**CHAPTER 14:**

**The Stock Market and Stock Prices**

**FOCUS OF THE CHAPTER**

This chapter begins with a simple introduction to **over-the-counter markets** and **stock exchanges**. The rest is a discussion of **the efficient market hypothesis** and **the fundamentalist approach** to the determination of stock prices. Well-known **anomalies in stock price behaviour** are also discussed. The chapter ends with a brief discussion of **international linkages in stock prices**.

**Learning Objectives:**

1. Describe how over-the-counter markets or stock exchanges function
2. Explain how stock indexes are evaluated
3. Determine how the efficient markets hypothesis and the fundamentalist approach explain stock prices
* Identify why the amount of information investors possess is crucial to how well they can forecast stock price movements
* Describe what a random walk is and what it looks like
* Explain why excessive volatility, calendar effects, and bubbles are puzzles
* Identify what home-bias is and why it happens and other anomalies in stock price behaviour
* Explain international linkages in stock prices

**SECTION SUMMARIES**

**The Markets for Stocks**

In Canada, stocks are traded in two types of markets: over-the-counter markets and organized stock exchanges. Trading in over-the-counter markets is quote-driven, while trading in stock exchanges is order-driven. The **Canadian Dealing Network** provides quotations of more than 1000 over-the-counter stocks. Trading in the **Canadian Dealing Network Exchange (CDNX)** is driven by electronic quotations and carried out through securities dealers. **Stock Exchanges** are organized markets where trading takes place in a central facility, either electronically through a broker or by open bidding. The Toronto Stock Exchange (TSE) is the largest stock exchange in Canada. In November 1999 it became the sole market for “senior” stocks. The Alberta and Vancouver stock exchanges were merged into the CDNX. In April 2000, TSE purchased the CDNX and formed the combined institution named TSX and the TSX Venture exchange. Now, equities are traded in Toronto while derivative products are traded in the Montreal stock exchange.

 Modern technology (computer and communication technology in particular) has linked stock exchanges worldwide and changed the way stock exchanges operate internationally and internally. The performance of stock exchanges is measured by stock price indexes such as the **Toronto Stock Exchange 300 (TSE300)**, which was an index of 300 stocks traded at the Toronto Stock Exchange. Recently, TSE300 has been replaced by the S&P (Standard and Poor’s)/TSX composite index.

**Stock Price Determination**

The **efficient market hypothesis** and the **fundamentalist approach** are two different approaches to the determination of stock prices, but are not necessarily contradictory.

***The Efficient Market Hypothesis:*** The efficient market hypothesis is the theory that individuals make informed forecasts of future stock prices based on all available information, and therefore, no one can earn abnormal profits. This does not mean that the stock market offers no profitable opportunities. Rather, this means that foreseeable events offer no special opportunities. There are three forms of the efficient market hypothesis: the weak form, the semi-strong form, and the strong form.

*Weak Form:* The expected value of a stock in the next period (St+1) is conditional upon the current (today) and past values of the stock (St, St-1, St-2...). Note that the subscript *t* refers to the current period. Since today’s stock price (St ) is known, and reflects information contained in past prices, the best forecast of tomorrow’s price is today’s price:

 E (St+1 St, St-1, St-2, ...) = St

 Taking the effect of unpredictable events on the stock price (Ut) into account, the best forecast of tomorrow’s price can be written as:

 St+1 = St + Ut

This implies that the change in stock price (ΔSt+1) is equal to Ut , (i.e., is unpredictable):

 ΔSt+1 = St+1 - St = Ut

Assuming that, on average, the unpredictable (or random) component Ut is zero, the best forecast of the next period’s price can be shown to be today’s price:

 E(St+1) = E(St) + E(Ut.)

 E(St+1) = St+ 0, because E(Ut.) = 0 by assumption.

 E(St+1) = St

The notion that the best forecast of the next period's value of stock prices (or any economic variable) is today's price plus a random component is referred to as the random walk.

*Semi-strong Form:* This form of the efficient market hypothesis suggests that information contained about the past behaviour of interest rates (R), the inflation rate (π), and even company performance is as irrelevant as past prices in forecasting future stock prices:

 E (St+1 St, St-1, St-2, ..., Rt, Rt-1, Rt-2, ..., πt, πt-1, πt-2 ) = St.

The change in stock prices is still unpredictable.

*Strong Form:* This version of the efficient market hypothesis argues that there is no information whatsoever that can be profitably exploited by an investor. However, many economists do not believe this, since there are well-documented cases of profiting from insider information.

 The investigative reporting route and the event-study approach are two methods to find out unusual stock price movements. Based on the efficient market hypothesis, the event-study approach calculates abnormal returns () as:

 i t = Ra i t - E(Ri t)

where subscripts i and t refer to the stock and time respectively.

 Ri t = [(Si t - Si t-w)/Si t-w)] x 100

where t-w is an arbitrarily chosen period, and w is referred to as the event window (usually a few days or weeks long).

 Using statistical criteria, it can be determined whether the calculated i t is abnormal.

***The Fundamentalist Approach:*** The fundamentalist approach argues that fundamentals, such as the flow of anticipated dividends of a company, determine the price of its stocks. Suppose that a firm pays out all its profits in the form of dividends, that this firm is expected to operate indefinitely into the future and that suspension of dividends is not expected at any time. Then the value of the stock (S) can be written as follows:

 S = *d*1 /(1+R) + *d*2 /(1+R)2 +....

where *d*1 and *d*2 denote dividends for year 1 and year 2, respectively. R is the rate of interest. Assuming the dividends grow at an annual rate of *g,* the above equation can be written as:

 S = *d*1 /(1+R) + *d*1 (1+*g*)/(1+R)2 +....

The solution to the equation is given by:

 S *= d*1 /(R-*g*)

This shows that, given *d*1 and R, the higher the *g*, the higher the S (stock price). This also shows that S and R are negatively related.

***Can the Two Approaches Be Reconciled?*** Under certain conditions the fundamentalist and efficient markets approaches are consistent and not conflicting with each other.

**Stock Market Volatility**

The volatility of the stock market can be defined in several ways. Suppose that we are concerned with the volatility of stock prices, measured by the variance (V) of the price. The stock markets have two types of participants: **informed traders and noisy traders**. Also, suppose that individuals cannot forecast S precisely, since the future behaviour of dividends is not completely known. Therefore, S can be written as the sum of the imprecise forecast S\* and the magnitude of the imprecision in the forecast (U):

 S = S\* + U

The variance of S (Vs) can be written as follows:

 Vs = Vs\* + Vu

The noisy traders can be viewed as raising the Vu, since they are likely to react to information that is irrelevant to the fundamental value of a stock. The prevalence of news is one of the possible factors contributing to noise in the stock markets.

**Other Anomalies**

Economists have made some observations of stock price behaviour which cannot be satisfactorily explained by the efficient market hypothesis (the random walk hypothesis). The **volatility of stock prices** is only one of these anomalies. Another is the observation that stock returns are regularly higher in January than in the preceding month of December. This anomaly is known as the “**January effect**.” The behaviour of future prices and the possible role of mass psychology on price behaviour reflected in episodes of explosive behaviour in stock prices (**bubbles**) are two other anomalies that have received considerable attention in the study of stock prices. The finding that stock of a company traded on different exchanges performs differently is a recent addition to the list of anomalies.

**International Linkages in Stock Prices**

The globalization of financial markets has increased opportunities for cross-border trading. However, the **cross-border trading** of stocks (the internationalization of stock markets) has not developed as quickly as the cross-border trading of bonds. The portfolios of domestic investors suggest that there is a “**home-bias**” in their investments (i.e., foreign stocks are a very small proportion of the portfolios). Relatively higher transaction costs of monitoring foreign stocks, the persistence of capital controls in many countries, differential treatment of foreign investments in taxation, and other regulatory arrangements may explain this “home-bias” in investments.

**MULTIPLE-CHOICE QUESTIONS**

1. In Canada, over-the-counter trades are now reported by

a) The Canadian Dealing Network.

b) the TSX-Venture Exchange

c) NASDAQ

d) the Canadian Payments Association.

2. Since 1999, the Toronto Stock Exchange

a) has become the only stock exchange in Canada.

b) has become the sole market for “senior” stocks.

c) has been merged into the CDNX.

d) deals only with derivative markets.

3. The Dow Jones Industrial Average (DJIA) is

a) a bond-rating scheme used in the United States.

b) an index of total industrial output in the United States.

c) a stock price index used in the United States.

d) a price index of stocks traded on the Toronto Stock Exchange.

4. “There is no information that can be discovered from an analysis of past performance of a stock or security that can be profitably exploited by an investor.” This is a statement of

a) the fundamentalist approach to stock price determination.

b) the weak form of the efficient market hypothesis.

c) the semi-strong form of the efficient market hypothesis.

d) the strong form of the efficient market hypothesis.

5. “There is no information whatsoever that can be profitably exploited by an investor except private or insider information.” This is a statement of

a) the fundamentalist approach to stock price determination.

b) the weak form of the efficient market hypothesis.

c) the semi-strong form of the efficient market hypothesis.

d) the strong form of the efficient market hypothesis.

6. “There is no information whatsoever that can be profitably exploited by an investor.” This is a statement of

a) the fundamentalist approach to stock price determination.

b) the asymmetric information problem.

c) the semi-strong form of the efficient market hypothesis.

d) the strong form of the efficient market hypothesis.

7. The efficient market hypothesis argues that

a) stock prices follow a random walk.

b) the best forecast of the next period’s stock price is the past period’s price.

c) only the changes in stock prices are predictable.

d) random economic events do not affect stock prices.

8. In the weak form of efficient market hypothesis, the investor’s information set includes

a) the current and past values of both the inflation rate and the stock price.

b) all the information about the fundamentals of the company.

c) only the current and past prices of the stock.

d) no information about the past behaviour of stock prices or the inflation rate.

9. The annual dividend is $15.00, the interest rate is 8%, and the growth rate of dividends is 5%. What is the value of the stock of this company, according to the fundamentalist approach?

a) $300

b) $45

c) $500

d) $75

10. According to the fundamentalist hypothesis, the price of a stock and the rate of interest

a) are positively related.

b) are negatively related.

c) are unrelated.

d) are equal to each other.

11. The empirical observation that for a long time the mean return on stocks has been higher than the mean return on long-term bonds, is referred to as

a) the random walk.

b) stock market noise.

c) the home-bias puzzle.

d) the equity premium puzzle.

12. The empirical evidence suggests that, in the last decade, the internationalization of stock markets

a) has been faster than the internationalization of bond markets.

b) has been slower than the internationalization of bond markets.

c) has proceeded at the same pace as the internationalization of bond markets.

d) has not been affected by the process of globalization.

## PROBLEMS

## 1. Suppose that an economist calculated the monthly growth rate of the price of a particular stock issued by a technology company and found that the growth rate increased continuously over time during the last five years. Does this finding support the efficient market hypothesis? Explain why.

## 2. Suppose a particular stock is expected to generate annual dividends of $10 a share forever. What is the price of the stock if

## a) dividends are constant and the opportunity cost is 5%?

## b) the expected annual growth rate of dividends is 2% and the rate of interest is 6%?

## c) the expected annual growth rate of dividends decreased to 1% and the rate of interest increased to 9%?

## 3. Suppose that the rate of interest is 10% and a company expects its annual dividend payments to grow at a rate of 6%. If the price of the stock is set at $100,

## a) what is the company’s expected annual dividend payment?

## b) what would be the price of the stock if the rate of interest decreased to 8%?

## c) what would be the price of the stock if the expected growth rate of dividends also decreased to 4%?

## 4. If the price of a stock is $12 and it pays a $1.00 dividend, what must its growth rate be if the return is 12%?

## 5. Consider the following data for portfolios of various sizes:

 **Portfolio Size Mean Return Mean Price-Equity Ratio**

 Smallest 0.75 0.50

 2nd 1.00 0.60

 5th 1.25 0.75

 9th 1.45 0.95

 Largest 1.50 0.98

 Does this set of data represent an anomaly in stock price behaviour? Explain why.

**ANSWER SECTION**

**Answers to multiple-choice questions:**

1. b (see page 265)
2. b (see page 265)
3. c (see page 266)
4. b (see pages 267-269)
5. c (see page 270-271)
6. d (see page 271-272)
7. a (see page 269)
8. c (see pages 268-269)
9. c (see page 272-273)
10. b (see page 273)
11. d (see page 277)
12. b (see pages 279-280)

**Answers to problems:**

1. No, because, according to the efficient market hypothesis, the price of a stock follows a random walk. This implies that there is no clearly identifiable increasing or decreasing trend in the stock prices, which is to say that one cannot predict tomorrow’s price from past experience. However, the fact that the growth rate of the price of the stock has been increasing over time clearly violates the predicted pattern in the efficient market hypothesis.

2.Follow the fundamentalist approach and use the equation S *= d*1 /(R-*g*) to answer these questions:

 a) S = $10.00/(0.05-0.0) = $200.00

 b) S = $10.00/(0.06-0.02) = $250.00

 c) S = $10.00/(0.09-0.01) = $125.00

3. Follow the fundamentalist approach and use the equation S *= d*1 /(R-*g*) to answer these questions:

 a) $100 = *d*1/(0.10-0.06), *d*1 = $100(0.10-0.06) = $4.00

 b) S = $4.00/(0.08-0.06) = $ 200.00

 c) S = $4.00/(0.08-0.04) = $100.00

4. Solving the equation S *= d*1 /(R-*g*) for g = R -  *d*1 / S and using the values given:

 g = .12 – 1/12 = .12-.0825 = .0375

5.No. The well-known anomaly is the fact that stocks of companies with low price-equity ratios outperform those companies with high price-equity ratios. The data given in the problem show that the mean return ratio increases as the price-equity ratio increases (or that they are clearly positively related). Therefore, the data do not represent an anomaly.