introduce “Modern Portfolio Theory” which is just the idea of hedging. This does not address the issue of which stocks to invest in, but it does address the point of how many you should have in your portfolio: lots.

Malkiel also says just after this:

“Now financial analysts in pin-striped suits do not like being compared to bare-assed apes. They retort that academics are so immersed in equations and Greek symbols (to say nothing of stuffy prose) that they couldn’t tell a bull from a bear, even in a china shop.”

This is also important in my opinion. First of all, the market analysts are more-or-less right. We have never mentioned the real stock market in this class. Incidentally, I do not choose my own

investments. I don't even have that much money to invest. So, if a professor starts to suggest to you how to invest your money, be wary. It would be pointless for me to tell you how to invest when I've never even invested any of my own money. But Malkiel is different. He is a professor, at Yale. But he is also a market analyst.

“But before we begin, perhaps I should introduce myself and state my qualifications as guide. I have drawn on three aspects of my background in writing this book; each provides a different perspective on the stock market.”

“First is my professional experience in the fields of investment analysis and portfolio management. I started my career as a market professional with one of Wall Street's leading investment firms. Later, I chaired the investment committee of an insurance company with \$800 billion of assets and for many years served as director of one of the world's largest investment companies with over one trillion dollars of assets. These perspectives have been indispensable to me.”

One comment is that this is in the 9th edition. Published in 2007. In 2003 those numbers were both \$500 billion. So at least the companies he was associated with are rising in total assets nicely. I am still not saying that because of these credentials you should trust Malkiel, either. But at least you should trust him more than me!

### Page 28/28: Investing in Theory

Malkiel describes two mutually exclusive theories on how to determine the value of stocks. He calls these the “Firm-Foundation Theory” and the “Castle-in-the-Air Theory”.

“The firm-foundation theory argues that each investment instrument, be it a common stock or a piece of real estate, has a firm anchor of something called intrinsic value, which can be determined by careful analysis of present conditions and

future prospects. When market prices fall below (rise above) this firm foundation of intrinsic value, a buying (selling) opportunity arises, because this fluctuation will eventually be corrected – or so the theory goes. Investing then becomes a dull straightforward matter of comparing something’s actual price with its firm foundation of value.”

Thus the firm foundation theory says that by doing research into the company, seeing its assets in its factories, comparing its market share, and potential future market share, etc., you can determine the value it should have, regardless of what the stock is actually trading for, you can identify opportunities to buy low and sell high. Malkiel points to Warren Buffett, the “sage of Omaha” as the most prominent practitioner of this theory.

“The logic of firm-foundation theory is quite respectable and can be illustrated best with common stocks. The theory stresses that a stock’s value ought to be based on the stream of earnings a firm will be able to distribute in the future in the form of dividends. It stands to reason that the greater the present dividends and their rate of increase, the greater the value of the stock; thus differences in growth rates are a major factor in stock valuation. Now the slippery little factor of future expectations sneaks in. ”

It is impossible to predict the future. So in determining the intrinsic value, you have to do some guess work. Therefore, no matter how good your analysis, your decision as to the value is still basically a gamble, although it might be a gamble you are willing to take.

“The castle-in-the-air theory of investing concentrates on psychic values. John Maynard Keynes, a famous economist and successful investor, enunciated the theory most lucidly in 1936. It was his opinion that professional investors prefer

to devote their energies not to estimating intrinsic values, but rather to analyzing how the crowd of investors is likely to behave in the future and how during periods of optimism they tend to build their hopes into castles in the air. The successful investor tries to beat the gun by estimating what investment situations are most susceptible to public castle-building and then buying before the crowd.”

So, according to the castle-in-the air theory, you do not necessarily care about the so-called intrinsic value of the stock at all. All you care about is whether other investors are likely to want to pay more or less for the stock in the future. I.e., what you are most interested in is the derivative of the stock price with respect to time. In the most extreme version of this game, the value of the stock could become completely disassociated from the company that you have stock in. Even if the company does phenomenally well or terribly badly, you might not care. All you care about is what the mass or crowd of investors is doing: trying to guess where the herd goes next. But of course, herd-mentality is unstable. When everyone is paying attention to what everyone else is doing and trying to second guess, then small triggers can set off large scale chain reactions. So it could be that small changes in the market or the company drastically change the stock price in unpredictable ways.

“In this kind of world there is a sucker born every minute – and he exists to buy your investments at a higher price than you paid for them. Any price will do as long as others may be willing to pay more. There is no reason, only mass psychology. All the smart investor has to do is beat the gun – get in at the very beginning. This theory might less charitably be called the “greater fool” theory. It’s perfectly all right to pay three times what something is worth as long as later on you can find some innocent to pay five times what it’s worth.”