

## Answer Outline

ECONOMICS 353

L. Tesfatsion/Fall 05

EXERCISE 7: Six Questions (8 Points Total)

DUE: Tues, Oct 18, 2005, 2:10pm

**\*\*IMPORTANT REMINDER: LATE ASSIGNMENTS WILL NOT BE ACCEPTED  
– NO EXCEPTIONS\*\***

### EXERCISE INSTRUCTIONS:

- (1) Please **fill in your name and student ID number** on Side 1 of your bubble sheet and write **353 Exercise 7** in the top margin of Side 1.
- (2) Use a number 2 pencil to **mark your answers** on Side 1 of the bubble sheet to the first five questions Q1 through Q5, below, which are in multiple choice format.
- (3) The sixth question Q6 is a Web Exercise that asks you to investigate the recent performance of three different stock market indices: the **Dow Jones Industrial Average (DJIA)**, the **Standard and Poor 500 (S&P 500)**, and the **NASDAQ Composite index**. Please put your **name, student ID number, and 353-Ex7-Q6** at the top of your answer sheet(s) for Q6 and **separately** hand in your answer sheet(s) for Q6 in addition to your answer bubble sheet for questions Q1 through Q5.
- (4) Each question Q1 through Q5 is worth 1 point, and Q6 is worth 3 points.

**Q1 (1 point).** Expectations formed on the basis of past experience only, typically as some kind of weighted average of past observations, are known as

- A. rational expectations.
- B. informational expectations.
- C. adaptive expectations.
- D. anticipatory expectations.

**Q2 (1 Point).** When people make optimal use of whatever information they have available when forming their expectations, this is known as

- A. rational expectations.
- B. informational expectations.
- C. adaptive expectations.
- D. anticipatory expectations.

**Q3 (1 Point).** When people exhibit rational expectations, the forecast errors (i.e., deviations of expected from actual values) that result

- A. will be zero.
- B. will average out to zero.
- C. will exhibit positive correlation over time.
- D. will exhibit negative correlation over time.

**Q4 (1 Point).** According to Mishkin (Chapter 7), the Efficient Markets Hypothesis for financial markets in its first (i.e., weakest) form asserts that

- A. financial investors exhibit perfect foresight.
- B. financial investors minimize their transactions and informational costs.
- C. market demand equals market supply.
- D. investor expectations are equal to optimal forecasts using all available information.

**Q5 ( 1 Point).** According to Mishkin (Chapter 7), the Efficient Markets Hypothesis for financial markets in its third (i.e., stronger) form asserts, in addition to the condition identified in Q4, that

- A. there is no moral hazard in financial markets.
- B. the prices of securities reflect their true fundamental (i.e., intrinsic) values.
- C. the prices of securities that have never paid a dividend must be zero.
- D. technical analysis is the preferred mode for determining financial market investment strategies.

**SEE THE FOLLOWING PAGE FOR  
Q6: WEB EXERCISE**

**Q6: Web Exercise (3 Points Total).** This exercise question Q6 asks you to investigate the recent performance of three different stock market indices: the **Dow Jones Industrial Average (DJIA)**, the **Standard and Poor 500 (S&P 500)**, and the **NASDAQ Composite index**.

You should turn in one or more stapled sheets that include your (TYPE)WRITTEN answers for Parts A and C and your EXCEL CHART for Part B, being sure to include your name, your student ID number, and “353-Ex 7-Q6” at the top of the first sheet.

**NOTE:** This exercise question Q6 is a MODIFIED version of Mishkin, Chapter 7, Web Exercise 1, page 166.

**PART A (1 Point):** Provide brief but careful definitions for the DJIA, the S&P 500, and the NASDAQ Composite. Be sure to include a full citation for the reference(s) you used for these definitions (whether Web or print).

**Answer Outline for Part A:**

***DJIA:***

“(The Dow Jones Industrial Average (DJIA) is) the most widely used indicator of the overall condition of the stock market, a price-weighted average of 30 actively traded blue chip stocks, primarily industrials. The 30 stocks are chosen by the editors of the Wall Street Journal (which is published by Dow Jones & Company), a practice that dates back to the beginning of the century. The Dow was officially started by Charles Dow in 1896, at which time it consisted of only 11 stocks. The Dow is computed using a price-weighted indexing system, rather than the more common market cap-weighted indexing system.” Source: <http://www.investorwords.com/1525/DJIA.html> (Accessed 10/15/05)

**Extra Technical Note:** To calculate the DJIA, simply add up the closing prices of its component stocks on their primary exchanges and divide the sum by the “DOW divisor.” Over the years, adjustments have been made to the DOW divisor to ensure the continuity of the DJIA after corporate actions such as spin-offs and stock splits. As a result the DOW divisor is no longer equal to 30, the number of stocks included in the DJIA. In fact, after 100 years of adjustments, the current DOW divisor for the DJIA is less than one. Source: Paraphrased from <http://www.djindexes.com/mdsidx/index.cfm?event=showAvgMethod> (Accessed 10/15/05)

***S&P 500***

“Standard & Poor’s 500 Index, the ‘S&P 500’ or just the ‘S&P’, ... is a broad stock market index (indicator) derived from the value (price) of common stocks of 500 publicly traded companies. The S&P 500 is composed of 400 industrial, 60 transportation and utility, and 40 financial company stocks. While the DJIA is the most popular indicator, the S&P 500 is believed to be more representative of the entire market.” Source: <http://pages.prodigy.com/wealth/term.htm> (accessed 10/15/05)

“The S&P 500 index is weighted by market value, and its performance is thought to be representative of the stock market as a whole. The S&P 500 index was created in 1957, although it has been extrapolated backwards to several decades earlier for performance comparison purposes. This index provides a broad snapshot of the overall U.S. equity market; in fact, over 70 percent of all U.S. equity is tracked by the S&P 500. The index selects its companies based upon their market size, liquidity, and sector. Most of the companies in the index are solid mid cap or large cap corporations. Like the Nasdaq Composite, the S&P 500 is a market-weighted index. Most experts consider the S&P 500 one of the best benchmarks available to judge overall U.S. market performance.” Source: [http://www.investorwords.com/4378/SP\\_500.html](http://www.investorwords.com/4378/SP_500.html) (accessed 10/15/05)

**Extra Technical Note:** A company’s *market capitalization* is the total market value of all of its outstanding stock shares. A *Market-Capitalization Weighted Stock Index*, also known as a *Market-Valued Weighted Stock Index*, is a stock index in which each stock share price included in the index is weighted by the current (relative) market capitalization of the company issuing the stock. For example, if a company’s market capitalization is \$1,000,000 and the market capitalization of all stocks in the index is \$100,000,000, then the weight applied to the company’s stock share price would be 1 percent. In such a weighting scheme, larger companies account for a greater portion of the index. Most indexes are constructed in this manner, with the best example being the S&P 500. Paraphrased from <http://www.investopedia.com/terms/w/wamc.asp> (Accessed: 10/15/05)

***NASDAQ Composite:***

“A market-value weighted index of all (4000+) common stocks listed on Nasdaq. The Nasdaq Composite dates back to 1971, which is when the Nasdaq exchange was first formalized. The index is used mainly to track technology stocks, and thus it is not a good indicator of the market as a whole. Unlike the Dow Jones Industrial Average (DJIA), the Nasdaq is market value-weighted, so it takes into account the total market capitalization of the companies it tracks and not just their share prices.” Source: [http://www.investorwords.com/3190/Nasdaq\\_Composite\\_Index.html](http://www.investorwords.com/3190/Nasdaq_Composite_Index.html) (Accessed: 10/15/05)

**Extra Note on Terminology:** “NASDAQ” is an acronym for *National Association of Securities Dealers Automated Quotation*. In recent times, the acronym interpretation has been dropped and Nasdaq is used in place of NASDAQ as if it were a proper noun.

**PART B (1 Point):** Following the same general type of steps for preparing an Excel chart as outlined by Mishkin in his sample Web exercise in Chapter 1 (pages 15-17), prepare a data chart as follows.

- Visit <http://www.forecasts.org/data/index.htm> and click on “Stock Index Data” at the VERY TOP of the page.
- Now click on “U.S. Stock Indices-Monthly.”
- Using the menu on the left, copy and past the stock market index values for the DJIA, the S&P 500, and the NASDAQ Composite **for the time periods 1985.01 through 2005.07 only** to an Excel worksheet, being careful to match up the months/years across the three time series.
- PREPARE and PRINT OUT an Excel chart (using a “line diagram”) that displays the three time series on the same chart for the months/years 1985.01 through 2005.07. Label the chart “Stock Index Comparisons (1985-2005)” and label the Y-axis “Stock Index Value” and the X-Axis “Time.” **NOTE: Be sure to choose colors/markers for the three time series so that they are easily distinguished on the print-out.**

**Answer Outline for Part B: SEE ATTACHED CHART.**

**PART C (1 Point):** Which index appears to be MOST volatile (i.e., which time series appears to exhibit the most substantial up-and-down fluctuations)? LEAST volatile? Using your definitions in Part A, what do you think accounts for these differences in volatility? Explain carefully.

**Answer Outline for Part C:**

I must apologize, here, for not giving a more precise definition of “volatility.” The potentially confusing aspect of this concept, intuitively, is that one would like to take into account TWO different meanings of “substantial” in the above verbal description: the AMPLITUDE of fluctuations; and the FREQUENCY of fluctuations.

Viewing the three time series plotted in Part B, the S&P 500 clearly appears to be the LEAST volatile in both amplitude and frequency. However, for the other two, there is some ambiguity. While the NASDAAQ composite might have undergone the largest fluctuation (relative to its mean value), with the dot.com bust in the late 1999s, it is not clear that it exhibits more FREQUENT fluctuations than the DJIA. I am therefore asking the TA to accept any well-reasoned argument here for either the DJIA or the NASDAAQ Composite as being more volatile.

**TECHNICAL REMARK:** The conventional measure of “volatility” in financial economics as applied to some financial variable  $Z$  (e.g., the return rate on a financial asset) is to calculate the “(sample) standard deviation” of the sequence of observed values  $Z_1, Z_2, \dots, Z_T$  for this

variable over a specified period of time  $1, 2, \dots, T$ . Roughly, the (*sample*) *standard deviation* is the sum of the squared deviations  $[Z_t - m_T]^2$  of the individual  $Z_t$  terms about the mean (average) value  $m_T$  of the  $T$  observed values.

A problem arises here, however, if the measured mean value of the observed values for the variable itself exhibits “drift” over time (i.e., as  $T$  increases). Consider, for example, the “volatility” of the variable  $Z_t$  that satisfies the following *random walk with drift*:

$$Z_{t+1} = a + Z_t + \epsilon_t, \quad t \geq 0, \quad (1)$$

where  $Z_0 = 0$ ,  $\epsilon_t$  in each period  $t$  takes the value 1 with probability 1/2 and the value  $-1$  with probability 1/2, and where  $a$  is some constant value. Technically speaking, the expectation of  $Z_t$  in each period  $t > 0$  is  $a$ , but the measured mean (average) value  $m_T$  of the observations  $Z_1, Z_2, \dots, Z_T$  will tend to vary widely as  $T$  keeps increasing. And how would you define the “volatility” of a variable  $X_t$  that is generated as follows:

$$X_{t+1} = b \cdot t + X_t + \epsilon_t, \quad t \geq 0, \quad (2)$$

where  $X_0 = 0$ ,  $b$  is a nonzero constant, and  $\epsilon_t$  is the same as above? The  $X_t$  series now definitely displays a persistent time trend through the term  $b \cdot t$  and hence a time-varying mean value.

If time permits, I will prepare a hand-out that more carefully addresses this important issue.

In the meanwhile, here are some intuitive thoughts. The S&P 500 index includes the stock share prices for a relatively diverse collection of 500 companies, with each price weighted by the market value of the stock relative to the total market value of all included stocks. Consequently, the S&P is essentially a “market portfolio” reflecting average market performance in an inertial manner, with idiosyncratic price fluctuations experienced by individual companies greatly smoothed out.

Although the NASDAQ Composite actually includes stock share prices from many more companies (4000+) than either the S&P 500 or the DJIA (30), these companies tend to be rather heavily concentrated in the technology sector. Consequently, the NASDAQ Composite is not as diversified as the S&P 500 or the DJIA in terms of the types of companies it represents. It is thus more exposed to idiosyncratic risk, in particular to shocks hitting the technology sector, and there have been plenty of these over the past decade (e.g., the dot.com bust).

Consequently, the DJIA is at once more diversified (across types of companies) than the NASDAQ Composite but also incorporates the stock prices of far fewer firms than the NASDAQ Composite. The first fact would tend to indicate the DJIA will be more volatile than the NASDAQ Composite, but the relative smallness of the DJIA would tend to increase its volatility relative to the NASDAQ Composite.

Stock Index Comparisons (1985-2005)

