

CHAPTER IX

INTERNATIONAL EQUITY MARKETS

This chapter studies the specific characteristics of national stock markets. National stock markets tend to have not only different legal and physical organization, but also different transaction and accounting methods. Recall that stock markets provide valuable information about publicly traded corporation. Different organizations and macroeconomic environments will affect the quality of the information disseminated by a stock market. The better a market is at disseminating information, the more attractive it becomes to international investors. This chapter begins with a general review of the major differences among international equity markets. Then, the chapter analyzes market microstructure issues. We end this chapter with a discussion of some practical issues, relevant to international investors.

I. General Overview and Differences

In this section we discuss the broad differences among international equity markets. We focus on three areas where markets differ: liquidity, taxation, and stock market benchmarks.

1.A Liquidity

Liquidity refers to the ability to transform a non-cash asset into its cash equivalent without a loss of principal. That is, liquid markets are markets where exit is relatively easy. Other things being equal, international money managers will prefer to invest in liquid markets. There are several ways to measure the liquidity of a market. Different size measures and bid-ask spreads are very good liquidity indicators.

1.A.1 Measures of Size

1.A.1.i. Capitalization/GDP

A broad measure of liquidity -and easy to calculate- is total market capitalization. According to this measure, the largest equity market in the world is the U.S. market, with a market capitalization of USD 13.5 trillion in 1998. For the same year, the second largest equity market was the Japanese market with a market capitalization of USD 2.5 trillion, while the third largest market was the U.K. market with a market capitalization of USD 2.4 trillion. The German equity market and the French equity market were a distant fourth and fifth on the list, with market capitalizations of USD 1.1 trillion and USD 1.0 trillion, respectively.

The U.S. capital market is very large compared to the U.S. economy. In 1998, the U.S. stock market capitalization represented roughly 167% of the U.S. GDP. During the same year, the market capitalization/GDP figure for Germany was only 50%, while the corresponding figure for Mexico was 23%. There are different reasons that explain these different ratios.

In many European countries corporations are undercapitalized and rely heavily on bank financing. In Europe, banks tend to provide corporations with all financial services. They assist them in their commercial needs as well as in their long-term debt and equity financing. It is common for European banks to own shares of their clients. In Germany 15% of large German firms are bank controlled, while the percentage reaches 30% in Belgium. In the U.S., commercial banks are prohibited by the Glass-Steagall Act to participate in their clients' equity. Thus, U.S. companies, especially small ones, need to go public to raise capital in the marketplace.

In other countries, many large firms are state owned and, thus, not listed on the capital markets. In a recent study of corporate control of large firms in 27 countries, most of them industrial countries, La Porta, Lopez de Silanes, and Shleifer (1999) estimate that 18% of firms are state owned. In Italy, for example, a large part of arms-manufacturing, oil, chemical, electronic, automobile, banking, insurance, and transportation industries is owned by the government.

Family ownership is another factor that influences market capitalization. Many family-owned firms are reluctant to list their stock in an exchange for fear of losing family control. Family ownership of large firms is unusual in the U.S. In other countries, however, family ownership is extremely common. For example, in Israel 50% of large firms are considered family-controlled. In Hong Kong the percentage of family-controlled large firms is 70%.

1.A.1.ii Transaction volume

Another measure of liquidity and exchange activity is transaction volume. Not surprisingly, New York and Tokyo have the largest share turnover. Depending on market activity, these figures can vary widely from one year to the next, but in general most major markets enjoy a similar degree of liquidity in terms of transaction volume. In fact, the annual turnover ratio (TR) -i.e., the ratio of annual transactions in USD to year-end USD market capitalization- varies significantly over time. Therefore, comparison of national market liquidity based on the TR could lead to different conclusions if different years are taken into account.

Example IX.1: From 1991 to 1995 the U.S. annual turnover varied from 55% to 74%, while the same statistic ranged from 33% to 140% for France. In contrast, for the same period, the TR changed from 136% to 25% for Israel. ¶

1.A.1.iii Degree of concentration found in the major markets

Another informative statistic related to liquidity is the degree of concentration found in the major markets. It is important for the investor to know whether a national market is made up of many small firms or concentrated in a few large firms. Institutional investors are reluctant to invest in small firms for fear that they offer poor liquidity. In addition, this statistic can be indicative of diversification opportunities for passive investors. The more concentrated a national equity market is in a few stocks, the less diversification benefits arise for a passive investor.

Table IX.1 presents the market share of the 10 largest companies in each national stock market.

TABLE IX.1
Market share of the 10 largest companies in each national stock market (1994)

Country	1994
U.S.	11.9
Japan	20.2
U.K.	23.2
Canada	25.2
France	26.7
Malaysia	35.6
Germany	39.2
Australia	40.6
Hong Kong	44.4
Sweden	51.5
Italy	51.7
Spain	56.2
Switzerland	67.0
Netherlands	74.3

Source: Emerging Markets Factbook, IFC.

It is worth noticing that, in 1994, the largest company in the U.S. was GM with a 1.8% share of total market capitalization. By contrast, in the Netherlands the largest company was Royal Dutch/Shell with a 31.7% share of the market capitalization.

1.A.2 The bid-ask spread

A market maker buys and sells shares of a company. When a market maker buys shares (at the bid quote), she expects to sell those shares in the future (at the ask quote). The longer it takes to receive a buy order, the costlier the transaction becomes for the market maker. The market maker will require a higher compensation for shares that takes longer to sell. A higher compensation for a market-maker means a higher bid-ask spread. A market maker will have small bid-ask spread for the shares of a company that he/she expects to receive frequent buy and sell orders. The smaller the bid-ask spread for the shares of a company is, the more liquid those shares are. Similarly, the higher the average bid-ask spread of a stock market, the less liquid that stock market.

1.B Taxes

Taxes are an explicit transfer of wealth. Even though, tax laws tend to be complex, the principles of taxation are easy to understand. In this section we focus on taxes on investments. Taxes on investments are applied in three areas: transactions, and income (dividends, coupon payments, etc.) and capital gains.

In general, taxes on transactions are small, from 0.01% to 0.50% of nominal amount traded. Many countries, however, impose domestic no transactions tax, for example, Canada, Israel, and Sweden. Countries like France and Finland impose transactions taxes on domestic residents only, foreigners are exempt. Some countries also impose a VAT (Value Added Tax) on the commission paid to a broker, for instance, Morocco imposes a 7% VAT on commissions.

Taxes on income are collected based on two principles:

- (1) The *residence* principle: All *residents* of the country can be taxed on their *worldwide* income.
- (2) The *source* principle: All income earned *inside* the country, whether by residents or nonresidents, is taxable in this country.

The two principles are in perfect agreement when the entire income of a resident is earned in the country of residence. In an international context, however, the two principles have different implications.

Example IX.2: A U.S. computer consultant works three months a year in Greece. According to the residence principle, she may have to pay taxes on her Greek labor income in the U.S. According to the source principle, she may have to pay taxes on her Greek labor income in Greece. Therefore, the Greek income can be taxed twice, unless some form of tax relief against double taxation is in place. ¶

According to the above taxation principles, income from foreign investments may be taxed in two locations: the investor's country and the investment's country

Capital gains are normally taxed using the residence principle. In this way, local authorities try to avoid creating an incentive to export capital, as would occur if a foreign country taxes capital gains at a lower rate than the domestic rate. In other words, domestic and international investments are taxed the same way.

The international convention on taxing income is to make certain that the investor in at least one country pays taxes. For this reason, withholding taxes are usually levied on dividend payments.

1.B.1 Tax Neutrality

As Example IX.2 illustrates, double taxation occurs frequently in an international context. Governments try to avoid it through a network of international tax treaties, local tax exemptions (tax breaks) and tax credits for income taxed abroad. *Tax neutrality* (that is, the absence of tax penalties associated with international business) can be achieved on the basis of either of two approaches: capital import neutrality or capital export neutrality.

i. *Capital Import Neutrality*

Under this principle there is no penalty or advantage attached to the fact that capital is foreign-owned. Foreign capital is allowed to compete on an equal basis with domestic capital. Under this principle, local tax authorities should exempt foreign-source income from local taxes. For a U.S. multinational corporation this method implies the exclusion of foreign branch profits from taxable U.S. laws. This is called the *exclusion method*.

ii. *Capital Export Neutrality*

Under this principle, local authorities do not want to create a tax incentive for firms to export capital and employment to a relative low tax foreign country. The overall tax should be the same as whether the capital remains in the country or not. Under this system, local authorities "gross up" the after-tax income with all foreign taxes (they recompute the before-tax income); they then apply the home-country tax rules to that income, and give credit for foreign taxes already paid. This is called the *credit method*.

Example IX.3: Bertoni Bank, a U.S. -based bank, establishes a branch in Hong Kong. The income of the Hong Kong branch, after translation into USD, is USD 100. Suppose the applicable tax rate is 35% in the U.S. and 17% in Hong Kong. The next table shows Bertoni Bank's tax situation under both methods and double taxation.

	Double Taxation	Exclusion Method	Credit Method
Hong Kong			
Branch profit	100	100	100
(17% tax) (i)	<u>17</u>	<u>17</u>	<u>17</u>
Net profit	83	83	83
U.S.			
Net Hong Kong profit	83	83	83
Gross up	<u>0</u>	<u>0</u>	<u>17</u>
Taxable income	83	0	100
(35% tax)	29.05	0	35
Tax credit	<u>0</u>	<u>0</u>	<u>(17)</u>
Net Tax due (ii)	29.05	0	18
Total taxes (i)+(ii)	46.05	17	35
Net income	53.95	83	65

That is, under the exclusion method, the overall tax is just the Hong Kong tax (USD 17), while under the credit method, the overall tax is the U.S. tax (USD 35). ¶

Usually, investors receive a dividend net of withholding tax plus a tax credit from the foreign tax government (capital export neutrality principle). The investor's country of residence imposes its tax on the gross foreign dividends, but the amount of this tax is reduced by the withholding tax credit. In other words, the foreign tax credit is applied against the home taxes. To a tax-free investor, such as a pension fund, this tax credit is worthless, since the investor does not pay taxes at home. In this case, the investor can reclaim the tax withheld in the foreign country. Reclaiming a withholding tax is often a lengthy process (from a few months to a couple of years).

Example IX.4: Tax credit in the U.S.

Ms. Sternin, a U.S. investor, buys 1,000 shares of Nestle listed in Zurich for CHF 62. The current exchange rate is 0.58 USD/CHF. Her total cost is USD 35,960 or USD 35.96 per share of Nestle. Six months later, a dividend of CHF 0.5 is declared and paid. Ms. Sternin sells the Nestle shares. Currently, Nestle shares are trading at CHF 60. During this period the CHF has appreciated against the USD, and is trading at 0.65 USD/CHF. The same exchange rate is used in the dividend payment date. Here is the cash flow she received in USD:

Dividend Payment Minus Withholding Tax ($S_t = 0.65$ USD/CHF):

	Net dividend	Tax credit
CHF per share	0.450	0.05
USD per share	0.2925	0.0325
Net (in USD)	292.50	32.50

Sale of Nestle shares ($S_t = 0.65$ USD/CHF)

CHF per share	60.00
USD per share	39.00
Net (in USD)	39,000

Ms. Sternin has made a capital gain of USD 3,040, which will be taxed in the U.S. at the U.S. capital-gain tax rate. She will also declare a total gross dividend of USD 325 as income, which will be taxed at her income tax rate. She can deduct from her income tax a tax credit of USD 32.50 thanks to the U.S.-Swiss tax treaty. ¶

The median withholding tax rate across countries is 15%. In general, these nations also allow tax-credits for taxes on capital gains and dividends paid on foreign countries. Many nations like the U.K., Hong Kong, the Russian Federation, Singapore and Argentina do not withhold taxes on capital gains and dividends earned by foreigners. Some investors such as public funds can obtain complete exemption from withholding taxes.

Withholding taxes are completely different for bonds. No withholding tax is applied to Eurobonds, and many countries have removed withholding taxes on domestic bonds purchased by nonresidents. (More about this later, in Chapter XII.)

1.C Stock Market Benchmarks

Stock market benchmarks allow an investor to measure the average performance of a national stock market. There are several stock market indexes that are used to benchmark the performance of a given market. That is, there are one or several indexes may track a national market at any given time.

1.C.1 International Stock Indexes

For many years, Morgan Stanley Capital International (MSCI) has been publishing a monthly newsletter, *Morgan Stanley Capital International Perspectives*, with national market value-weighted indexes on 22 developed markets based on approximately 2600 stocks. Their indexes are constructed to avoid double counting. These indexes have been available since 1970 and cover at least 60% of the market capitalization for each country. They also publish regional indexes. The most popular regional indexes are the World Index, and the European, Australasia, and Far East (EAFE) Index. These indexes are used widely by international money managers for asset allocation decisions and performance measurements. MSCI also publishes related information on their sample of stocks, including financial ratios such as price earnings, price to book value ratios, and yield. Today, MSCI also publishes stock market indexes for more than 30 emerging markets based on 1,700 stocks. All the MSCI indexes can be found at MSCI's website at www.ms_cidata.com.

Since 1987 the *Financial Times* publishes the FT-Actuaries world indexes in association with Goldman Sachs and Wood MacKenzie. Twenty-two national indexes are provided as well as numerous industrial and regional indexes. The most important of the regional indexes are the World index, the Europe Index, the Pacific Basin Index and the Europe and Pacific Index. The FT-Actuaries indexes have a wider coverage than the MSCI indexes since they are based on a sample of around 2400 stocks and cover more than 60% of each market capitalization.

More recently, the Dow Jones Co., started to publish similar indexes, which are available through the *Wall Street Journal*. Other popular international equity benchmarks are produce by Salomon Brothers and Frank Russell, Union de Banques Suisses (UBS), and First Boston.

1.C.2 Domestic Indexes

Local indexes are widely used by domestic investors to calculate performance, market betas, hedge ratios, etc. Private international investors often prefer domestic indexes for the following reasons:

- (1) local indexes have a broader coverage of stocks (they give the idea of the market portfolio).
- (2) local indexes are available immediately.
- (3) local indexes have been used for several decades and therefore there is more data available.

Example IX.5: On February 15, 1996, the *Wall Street Journal* published the following international domestic (MSCI Stock Market Indexes are also published in the same page of the WSJ):

Stock Market Indexes

EXCHANGE	2/14/96 CLOSE	NET CHG	PCT CHG
Amsterdam ANP-CBS General	343.6	+ 0.8	+ 0.23
Argentina Merval Index	545.04	- 9.22	- 1.66
Australia All Ordinaries	2300.8	+ 11.1	+ 0.48
Brazil Sao Paulo Bovespa	53308	- 547	- 1.02
Brussels Bel-20 Index	1661.61	- 1.83	- 0.11
Euro, Aust, Far East MSCI-p	1145.8	+ 4.4	+ 0.39
Frankfurt DAX	2427.07	- 6.84	- 0.28
Hong Kong Hang Seng	11364.46	+ 164.27	+ 1.47
Johannesburg J'burg Gold	1747	+ 34	+ 1.98
London FT 30-share	2738.7	- 10	- 0.36
London 100-share	3745	- 2.6	- 0.07
Madrid General Index	330.7	- 0.23	- 0.07
Mexico I.P.C.	2971.25	+ 50.53	+ 1.73
Milan MIBtel Index	9713	- 365	- 3.62
Paris CAC 40	1956.38	- 26.95	- 1.36
Singapore Straits Times	2401.79	- 20.88	- 0.86
S. Korea Composite	869.98	+ 11.8	+ 1.38
Stockholm Affarsvariden	1819	- 6.1	- 0.33
Taiwan DJ Equity Mkt	119.39	- 0.35	- 0.29
Tokyo Nikkei 225 Average	20943.59	+ 159.36	+ 0.77
Tokyo Nikkei 300 Index	302.36	+ 1.53	+ 0.51
Tokyo Topix Index	1617.41	+ 7.18	+ 0.45
Toronto 300 Composite	50059.69	+ 14.38	+ 0.29
Zurich Swiss Market	3266.1	+ 6	+ 0.18

p-Preliminary
na-Not available

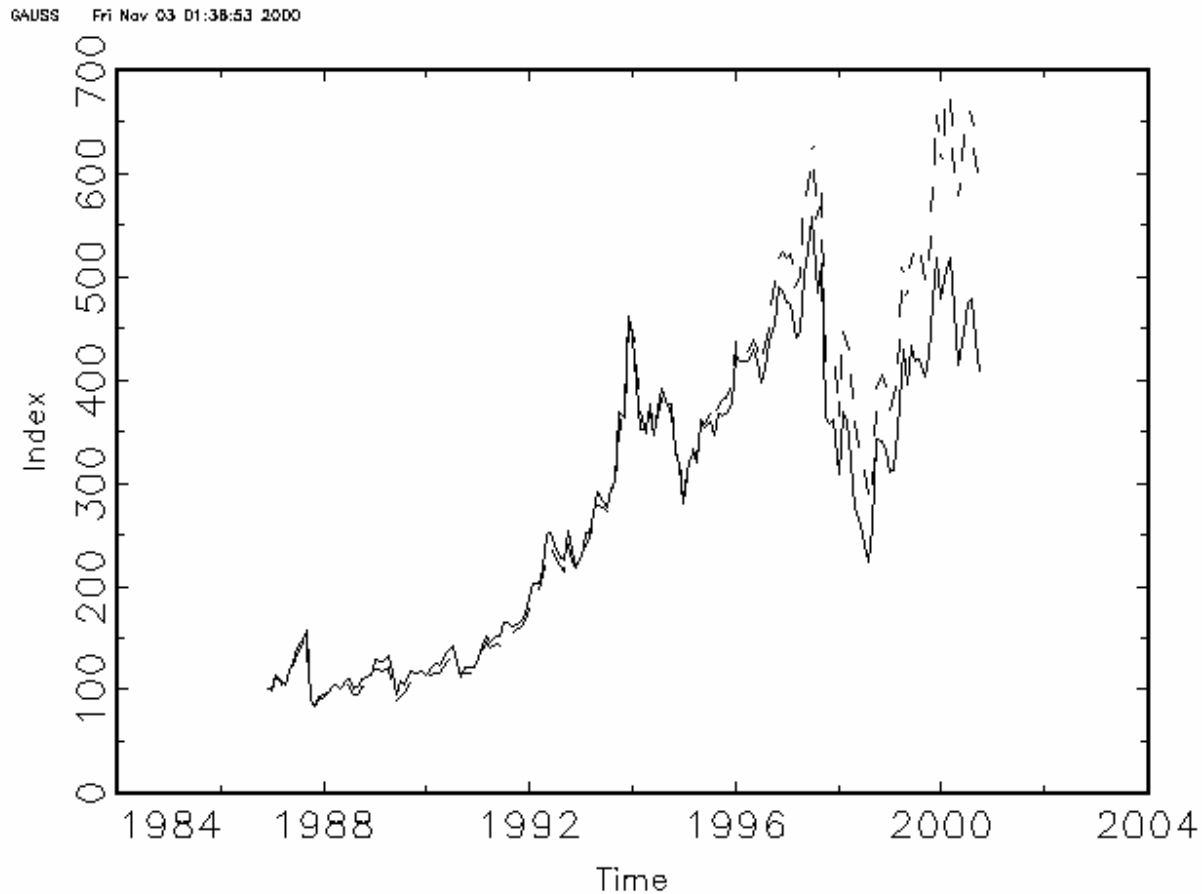
Pension funds or passive approach investors, on the other hand, prefer to use the MSCI, FT or other international indexes for the following reasons:

- (1) Pension funds do not need up-to-the-minute indexes.
- (2) The indexes on all stock markets are available in a central location.
- (3) All MSCI or FT indexes are calculated in a single consistent manner, allowing for direct comparisons between markets.

The choice of index is important. Although they are highly correlated, the difference in performance between two indexes for the same market can be significant by as much as several points.

Example IX.6: In Graph IX.1 we plot two widely used market value-weighted Hong Kong stock indexes from December 1986 to October 2000. The solid line is the MSCI index and the dotted line is the Hang Seng index.

GRAPH IX.1
Local vs. International Index



In general, both indices move together, but by October 2000, the difference between the two HKD denominated indices becomes substantial: 200 points. ¶

.. **What's in the Index?**

The Nikkei 225 is Japan's most widely used index. This index is not a very reliable index. The Nikkei 225 has many failings as a true indicator of market value.

The Nikkei 225 is practically unweighted, calculated by adding up the individual stock prices and dividing by 225. The result means that Shimura Kako, a specialized nickel alloy processor with 29 employees and sales of USD 100 million, has the same weighting as Toshiba, the electronics giant that employs 67,900 staff and generates sales of USD 32,000 billion. This lack of weighting has significant implications. It makes it easy for the government or private institutions to manipulate the index. They need only buy or sell small quantities of low liquidity stocks to drive the index up or down. This is important, given the volume of trading in Osaka and Singapore of Nikkei 225 futures.

The Nikkei 225's constituents have barely changed since it was set up in 1950. The rules governing the index emphasize the need for continuity, therefore, the 225 represents the Japan of the 1950s and 1960s. The obsession with continuity has excluded 17 of the 50 largest stocks on the first section of

the Tokyo Stock Exchange from the Nikkei 225. Maruzen, a bookseller with sales of USD 123 million is in the Nikkei 225, but Ito-Yokado, Japan's second biggest retailer with sales of USD 13,000 million and eight largest capitalized stock on the market, is not in the Nikkei 225.

It is true, that rules have been introduced in 1991 that permit stocks to be expelled on the grounds of low liquidity, rather than simply bankruptcy or merger. But since 1993, only one company -Japan Wool of Textile- has been withdrawn for liquidity. The liquidity criteria for inclusion leads to some strange entrants. For example, Asahi Bank entered the 225 in 1998, but not its bigger rivals Industrial Bank of Japan and Tokai Bank. One European broker suggested that Asahi's entry might reflect the better than expected performance of Asahi.

The Nikkei has responded to these criticisms by creating the Nikkei 300 index, which is weighted and its constituents are based on market capitalization. **Source:** Financial Times, October 19, 1998.



1.D Stock Index Futures and Options: Hedging Market Risk in International Markets

In Chapters VI to VIII we studied different hedging techniques. Our goal, in those chapters, was to hedge currency risk. Now, we will learn how to use stock index futures and options to hedge the risk in a well-diversified portfolio.

1.D.1 Stock Index Futures

In the Review Chapter we studied that the relation between the return on a portfolio of stocks and the return on the market can be summarized by β . When $\beta=1$, the return on the portfolio tends to change one-on-one with the market. When $\beta<1$ ($\beta>1$), the excess return on the portfolio tends to be smaller (greater) than the excess return on the market.

Suppose we want to hedge against changes in the value of a portfolio during a period of time, $T-t$. Define

r_p : return of USD 1 invested in the portfolio.

r_m : return of USD 1 invested in the market index.

S_t : current value of the portfolio.

F_t : current value of one index futures contract at time t .

N : Optimal number of contracts to short when hedging the portfolio.

The value of one contract, F_t , is the futures price multiplied by the contract size. In the case of the S&P 500 futures contract, one contract is on 250 times the index. That is, USD 250 per full index point. In the case of the FT-100, traded in LIFFE, one contract is on GBP 25 times the index.

Example IX.7: On November 24, 1995, the *Financial Times* published the following futures quotes for the FT-SE 100 index.

FUTURES AND OPTIONS

? FT-SE 100 INDEX FUTURES (LIFFE) 25 per full index point

	Open	Sett price	Change	High	Low	Est. vol	Open Int.
Dec	3463.0	3610.0	-34.0	3643.0	3605.0	5269	64944
Mar	3663.0	3634.0	-33.5	3663.0	3634.0	685	8971
Jun		3640.0	-34.0			0	134

For example, the value of the Dec 1995 FT-SE 100 futures contract is
 $\text{GBP } 25 \times 3610.0 = \text{GBP } 90,250.$ ¶

From the definition of β , it is approximately true that

$$r_p = \alpha + \beta r_m,$$

where α is a constant. The change in the value of the portfolio between times t and T is $S r_p$ or

$$S \alpha + \beta S r_m.$$

The change in the value of one futures contract price during this time is approximately $F r_m$. The uncertain component of the change in the value of the portfolio is therefore approximately $\beta x S/F$ times the value of one futures contract. Therefore,

$$N = \beta \times S/F.$$

.. **Zero beta, but there is still risk**

This hedge creates a situation where the stock position is indifferent to changes in the market portfolio. That is, the beta has been reduced to zero. Risk, however, exists as long as the underlying position does not perfectly correlate with the market index. ♦

Example IX.8: On November 24, 1995, Mr. Hill, a U.S. portfolio manager, has invested GBP 4 million in a U.K. mutual fund. He feels very comfortable with the medium and long-run perspectives of the U.K. stock market, but he forecast that the U.K. market will not do very well in the next four months. He decides to hedge the U.K. position using a March 96 FT-SE 100 index futures contract. The current futures price (see Example IX.7) is 3663.0 and the β of his portfolio is 1.3. The value of one futures contract is GBP 91,575. The number of futures contracts to short is

$$N = 1.3 \times 4,000,000/91,575 = 56.78 \text{ (or 57 contracts.)} ¶$$

A stock index hedge, if effective should result in the hedger's position growing at approximately the risk-free interest rate (in Example IX.8, the U.K. risk-free interest rate).

1.D.1.i Changing Beta

Stock index futures can be used to change the beta of a portfolio. Consider the situation in Example IX.8. To reduce the beta of the U.K portfolio from 1.3 to 0, we needed to sell 56 contracts. To reduce the beta to 1.0, it is necessary to short $(56.78 - 43.68)$ 13 contracts; to increase the beta from 1.3 to 2.6 a long position in 57 contracts is needed; and so on.

In general, to change the beta of the portfolio from β to β^1 , where $\beta > \beta^1$, a short position in

$$(\beta - \beta^1) \times S/F$$

contracts is needed. When $\beta < \beta^1$, a long position in

$$(\beta^1 - \beta) \times S/F$$

contracts is needed.

1.D.2 Stock Index Options

The value of a stock index options is equal to the stock index price multiplied by the contract size. In the case of the S&P 500 index option, traded at the CBOT, the contract size is USD 100. The S&P 500 stock index option is European. The S&P 100 stock index option, also traded at the CBOT, has a contract size of USD 100 and it is American. LIFFE trades stock index options on the FT-SE 100 index. LIFFE offers American and European contracts. The contract size for the FT-SE 100 is GBP 10. All contracts are settled in cash.

Stock index options are routinely used to hedge market risk. For example, put options are used to buy portfolio insurance. We will derive the number of contracts needed to buy portfolio insurance.

Suppose a manager decides to put a floor on the value of her portfolio. Assume that the value of her portfolio is perfectly correlated with the stock index.

Notation:

S_t = value of portfolio,

$Index_t$ = Value of the index at time t,

N = number of options,

$Floor_t$ = floor on the value of portfolio set at time t,

X = strike price,

m = contract size (multiplier),

p = option's premium.

Given the above assumptions, we have that

$$S_t = a + b Index_t.$$

If at time T, the index is lower than X ($\text{Index}_T < X$), the manager wants to select N such that the value of the new portfolio -i.e., value of S_t plus the value of N options- is never lower than the floor. That is,

$$b \text{Index}_T + N m (X - \text{Index}_T) - N m p \geq \text{Floor}_t.$$

The first term represent the value of the portfolio at time T. The second term represents the value of the N put options in-the-money at time T. Finally, the third term represents the cost of the N put options.

The goal of the manager is to select N. Now, we rewrite the above equation as:

$$(b - N m)\text{Index}_T + N m (X - p) \geq \text{Floor}_t.$$

Note that if $(b - N m)=0$, then the value of the portfolio is independent of market fluctuations at time T. That is, Index_T has no influence on the value of the portfolio. Therefore,

$$N = b/m.$$

If $\text{Index}_T < X$, the options expire worthless and the value of the overall portfolio is:

$$b \text{Index}_T - N m p \geq \text{Floor}_t.$$

If the portfolio and the market index are not perfectly correlated, the use of index options only provides partial insurance. In this, more realistic, case we should adjust N by the beta of the portfolio. That is, the number of contracts used to hedge market exposure is given by: $\beta \times b/m$.

“ **Futures and Options Hedge against the Market** ”

The portfolio is insured against movements on the market, not against movements of the stocks in the portfolio. ”

Example IX.9: It is January 2, 1997. Today, the FT-SE 100 closed at 4060. Ms. Howe manages a British portfolio valued at GBP 12 million. Ms. Howe's portfolio has $\beta=.93$. She is concerned about a possible drop of the British market during the next two months. She does not want the value of her portfolio to drop below GBP 10 million. That is, Ms. Howe is interested in buying insurance such that the floor for her portfolio is GBP 10 million. She decides to use FT-SE 100 index put options to establish this floor. On January 3, 1997, the March put option with a strike price of 4,000 is trading at 69. That is, the cost of each contract is: $69 \times \text{GBP } 10 = \text{GBP } 690$.

Using historical data, Ms. Howe has estimated that $b = 2790$.

Ms. Howe wants to determine the number of options to hedge her exposure.

$$N = .93 \times 2790/10 = 259.47$$

Now, we want to check if the floor really works. Suppose that in March, $\text{Index}_M = 3,500$.

Then the value of her portfolio is:

$N_m (X - m p) \geq \text{Floor}_t$.

$259.47 \times 10 (4000 - 69) = \text{GBP } 10,199,765.70 \geq \text{Floor}_t = \text{GBP } 10,000,000$.

If in March, $\text{Index}_M = 4500$, then

$2790 \times 4500 - 259.47 \times 10 \times 69 = \text{GBP } 12,375,965.70 \geq \text{Floor}_t = \text{GBP } 10,000,000$.

The total cost of this floor is $\text{GBP } 690 \times 259.47 = \text{GBP } 179,034.30$ ($\approx 1.50\%$ cost relative to amount insured).¶

II. Market Microstructure

2.A Basic Organization

The typical organization for a stock market is the *private stock exchange* model. Private stock exchanges are founded by independent members for the purpose of trading securities. A typical example of the private stock exchange is the New York Stock Exchange (NYSE). There might be several private stock exchanges in a country and they may compete with each other. The multiple private stock exchange structure is observed in the U.S., Japan, and Canada. In other countries, like the U.K., Mexico, and Taiwan, one leading exchange has emerged through either attrition or absorption of its leading competitors.

The exchanges are private, but they are subject to public regulation. The mix of self-regulation and government supervision is oriented more toward self-regulation. Private exchanges often require members to perform all of their transactions on the floor of the exchange. Commissions are either set by the exchange or imposed by the public authority. In many countries, commissions are fully negotiable.

Another organizational model for stock exchanges is the *public stock exchange*. This structure was created in France, using the Napoleon legal code. This structure gives the brokers, who are appointed by the government, a monopoly over all transactions. Brokerage firms are private and new brokers are proposed to the state for nomination by the broker's association. Many European stock exchanges were organized under this model. The stock exchanges of Paris, Athens, and Madrid, among others, used this model.

Some countries have organized their stock exchanges around banks. Under the *bankers stock exchange*, banks are the major securities traders. The SWX Swiss Exchange is a typical example of a bankers exchange. The seventy-six members of the SWX are all banks, a quarter of them foreign. Some of the members are "remote members." These remote members are foreign banks with no physical presence at the exchange. Bankers exchanges may be either private or semipublic organizations. Bankers exchanges are found in the German sphere of influence: Austria, Switzerland, and Scandinavia.

During the last twenty years, deregulation and competition from other stock exchanges have progressively affected all public exchanges. Today, the majority of the exchanges have been reorganized following the private stock exchange model. The Borsa Italiana S.p.A., the group leader and responsible for the organisation and management of the Italian stock exchange. The Company,

founded in 1997 following the privatisation of the exchange and operational since 2nd January, 1998, is responsible for:

.. Privatization of a Stock Exchange: The Athens Stock Exchange

The Athens Stock Exchange (ASE) was established in 1876, by the issuance of the first Stock Exchange Law based on the French Commercial Code. Stock Exchange began to operate as a self regulated public institution. Later, in 1918, Law 1308 set up ASE as a public entity

In early 1994, a series of laws were approved to modernize the ASE. In 1995, Law 2324 transformed the ASE into a joint stock company, supplemented the listing regulations, allowed over the counter (OTC) transactions and short selling (under specific circumstances). The Law 2324 defined the conditions for the disposal of shares through private placement, broadened the scope of activities of brokerage companies, allowed remote brokering, deregulated commissions and introduced amendments to the Capital Markets Commission regulations. Finally, in 1997, Law 2533 provided the legal framework for the privatization of the ASE. The same Law created three new markets, the derivatives market, the parallel market for emerging markets and the market for fixed income securities.

Today, the ASE is owned by a holding company called Hellenic Exchanges S.A. (HELEX) established and listed on ASE in March 2000. ♦

A more recent development is the transformation of many exchanges --e.g., the Paris Bourse, Deutsche Börse, Athens Stock Exchange (ASE) and Australian Stock Exchange (ASX)-- into business organizations. They are adopting corporate-type ownership and governance, segmented markets and performance-driven organizational structure and culture. For example, on March 15, 2000, the London Stock Exchange's (LSE) shareholders voted to demutualize and, thus, enable the exchange to become a public company. A month later, shares of LSE started to be traded at the LSE. On December 6, 2002, the Chicago Mercantile Exchange -the largest U.S. futures exchange- listed on the NYSE, becoming the first U.S. financial market to go public.

Exchanges are competing for listings with one another like businesses. The New York Stock Exchange (NYSE) and the LSE are aggressively pursuing listings from around the globe to grow. Competition has recently created a wave of consolidation and cooperation agreements in the stock exchange industry around the world. In June 1999, the four French market operators (SBF, Matif SA, Monep SA, and Société du Nouveau Marché) merged to form a single entity, Paris Bourse. Later, in September 2000, the Amsterdam Exchange (AEX), the Brussels Exchange (BXS) and the Paris Bourse merged to form the first European exchange Euronext N.V. Euronext became the first fully integrated cross-border single currency stock, derivatives and commodities market. In February 2002, Euronext merged with the Lisbon Stock Exchange (BVL).

In January 1998, Stockholmsbörsen (OM) and the Copenhagen Stock Exchange (KFX) signed a cooperation agreement to form NOREX, a common Nordic equity market. Although the OM and the KFX remain independent, they allow cross-membership and use a single buy-and-sell order book for each security. NOREX has also adopted common trading rules and a uniform trading platform, SAXESS -Stockholmsbörsen's trading engine. In 2000, the Iceland Stock Exchange and the Oslo

Exchange joined NOREX. In another Nordic consolidation move, in September 2003, the OM and HEX (Helsinki Exchanges) merged and formed OMHEX.

2.B Differences in Trading Procedures

Besides the legal environment, numerous differences are found in the operation of national stock markets. The most important differences are in the trading procedures.

2.B.1 Cash versus futures markets

The terms *cash* and *forward* refer to the settlement of stock exchange transactions. An investor buys securities and the seller sells securities, but the buyer will have to pay for the securities she bought and the seller will have to deliver the securities he sold. On both markets, this settlement is executed in a different way. On the cash market, an executed order has to be settled soon after the execution of the order. For example, at the NYSE, transactions must be settled in three days after execution. This means the investor has a maximum of three trading days to pay/deliver the securities traded on the NYSE. On the forward market, all orders of the same fortnightly period are executed soon after the closing of this fortnightly period. For example, at the Brussels Stock Exchange (BXS) forward transactions are settled within four days of the carry over day.

Most stock exchanges are organized as cash markets, and transactions must be settled within a couple of days. In some countries, such as Germany and Japan, trading in forward and futures used to be explicitly forbidden.

To allow more leveraged investment, margin trading is available on many cash markets such as those of the U.S., Canada, Japan, and Switzerland. In margin trading, the investor borrows money from a broker to finance a transaction. Margin trading, however, is costly compared to trading on an organized futures market because private contracts must be arranged for each deal. This is still a cash market transaction and delivery of the shares takes place immediately; however, a third party steps in to lend money (shares) to the buyer (seller) to honor a cash transaction commitment.

In contrast, futures or forward stock markets provide an organized exchange for levered stock investment. The Paris Bourse is an example of a forward market. A deposit is required to guarantee a position, as on most forward markets. Some of these forward stock markets, such as those in Rio de Janeiro and the Far East, have sprung up quite recently as competitors to old cash stock markets.

Some stock exchanges have both forward and cash markets. For example, at the Brussels Stock Exchange (BXS) large firms are traded on a forward market basis, while medium and small firms are traded on a cash market basis. That is, the BXS market is split up into two segments on the base of the liquidity or the negotiability.

2.B.2 Fixed versus continuous quotation

U.S. investors are accustomed to a *continuous* market, where transactions take place all day and where large *market-makers* assure market liquidity at virtually any point in time. In some markets, the market maker has a monopoly for a given security, as is the case for the *specialist* on the NYSE. In other markets, the market makers, also called *dealers or jobbers*, compete with one another. An example of a dealership market is the London Stock Market. The client will turn to the market maker who provides the best bid-ask quote. Market makers adjust their quotes continuously to reflect supply and demand conditions.

In other countries, an asset is traded only a few times per day and its price is determined through a competitive auction system. This is known as a *call* or *fixing* market, where a single price applies to all transactions. The call system is used in markets where there is not enough liquidity to support a continuous system. In most of the continuous markets, a call auction system is used to determine the opening price at the start of the sessions (for example, Tokyo Stock Exchange, NYSE, and Buenos Aires Stock Exchange).

The increased volume of transactions as well as computerization has made continuous trading easier to implement. The 1990s wave of modernization of stock exchanges around the world has caused the pure call systems to disappear. The Tel-Aviv Stock Exchange (TASE) abandoned the pure call system by the end of 1997, and replaced it with an electronic continuous trading system. In many markets we find a mixture of call and continuous trading. The Wiener Börse (Vienna Stock Exchange) uses the continuous system for the most active securities, while a call system is used for the less active securities. Similarly, the BSX offers two price fixings (“semi-continuous system”) a day for the less liquid stocks.

2.B.3 Computerization

An important component of the modernization of trading systems implemented by most of the exchanges around the world has been a change toward a higher degree of automation. Trading on a floor where participants noisily meet is progressively being replaced by computerized trading.

At the NYSE and other exchanges, floor traders, however, execute all the orders, according to a set of rules, specified by the exchange. This set of rules can easily be entered into a computer program and an electronic exchange is born. Thus, in an electronic exchange, the need for floor traders disappears. In the simplest form of an electronic exchange, when bid and offer prices match, orders automatically execute against one another on screen, bringing increased speed and efficiency to the market. It has been shown that electronic exchanges deliver significant cost savings to investors. At the LSE, an independent study by The Plexus Group has shown that, since the introduction of the electronic order book (STS), the cost of trading for institutions in the U.K. equity market has more than halved, from an average of 60 basis points to 25 basis points.

A trade execution function is an algorithm that performs order matching according to a set of rules governing priority of submitted bids and offers. The priority rules determine the place of a bid or offer in the queue awaiting execution. A match occurs under several circumstances, depending on the design of the system. The best price is the highest priority on almost all systems. Almost all systems have a time priority, which means first in, first out. Time, however, refers to time at a

particular price, not time in the system. Some systems also have priorities based on size, order type, trader class, display, etc.

There are several examples of completely automated trading systems. The Computer Assisted Trading System (CATS) developed by the Toronto Stock Exchange (TSE) allows the automated execution of orders entered by traders in their office. It is a system well adapted to auction markets without market makers, and CATS has been adopted by many foreign markets (Paris, Tokyo, Madrid, Taiwan, etc.). The CATS system eliminated the need for a floor where participants meet. Several markets have adapted the CATS system to their special needs and/or priorities. The improvements made by the Paris Bourse to CATS, renamed CAC, were so attractive, that in 1996 the TSE bought the Paris Bourse's CAC system. The new TSE system now is called TOREX.

In the U.S., the National Association of Security Dealers has developed an electronic system known as SOES, which allows the electronic execution of small orders. The SOES system works alongside the trading floor. In London, in October 1997, the electronic order book (STS) was introduced to replace a competing quote-driven market maker system. The order book includes the FTSE 100, the most liquid FTSE 250 securities, equities that have a LIFFE traded equity option and Irish stocks traded in euro. London has implemented a NASDAQ-type system called SEAQ, which also allows the electronic execution of small orders and non-STX transactions. The SWX Swiss Exchange has developed the first electronic trading platform, which integrates trading, clearing and settlement. A single mouse-click initiates trading, payment, settlement and confirmation.

In Table IX.2 we present a list of all the fully automated stock and bond exchange.

TABLE IX.2
Some automated stock and bond exchanges

System (exchange)	Date	Hours	Securities	Country
SEATS (ASX)	1987	Day	All ASX listed stocks	Australia
TOREX (TSE)	2000	Day	All TSE listed stocks	Canada
MORRE (ME)	1990	Day	All stocks	Canada (Quebec)
SAXESS (NOREX)	1999	Day	Listed CSE and SSE stocks and bonds	Denmark, Sweden
CAC (Paris)	1986	Day	All stocks, most bonds	France
XETRA (FWB)	1997	Day	All stocks, 370 bonds, 23 warrants	Germany
HKTS (SEHK)	1993	Day	SEHK listed stocks	Hong Kong
GTB (Milan)	1991	Day	Most stocks	Italy
CORES (TSE)	1982	Day	TSE listed stocks	Japan
STS (OSE)	1991	Day	1,099 OSE stocks	Japan
SENTRA Capitales (BMV)	1996	Day	Listed stocks, bonds	Mexico
CLOB (SSE)	1987	Day	SSE, HK listed stocks	Singapore
SIB (SSE)	1991	Day	116 stocks	Spain

SWX (SWX)	1995	Day	All securities	Switzerland
STS (LSE)	1997	Day	most liquid listed stocks	UK
BEACON (BSE)	1987	Day	Stocks trade over ITS	USA
NSTS (CSE)	1985	Day	425 stocks (2,700 capability)	USA
MAX (MSE)	1981	Day	Exchange listed stocks	USA
ABS (NYSE)	1976	Day	Bonds	USA
OHT (NYSE)	1991	Night	NYSE stocks	USA
SCOREX (PSE)	1969	Day	Listed stocks	USA
PACE (PHLX)	1976	Day	Listed stocks	USA
MAX-OTC (MSE)	1987	Day	OTC stocks	USA
OLS (NYSE)	1986	Day	Odd lots for NYSE listed stocks	USA
SOES (NASD)	1985	Day	NASDAQ stocks	USA

There are more than 50 automated systems that trade stocks, futures and options. These can be classified according to the degree in which the price discovery process has been automated. Ian Domowitz, in a paper published in the Journal of Financial Services Research in 1992, describes seven levels of automation.

vi. Level 1: Exogenously determined prices.

These are systems, which determine their transaction prices by taking them directly from a trading floor or telephone market operating in tandem. Though trade matching is still executed according to time and order priorities, the price discovery system per se cannot be considered as automated. SOES is an example of this type of level of automation.

ii. Level 2: Exogenously determined prices with price improvement algorithm.

In these systems, transaction prices are also taken from a trading floor. A computer code, however, assesses market conditions and assigns improved prices. The treatment of stopped orders in the Midwest Stock Exchange's Enhanced SuperMax rules can be presented as an example since stopped orders are assigned different prices than the stop price, depending on expected price movements in the NYSE.

iii. Level 3: Systems with negotiation capability.

Some automated systems allow traders to advertise their quantities without price specification in order to motivate negotiation. SOFFEX, the electronic system of the SOFFE (Swiss Options and Futures Exchange), presents this level of automation.

iv. Level 4: Direct removal of quotes from the trading screen.

A trader, upon observing the bid-ask prices on the screen or the limit order book can access a trade by pushing a button, executing the transaction at the best quote available on the screen. Orders are

not saved for a later execution at a different price. The GLOBEX system of the CME and the APT system of the LIFFE are examples of this degree of automation.

v. Level 5: Automated continuous double auction.

Bids and offers are submitted in a continuous manner, transactions occurring when the orders cross. The price discovery process is completely endogenous, within the context of certain priority rules. These rules are set according to time, quantity, order type, and trader classification. The Madrid Stock Exchange's electronic market is an example of this level.

vi. Level 6: Automated periodic single-price auction.

Bids and offers are accepted over some time interval and are then simultaneously executed at one price. The execution price is calculated as the price that maximizes total trading volume. This system is used by many of the automated continuous double auctions in order to determine their opening prices. This system provides a very high degree of automation, since there is less human interaction in the price discovery process. The price setting procedure only determines whether an order will be executed and does not affect the probability of it being executed, as does a continuous system which accepts limit orders and prioritizes them according to their prices. The SOM system of the Swedish Options Market offers this level of automation.

vii. Level 7: Automated auction with pricing model.

These systems match orders according to criteria other than price. The justification being that prices may in fact not reflect changes in the underlying value of fundamentals, thus becoming "stale." The SYCOM system of the SFE (the Australian Futures and Options Exchange) is an example of this level of automation.

Domowitz also compares different automated and non-automated systems. He concludes that automated trading systems exhibit less price volatility and a faster decline of standard deviation with respect to market size. Liquidity, the size of the bid-ask spread, and depth (market's ability to absorb quantity without an appreciable effect on price) seem to improve with automation. The introduction of the SWX Swiss Exchange integrated electronic platform reduced the size of the bid-ask spread for blue chips from .2% to .15%.

A higher degree of automation also has an impact on transparency and anonymity. Several authors claim that the anonymity provided by automated systems is one of the main reasons for the success of the off-exchange computerized trading systems currently competing against the NYSE (for example, Instinet, Posit and Spaworks). The same reason is cited behind the implementation of a London based off-exchange trading system.

As a result of the efficiency and transparency gains of electronic trading systems and the increased international competition in the stock exchange industry, many stock exchanges have become floorless exchanges. For example, the ASX (1990), Kuala Lumpur Stock Exchange (1992), the Paris Bourse (1995), the Johannesburg Stock Exchange (1996), the Korean Stock Exchange (1997), the Bombay Stock Exchange -Mumbai- (1997), and the Toronto Stock Exchange (1997) have chosen to close the trading floor and became fully automated exchanges.

◆ **The End of an Era**

After 90 years of floor trading, on January 8, 1999, the last open outcry transaction (“viva voz” transaction) was carried out in the floor of the Bolsa Mexicana de Valores (BMV), the Mexican stock exchange. From January 11 on, all transactions are carried out through the computerized system BMV-SENTRA Captales. BMV-SENTRA Captales is a totally decentralized and automated system, which allows users to perform trades in real time through hundreds of computer terminals interconnected by a network. The terminals are located in brokerage firm offices and controlled by the Trading Control station at BMV. Transactions are closed or entered through on-screen formats specifying issuer, series, amount and price of the securities the user wishes to buy or sell.

A broker must send orders from the broker's headquarters to the Bolsa's central order book via the electronic trading system for equities or BMV-SENTRA Captales, where they are matched when a similar but opposite order is received. ◆

2.C Internationalization

To service international investors, securities firms have developed an international network of offices. These networks provide an expensive medium for domestic investors to reach foreign markets. A cheaper alternative for investors is to be able to access from their domestic markets other international markets. With the advanced computerization of the major exchanges, accessing foreign markets is very easy. There are no real technological impediments for cross-border automated trading. The SWX Swiss Exchange allows its remote members to use the SWX electronic platform from their home base. Xetra, the electronic platform of the Deutsche Börse, also takes orders from any point in the globe, which then are automatically inputted into the order book on the central computer.

Linkages of stock markets around the world (and around the clock) are becoming serious alternatives. The main problem for linking national stock markets is the different sets of rules that governed each market. Harmonization of trading rules and procedures is a tool that many stock exchanges are using to become more competitive. In 1998, the OM Stockholm Exchange (OMX) and the Copenhagen Stock Exchange (KFX) signed an agreement covering a common Nordic exchange, NOREX. The OMX and KFX have thus implemented a cross-border trading system and a common set of trading rules. The NOREX gives access to 80% of the Nordic equity market via one joint electronic trading system, the SAXESS. The NOREX has expanded to include the Oslo Stock Exchange (November 1999) and the Iceland Stock Exchange (March 2000).

In another example of linking different exchanges through a single trading platform, the Paris Bourse, the AEX Amsterdam Exchange, and the BXS Brussels Exchange in March 2000 formed Euronext, an integrated European stock exchange. Although the different jurisdictions and local licenses of the individual exchanges are maintained, Euronext provides a single operating umbrella for all three exchanges. Trading is centralized, and a uniform trading platform—the Paris Bourse’s NSC trading engine—is used, allowing a single trade price to be established. Shares are

listed at a national level and companies can select their trading venue from among the three exchanges.

True cross-border automated trading is also provided by the EURO.NM and by the EASDAQ. The EURO.NM (NM stands for New Market) is a new stock exchange created to attract young, high growth companies. The new market is a pan-European network of stock markets, with five members: AEX Amsterdam Exchange, BXS Brussels Exchange, Deutsche Börse, Paris Bourse, and Borsa Italiana. At the end of 1999, there were over 300 companies listed on the EURO.NM, with a total market capitalization of over EUR 60 billion.

Competing with EURO.NM to attract high growth companies, the European Association of Securities Dealers Automated Quotation (EASDAQ) offers a truly European stock market, governed by a single legal system and subject to a single supervisory structure. EASDAQ is a screen-based, quote-driven market, which uses a multiple market maker system similar to that used by NASDAQ in the United States. EASDAQ has its own dedicated trading platform, which allows seamless trading and settlement across the European Union. Trading on EASDAQ takes place through EASDAQ's European members, currently situated in the U. K., France, Germany, the Netherlands, Switzerland, Austria, Belgium, Portugal, Italy, Denmark, Finland, Greece, and Luxembourg. By the end of 1999, the EASDAQ had over 50 companies listed, with a market capitalization of over EUR 20 billion.

The best global reach is provided by INSTINET, which has terminals located around the world. INSTINET is a proprietary automated trading system owned by Reuters.

.. **Exchange of the Future**

Some experts believe that the best method would not be to join cooperative agreement with other markets, but that stock exchanges should simply make their own automated trading system available (i.e., cross-border automation) worldwide on a 24-hour basis. To be attractive, such a system requires round-the-clock market makers and sufficient liquidity. Efficient clearing and settlement procedures are also needed. ♦

III. Practical Aspects

3.A Dual-Listing

Multinational companies such as IBM or Sony are traded on many exchanges. The listing of the same company in different exchanges is called dual-listing or cross-listing. Many European exchanges have a large proportion of foreign listed companies. In 1998, Germany and Luxembourg had more foreign companies listed than domestic companies. cross-listings have become increasingly common in the U.S. For example, by the end of 1998, at the NYSE the number of foreign listed companies grew to 391. This number represented nearly 170 more foreign companies than at the beginning of 1996.

The procedure for admitting foreign stocks to a local market varies. In some markets the regulations are quite lax. For example, as of 1986 the Quebec Securities Act allowed a foreign company to be listed in Montreal simply by meeting the same regulatory requirements as those in its own jurisdiction. In other markets, like the U.S., cross-listing means that foreign companies must satisfy the local exchange and other regulatory requirements (which might be costly, for example, producing quarterly reports in English).

Multiple listing implies that the share values of a company are linked on several exchanges. One company should sell at the same share price all over the world, once adjustments for exchange rate and transactions costs have been made. Arbitrage among markets ensures that this is so.

There are several reasons for being listed on several national markets. Cross-listings allows investors from around the world to enjoy the benefits of international diversification by investing in a foreign company. Greater market demand improves liquidity for the shares and might improve performance. Entrenched management might like to have a diversified ownership, and, thus, reduce the risk of a domestic takeover. Listing in international markets is a good advertising tool, especially for emerging market companies. Cross-listing is also a signal that the company complies with disclosure standards and good accounting practices.

Double-listing has disadvantages. Foreign ownership might not be welcome by the local government or by domestic residents and investors. The main disadvantage of dual listing, however, is increased volatility.

Example IX.10: Bad political news in Chile has frequently been followed by an immediate outflow of international capital, driving domestic share prices down in this illiquid stock market. Chilean shareholders display less volatile behavior than foreign investors for two reasons: they are not as surprised by bad domestic news, and domestic controls and regulations give them few attractive investment alternatives. ¶

◆ Restricting Foreign Ownership

Many governments in both developed and developing countries often impose restrictions on the maximum proportionate ownership of local firms by foreigners. In countries like India, Thailand, and Mexico, for example, foreigners are allowed to control at most 49% of the outstanding shares of local firms. In Switzerland, a local firm can issue two different classes of equity shares, bearer and registered shares. Foreigners are often allowed to buy only bearer shares; only Swiss nationals are eligible to buy registered shares. Chinese firms issue A shares and B shares, and foreigners are allowed to hold only B shares. ◆

3.A.1 American Depositary Receipts (ADRs)

In countries such as the U.S., the U.K., Singapore, and The Netherlands trading takes place in special shares of the foreign company, depository receipts (DRs). Specifically, U.S. investors deal in American depository receipts (ADRs). Depository receipts have been around since 1927, but their popularity took off in the 1980s, propelled by investors globalizing their portfolios, and emerging markets companies turning to the DR product in deregulated U.S. markets. European DRs were created to be traded in London, Singapore DRs are traded in the Singapore Stock Exchange, and the

Continental DRs are traded in The Netherlands. More recently, the Global DRs (GDRs) were created to meet the needs of European settlement systems (Cedel and Euroclear). DRs are denominated and pay dividends in the domestic currency. They have become the most popular vehicle for foreign companies to raise funds in the U.S. We will concentrate on the ADR market, which is by far the largest.

As mentioned above, ADRs have a long history in the U.S. stock market. ADRs were invented by a predecessor of Morgan Guaranty Trust Company of New York in 1927. These ADRs gave U.S. residents the opportunity to invest in foreign securities without suffering the illiquidity and dividend conversion expenses of direct foreign ownership. Initially, ADRs offered additional advantages: reduction of the delay in transporting stock certificates, faster settlement and registration of securities. The first ADR account to open was Selfridge Provincial Stores Limited. Another 17 ADR accounts were opened around that time, three of them still survive: BAT Industrias, Cortaulds plc, and The General Electric Co. plc. After the establishment of the original 18 ADR accounts, there were no new ADRs created until 1955.

Note that by trading in ADRs a U.S. investor avoids the delays of trade settlement, the problems associated with safeguarding the foreign stock certificates, and making currency transactions. No additional tax burden is carried.

Investment in ADRs is based on the performance of the underlying equities and their home markets and home currency. The market value of an ADR reflects the current rate of exchange between the U.S. and a foreign country and, taking transactions costs away, they trade at the same price that in the foreign country. Trading on ADRs does not eliminate currency risk or country risk.

Example IX.11: If the British pound depreciates sharply, British Airways dollar returns will decrease, and therefore, British Airways ADRs, trading in NYSE, will decline. Similarly, if there is political turmoil in South Africa, it will be reflected in the DeBeers ADRs, which trade in NASDAQ. ¶

In 1995, there were more than 1,800 ADR programs available to U.S. investors, with a combined market value of over USD 50 billion, representing companies from 58 countries. Originally created to foster investment in European companies, ADRs came to be dominated by emerging market companies. Therefore, even though most of the ADRs are large capitalization issues, there are an increasing number of small capitalization issues, especially from Latin American countries.

The increasing number of ADR programs available to U.S. investors has been reflected on the trading volume of U.S. equity markets. In 1991, purchases and sales of non-U.S. equities on the NYSE, AMEX, and the NASDAQ totaled USD 267 billion, a figure, which had multiplied nearly four-fold by 1996.

◆ **Another investment vehicle: American Shares**

American shares are shares of a foreign corporation issued directly to U.S. investors through a transfer agent. The foreign corporation has to meet all S.E.C. regulations that apply to all listed U.S. corporations. American shares are denominated in the currency of the foreign company; dividends and capital gains are received in foreign currency. Many investors find American shares to be

inconvenient because they trade and pay dividends in the foreign currency. American shares have low liquidity in the U.S. and, generally, are held by large investors. ♦

3.A.1.i The mechanics of ADRs

Under an ADR program, foreign shares are deposited with a U.S. bank or U.S. trust company that, in turn, issues ADRs in the name of the foreign company. That is, for U.S. investors, ADRs are receipts for stocks of specific foreign companies issued by U.S. banks and trust companies. A U.S. or foreign bank holds the actual stock in a custodial account, receives dividends and converts them to dollars, pays any foreign taxes, and passes the net amount on to the investors. These ADRs may trade freely, just like any other security, either on an exchange or in the over-the-counter market, and can be used to raise capital.

To avoid unusual share prices, ADRs may represent a combination or a fraction of several foreign shares. For example, Japanese shares are often priced at only a few yen per share. They are therefore combined into lots of 100 or more so that their value is more like that of a typical U.S. share price. On the other hand, an ADR on a German stock may represent one-fourth of a share.

On the depository side, three institutions --Bank of New York, Citibank and JP Morgan-- hold more than 95% of the action. In the first six months of 1995 Bank of New York held an 81% share of new ADR public U.S. offerings, against Citibank's 13% share. Citibank, on the other hand, has the more actively (and liquid) traded ADRs.

3.A.1.ii Types of ADRs

There are two kinds of ADR facilities: sponsored and unsponsored. A *sponsored* ADR facility is created pursuant to a deposit agreement between the issuer of the foreign security, the depository, and the holder of the ADRs. *Unsponsored* ADR facilities are created by a depository alone and the only document consists of the ADRs issued by the depository. Once a depository has created an unsponsored ADRs, it is common practice for other depositories to copy it, creating duplicate unsponsored ADR facilities. Sponsored facilities are exclusive to one depository and cannot exist simultaneously with unsponsored ADRs because sponsored and unsponsored ADRs trade at different prices. The price is different because in sponsored ADR facilities the issuer reimbursed the depository for its expenses in disbursing dividends to ADR holders, while in unsponsored ADR facilities ADR holders themselves bear such expenses.

Exchange listed ADRs are traded and quoted on stock exchanges (NYSE, the American Stock Exchange (AMEX), and NASDAQ). In 1995 there were 316 listed ADRs, with a share trading volume of almost 11 billion shares.

Unlisted ADRs include such variations as OTC Level I, Regulation S and Rule 144-A offerings.

OTC Level-I is the simplest way for a foreign company to access U.S. and non-U.S. capital markets by allowing trading over-the-counter and on some non-U.S. exchanges. Level Is, commonly known

as pink sheets, are the fastest-growing segment of the DR business. A Level I ADR does not have to comply with U.S. GAAP, it is not compelled to make a full disclosure to the S.E.C. Many companies involved in OTC Level I programs, however, ultimately upgrade to Level II or Level III programs, which mandate greater regulatory compliance in exchange for more visibility and attractiveness to investors. OTC Level II ADRs are used by foreign companies that wish to be listed on a U.S. exchange. OTC Level III ADRs are used by companies that wish to raise capital in the U.S. through an equity offering.

Regulation S ADRs are programs that trade outside the U.S. among non-U.S. investors.

Rule 144-A (RADR) are ADRs that are privately placed in the U.S. They are allowed under Rule 144-A adopted by the S.E.C. in 1990. Rule 144-A greatly increased the liquidity of privately placed securities by allowing qualified institutional buyers (QIBs) to resell these securities to other QIBs without the earlier requirement of a three-year holding period. QIBs included institutions that manage at least USD 100 million in securities and registered broker-dealers that own and invest on a discretionary basis at least USD 10 million in securities of non-affiliates. The first Russian ADR was a Rule 144-A program by Mosenergo, brought to market by Salomon Brothers in October 1995.

In Table IX.3 we present a selected group of ADRs.

NYSE and the ADR Market

In 1997, the NYSE listed nearly 3,000 companies. Of those companies, 326 are foreign companies. Non-U.S. trading volume amounted to nearly a tenth of total volume traded on the NYSE in 1996. This number is consistent with the so-called "home bias" in domestic portfolios, which will be discussed in Chapter X. U.S. institutional investors are now moving their holdings of non-U.S. equities up to about 15-20 percent of their portfolio. This number still leaves a lot of room for further expansion: the U.S. economy accounts for only a fifth of world gross product and for well under half of the total value of the world's equity markets. The NYSE plans to grow by taking advantage of this probable expansion of U.S. investment in foreign equities.

According to the NYSE, there are only 700-750 U.S. companies, which meet the NYSE's listing requirements and are not already trading on the exchange. If NYSE got them all to sign up, the market's total value would rise by less than 10 percent. By contrast, around 2,300 foreign companies meet the NYSE's listing requirements. If the NYSE could persuade the largest third of these to sign up, its market valuation would increase by more than two-thirds. In order to make the NYSE more global in character, the exchange has committed itself to trading in decimals rather than fractions over the next few years.

NYSE officials talk about a world, a few years in the future, in which their market will be trading on a global clock, in global currencies and in international securities other than today's ADRS. ♦

TABLE IX.3
Market Capitalization of Selected Major Foreign Stocks traded as ADRs

AUSTRALIA	
BHP Billiton (NYSE:BHP)	USD 22.151B
News Corporation (NYSE:NWS)	USD 31.510B
BRAZIL	
Companhia Vale do Rio Doce (NYSE:RIO)	USD 3.19B
FRANCE	
Total Fina Elf S.A. (NYSE:TOT)	USD 98.37B
L'Oreal S.A. (OTC:LORLY)	EUR 43.23B
PSA Peugeot Citroen S.A. (OTC:PEUGY)	EUR 10.26B
GERMANY	
BASF Aktien (NYSE:BF)	USD 23.71B
Bayer Aktien (NYSE:BAY)	USD 22.90B
Deutsche Bank AG (NYSE:DB)	USD 36.02B
Siemens Aktien (NYSE:SI)	USD 50.27B
JAPAN	
Canon Inc (NYSE:CAJ)	USD 26.98B
Fuji Photo (NasdaqSC:FUJIY)	USD 15.57B
Honda Motor (NYSE:HMC)	USD 18.66B
Toyota Motor (NYSE:TM)	USD 90.65B
MEXICO	
Turbo Aceros de Mexico S.A. (AMEX:TAM)	USD 653.5M
Telefonos de Mexico (NYSE:TMX)	USD 25.96B
NETHERLANDS	
Heineken N.V. (OTC:HINKY)	EUR 14.11B
Royal Dutch Petroleum (NYSE:RD)	USD 106.0B
SWEDEN	
LM Ericsson Telephone Co. (NasdaqNM:ERICY)	USD 33.63B

Note: Market Capitalization as January 2002.

3.B Financial Analysis and Valuation

Financial analysis in an international context is not an exotic field to domestic analysts. Analysts should consider foreign variables into account to price domestic firms. The product markets in which many domestic industrial companies compete are international. The methods and data used to analyze U.S., Mexican, or Malaysian companies are quite similar. The analysis of a company should produce two pieces of information: a measure of expected return and a measure of risk.

The expected return on an investment can be measured by a quantitative measure, such as a rate of return, or by a qualitative measure such as buy or sell recommendations. On the other hand, risk can be measured by a single number or by a sensitivity analysis that measures how much a company's value responds to changes in key factors such as economic activity, currency volatility, general market conditions and political stability.

3.B.1 The information problem

Financial analysts usually follow a two-step process to value a company. In the first step, based on the financial statements of a company, analysts assess the overall strength of the company, along with the company's growth possibilities. On the basis of this analysis, analysts make forecasts of the company's future earnings. At the end of this first step, analysts should produce a forecasts for the company's earning per share (EPS). In the second step, analysts try to predict how the stock market will value these forecasts. That is, analysts emphasize the relative valuation of the company within the stock market.) The traditional measures for this second step are the price-earnings (P/E) ratio and the market-to-book (M/B) ratio. (The M/B ratio is also called price-to-book (P/B) ratio.) The P/E ratio represents what the market is willing to pay for a unit of earnings, while the M/B represents the market's evaluation of the employed capital per share versus what the capital cost.

To do the above mentioned two-step process, analysts require a good amount of information. In the U.S., information on companies is very easy to obtain. If you have access to the Internet, Edgar Online will give you the quarterly and annual reports of any listed company. In international markets, however, we will be faced with two major information problems. The most important problem in some markets is the lack of information or, at least, good information. The second problem is related to the interpretation of the data.

3.B.1.i Quality of information

In the U.S., companies publish their quarterly earnings, which are publicly available within just a couple of weeks. Before the official release, U.S. companies issue "early earning warnings" if the quarterly results are significantly different from what analysts have been expecting. British and Japanese firms publish U.S.-style financial statements. In contrast, some European and Far Eastern firms only publish their earnings once a year. The vast majority of multinational and large domestic firms tend to publish both in their local language and in English. Many reports, especially for small firms, are only available in a company's local language.

Insider trading affects the quality of information publicly released to the market. Insider trading -- trading on non-public information that could affect a stock price-- makes a stock market

unattractive, especially to international investors. International investors want to know that they are trading on a level playing field, that they have access to the same company information that local investors do. In the well-established markets, strict rules severely punish insider trading and, therefore, the information released by a company has a potential impact in the value of its stock. In many emerging markets, insider trading is a real problem. International investors have pushed for change in insider trading rules from South America to Southeast Asia. There is, however, still room for improvement (see the box “Dealing with Insider Trading: South Africa” below).

Many international brokerage houses and banks compile reports and guides summarizing accounting information for foreign firms. The reports often include non-accounting information such as earning growth forecasts, expected returns on equity investment, and risk measures such as betas, which are discussed below.

Dealing with Insider Trading: South Africa

After ten years of political transformation, the Johannesburg Stock Exchange (JSE) has decided that it, too, must change. The JSE was notoriously famous among international investors by its insider trading. With a newly enacted law, the Insider Trading Act, South African regulators are after insider traders. In the first year under the new law, the regulators have won six settlements with insider traders. Under the old law, not once did South Africa ever win an insider trading conviction. South Africa, however, has nothing like the American S.E.C.’s army of investigators and prosecutors with the skills and resources to turn complicated investigations into viable prosecutions. But, giving potential insider traders cause for concern is seen as a step forward in South Africa.

Source: *The New York Times*, May 11, 2000. ♦

3.B.1.ii Comparative analysis

Accounting methods are different across countries. Most non-U.S. methods provide less information to investors of what lies behind the figures a firm reports on profit statements and balance sheets. It is usually uninformative to compare financial statements from different countries without making adjustments for the different standards.

Example IX.12: Many companies in Japan and South Korea do not report profits and losses on a consolidated basis, instead they hide losses among subsidiaries while reporting profits for the entire company. ¶

Example IX.13: Mexican companies still use inflation accounting. They increase the value of the assets of the company to keep up with inflation, but then they record a gain from that increase value. ¶

Example IX.14: Because the treatment of depreciation and extraordinary items varies so much among countries, an analyst would probably double the net income of Swedish or Japanese firms, in order to make a meaningful comparison to the corresponding figures for U.S. or British firms. ¶

But even where the same accounting methods are used, cultural, institutional, and tax differences can make cross-country comparisons of accounting numbers misleading.

Example IX.15: Comparing Japanese and U.S. earnings figures or accounting ratios is meaningless. The U.S. accounting standards are more conservative than the Japanese standards. Most large Japanese companies, however, publish secondary financial statements in English that conform to the U.S. GAAP and audited by major U.S. accounting firms. Institutional factors, however, make these U.S.-style statements difficult to interpret. For example, financial leverage is high in Japan compared to the U.S., which does not mean that Japanese firms are riskier. (Recall that, in Japan, banks and clients have a closer relation than their U.S. counterparts). ¶

The following list presents the major differences in international accounting practices:

- Publication of consolidated statements
- Inflation accounting
- Depreciation rules
- Inventory valuation
- Publication of accounts corrected for fiscal distortion
- Currency adjustment
- Treatment of extraordinary expenses
- Existence of "hidden" reserves

Misunderstanding asset values and reported profits played a major role in the 1997 Asian crisis. The lack of uniform accounting standards is costly. International banks and investors charge higher interest rates to companies that do not adjust their books to U.S. standards. Moreover, many foreign firms do not have access to international capital markets because their national accounting standards distort valuations. Japan, for example, ranks below Spain and South Korea on access to international capital markets. This very surprising fact is partially explained by the Japanese accounting methods.

◆ **Applied Corner: Pension Accounts**

Japanese companies have assumed unrealistic capital gains for years for their pension accounts. Now, corporate pension plans are greatly underfunded. In 1999, some experts estimate the pension shortfall at USD 500 billion. This is a debt that companies will have to pay in the future.

Many European companies did not keep pension funds separate. They used the pension funds to finance operations year in-year out. Now, many European firms are facing great liabilities. To correct this problem, European companies are separating their pension accounts from the companies' accounts, following the U.S. model. The U.S. model is governed by the Employee Retirement Income Security Act or ERISA. In 1974, the U.S. Congress was worried that without separate pension accounts, companies could go bankrupt and leave employees without a security net. Source: *Los Angeles Times*, May 1999. ◆

Bankers, investors, insurance companies, and pension funds are pushing for uniform international accounting standards. Since 1995, the International Accounting Standards Committee has been working to prepare more uniform rules. The U.S. Securities and Exchange Commission already oversees more than 1,300 foreign firms that trade their securities in the U.S. These foreign firms had to adjust their accounting and disclosure methods to the U.S. standards.

3.B.2 Stock market valuation

Given the different accounting standards and financial practices around the world, we observe that national stock markets seem to use different valuation criteria. For example, similar earnings announcement can lead to different price reaction in different countries

Example IX.16: In Table IX.4 we observe that the average price-earnings ratio varies greatly among countries in May 1994 (indexes are in U.S. dollars).

TABLE IX.4
AVERAGE FINANCIAL INDICATORS FOR DEVELOPED MARKETS

Index	M/B	P/CE	P/E	Yield
Australia	1.72	10.6	17.2	3.4
Hong Kong	2.16	14.2	16.6	2.9
Japan	2.33	11.9	88.0	0.7
New Zealand	1.89	10.1	13.7	4.3
Singapore	1.96	12.6	20.4	1.3
U.K.	2.22	9.7	15.5	4.2
France	1.55	7.7	27.2	3.1
Germany	2.10	6.2	60.3	2.4
Netherlands	1.71	7.8	17.6	3.5
Sweden	2.31	12.0	20.4	1.3
U.S	2.58	9.9	19.5	2.8
Canada	1.77	11.4	44.7	2.5
World	2.26	9.9	26.7	2.2
EAFE	2.13	9.9	33.8	1.9

Notes: M/B: market-to-book value; P/CE: price-to-cash-earning ratio. ¶

The ratios presented in Table IX.4 are routinely used to compare valuations across firms or industries. This way of comparing firms or markets is called valuation by *multiples*. Valuation by multiples is a process in which a ratio for a given firm is compared to the ratio of similar firms. Let us concentrate on the most popular multiple, the P/E ratio. Recall that a P/E ratio tells investors how long they have to wait to recover their investment in terms of earnings –assuming that current earnings are an excellent predictor of future earnings. For example, suppose Dell Computers (NYSE:DELL) and Hewlett-Packard (NYSE:HWQ) are considered similar companies. If the P/E ratio of Dell Computers is higher than the P/E ratio of Hewlett-Packard, analysts will conclude that the market values more aggressively Dell’s earnings than Hewlett-Packard’s earnings.

Comparisons across international markets are trickier than comparisons across domestic markets. U.K. firms have lower P/E ratios than firms from Germany or Japan; however, this does not indicate that U.K. firms are cheaper companies. Table IX.4 indicates that there are national differences in earnings accounting, rather than miss-pricing of comparable firms. For example, Japanese or U.S. companies tend to sell well above their accounting book values if their M/B ratios are compared to those of New Zealand or Canadian firms. But this does not mean that U.S. firms should be sold and Canadian firms should be bought.

3.B.2.i Company valuation

3.B.2.i.1 Discounted Dividend Model

The classic way of calculating the *fair price* of a company is to use some form of the discounted cash flow (DCF) model. A popular variation of the DCF model is the discounted dividend model (DDM). Under a DDM, the value of an asset is determined by the cash flows it generates for the investor. In a DDM the stock market price is set equal to the discounted stream of forecasted dividends.

$$P_t = E_t[D_{t+1}]/(1+r_1) + E_t[D_{t+2}]/(1+r_2)^2 + E_t[D_{t+3}]/(1+r_3)^3 + E_t[D_{t+4}]/(1+r_4)^4 + \dots,$$

where $E_t[D_{t+j}]$ represents the time $t+j$ expected dividends, conditional on today's information (time t), P_t is current stock market price, and r_j is the discount rate, or required rate of return, for j periods ahead.

Note that to estimate a fair price for a company, we need to forecast future dividends ($E_t[D_{t+1}]$, $E_t[D_{t+2}]$, etc.), and we need to calculate an appropriate discount rate (r_j). In addition, if the company is a foreign company, foreign exchange rates need to be forecasted to translate expected dividends to the domestic currency. As discussed in Chapter VIII, we can eliminate currency risk by using the appropriate forward rates to convert futures expected dividends to the domestic currency.

A usual approach to estimate future dividends is to estimate the future path of the firm in three phases:

- (a) Near term (i.e., the next two years): earnings are forecasted individually.
- (b) Medium term (i.e., years two to five): a general growth rate for the company's earnings is estimated. (For example, the growth rate in earnings reverts to the average in the industry.)
- (c) Long term: the growth rate in earnings is supposed to revert to the average of all firms in the market.

The second element needed to estimate the DDM for a company is an appropriate discount rate, r_j . If the risk of the expected cash flows is stable over time, firms can discount cash flows using risk-adjusted cost of capital, which is represented by a risk-free rate plus a risk premium. The Capital Asset Pricing Model (CAPM), discussed in the Review Chapter, provides a simple framework to estimate a risk premium.

Discount Rates and Risk Premium

The discount rate is influenced mainly by two factors: bond yields and the risk premium. For well-established markets, and keeping variables in real terms, government bond yields are about 3%. Government bond yields are taken to represent risk-free rates. The size of the risk premium, however, is more difficult to establish. There is no clear consensus about the risk premium, even for established markets. For example, for the U.S. markets, the risk premium estimates range from almost zero to 8%. ♦

Note that the DDM equation can be used to estimate a constant discount rate, or required rate of return (r). If the expected dividends (D_t) and the current stock market price (P) are known, then a firm will be able to estimate r .

Example IX.17: Using DDM to calculate the fair value of YPF ADRs

Since the Tequila effect, the Argentinean economy has been in a recession, of which it recovered by mid-1996. The Argentinean stock market has a short history as a modern exchange. Before 1991, the Argentinean stock market followed the public exchange model and it was a highly illiquid and undercapitalized market.

It is December 1995. Suppose we want to use the DDM to value the ADR of the oil company YPF (NYSE:YPF), Argentina's largest company. We need input values for $E_t[D_{t+j}]$, r_{t+j} , and S_{t+j} , for $j > 1$. Today's price of a YPF ADR is USD 20.53. Argentina has had a fixed exchange rate since 1991, $S_t = 1$ USD/ARS.

(1) Estimation of $E_t[D_{t+j}]$.

One of the problems in new emerging markets is developing a model for forecasting D_{t+j} . As mentioned before, the modern history of these markets is very new, and the past might not help us to predict the future. In addition, companies are slowly learning how to behave in a modern stock market. YPF dividends have been stable for the past two years at the level of ARS .80 per share. Dividends are forecasted to be ARS .84 for the next year. The predicted growth rate of dividends after the next year until the year 1999 is 9.1%. This level of dividend growth is very low for international standards. It is unrealistic to expect this dividend growth forever. After the year 1999, we expect the company's dividend growth rate to revert to the level of international oil companies, which is estimated to be 15.7%.

(2) Estimation of r_{t+j} .

The required rate of return is very complicated because we should make assumptions about how security prices are determined. Suppose we use the CAPM. According to CAPM, we should estimate:

$$E[r_{YPF}] = r_f + E[r_m - r_f] \beta_{YPF}$$

We obtain the following inputs: $\beta_{YPF} = .91$; $r_f = .085$; $E[r_m] = .18$. Therefore,

$$E[r_{YPF}] = .085 + (.18 - .085) \times .91 = .17145$$

(3) Estimation of S_{t+j} .

Given Argentinean history of price instability, there is an expectation that the stable exchange rate will not last beyond next year. For this reason, analysts believe the USD will appreciate at an average rate of 1% a year against the ARS for the next three years and at an average rate of 2%, afterwards.

Now, we are ready to value a YPF ADR (P).

First, we will determine the USD discounted value of all the cash flows from 1996 until the year 1,999 (year 4), P_{1-4} .

The effective USD rate of return from 1997 until 1999 is $[(1.091)^{.99} - 1] = .08009$.

$$P_{1-4} = .84/(1.17145) + .84(1.08009)/(1.17145)^2 + .84(1.08009)^2/(1.17145)^3 + .84(1.08009)^3/(1.17145)^4 = \text{USD } 3.5559.$$

Second, we will determine the discounted value of all the cash flows that start after the year 1,999 (year 5), P_{5+} .

The discounted dividends per share in year 4 will be:

$$\text{USD } .84[(1.091)^{.99}]^3/(1.17145)^4 = \text{USD } .56204.$$

The effective USD rate of return is $[(1.157)^{.98} - 1] = .13386$.

The USD present value of all futures cash flows after year 5 is given by

$$P_{5+} = \text{USD } .56204 \times (1.13386)/[(1.17145 - .13386)] = \text{USD } 16.9533$$

The present value of a YPF ADR is $P = P_{1-4} + P_{5+} = \text{USD } 3.56 + \text{USD } 16.95 = \text{USD } 19.50$.

Comparing this price to the December 1995 price of USD 20.53 indicates that the YPF ADR was slightly overvalued by the market, given our estimates of the variables in the DDM. ¶

The problem with the DDM is that companies have discretion over their dividend payments. Even after financing capital expenditures, they do not need to pay the rest of their cash flows in dividends. They can also use the money to repurchase shares, retire debt and make acquisitions. As a result, payout ratios vary considerably. The U.S., for example, has a much lower payout ratio than the U.K. This makes discounting dividends a complicated exercise.

3.B.2.i.2 Discounting Free Cash Flows

An alternative method is to use the DCF model to discount free cash flows. The usual formula for calculating free cash flow is:

$$\text{Free cash flows} = \text{EBITDA} - \text{Taxes} - \Delta\text{WC} - \text{CEx},$$

where EBITDA represents earnings before interest, taxes, depreciation and amortization, Taxes represents taxes after interest deductions, ΔWC represents change in net working capital, and CEx represents capital expenditures already planned. These free cash flows represent the cash flows available to the shareholders and creditors after all expenses, payments to government, and necessary maintenance investments have been made. Once the free cash flows are calculated for different years, the free cash flows are discounted using the weighted-average cost of capital:

$$k_{WACC} = k_e (E/V) + (1-t) k_d (D/V),$$

where k_{WACC} is the WACC, k_e is the cost of equity (usually, it's risk-adjusted), k_d is the before-tax cost of debt, t is the marginal tax rate, E is the market value of the company's equity, D is the market value of the company's debt, and V is the market value of the firm ($E+V$). The cost of equity, k_e , involves some assumptions, since it requires an asset pricing model such as the CAPM. On the other hand, the cost of debt, k_d , is easily calculated. It represents the current cost of debt for the firm, which can be obtained by placing a telephone call to the company's bank.

Example IX.18: The cost of capital for Merotex.

Merotex, an Italian construction company is planning to expand into the U.S. markets. They are currently negotiating the acquisition of two construction companies in Florida. Merotex plans to fund this foreign venture in the proportions 35% debt and 65% equity, which is the same debt/equity ratio of the whole company. Merotex uses the WACC to discount cash flows. The marginal tax rate is 30%. Merotex cost of debt in the USD debt market is 7.50%. To calculate the cost of equity, Merotex uses the CAPM. For this purpose, they collect the following information: the current risk-free USD rate is 7%, the average U.S. market return is 12.50%, and the estimated beta of the target acquisitions is .89.

$$k_d = \text{Cost of debt} = .0750$$

$$k_e = \text{Cost of equity} = r_f + \beta E[r_m - r_f] = .07 + .89 (.1250 - .07) = .11895$$

$$k_{WACC} = k_e (E/V) + (1-t) k_d (D/V) = .11895 \times .65 + (1 - .30) \times .0750 \times .35 = .0956925 (\approx 9.57\%).$$

Thus, Merotex should discount the cash flows associated with the two U.S. acquisitions using a 9.57% discount rate. ¶

3.B.2.i.3 Valuation by Multiples

Another popular use of the DCF model produces equilibrium price-earning (P/E) ratios. The P/E ratio is the most popular valuation ratio and it is widely in the valuation by multiples process. To derive equilibrium P/E ratios, we use a slightly different measure for free cash flows. We define free cash flows as earnings after interest, tax, and capital expenditures, but before depreciation and amortization –this information is calculated from ordinary after-tax earnings. To this measure of cash flows, we make two downward adjustments. The first cut is because the cost of replacing worn-out assets is higher than their original cost. The second is because companies invest also to expand. These two factors -about 10% in the first case and 25% in the second- reduce free cash flows to roughly two-thirds of earnings. Given these assumptions and assuming that in a steady state corporate earnings grow in line with trend economic growth, it is possible to calculate steady state (or equilibrium) fair price earning multiples for shares in different markets.

Example IX.19: Calculating the steady state P/E for the U.S.

Assume that real economic trend growth (g) is 2.5% a year. That is, corporate earnings (E), in the steady state, are growing at 2.5% a year. Assume that the real bond yield is 3% and the risk premium is 3%. Then the discount rate, r , is equal to 6%. Now, we are ready to discount free cash flows (CF), which we assume equal to two-thirds of earnings:

$$P = CF_1/(1+r) + CF_2/(1+r)^2 + CF_3/(1+r)^3 + CF_4/(1+r)^4 + CF_5/(1+r)^5 + \dots$$

$$P = 2/3 E(1+g)/(1+r) + 2/3 E(1+g)^2/(1+r)^2 + 2/3 E(1+g)^3/(1+r)^3 + 2/3 E(1+g)^4/(1+r)^4 + \dots$$

This formula simplifies to:

$$P = 2/3 E [(1+g)/(1+r)] / [1 -(1+g)/(1+r)].$$

Then,

$$P/E = 2/3 [1.025/1.06]/[1 - 1.025/1.06] = 2/3 (.96698)/(.0330189) = 19.52,$$

which is equal to the P/E for 1994 reported in Table IX.4. ¶

The global economy is not in a steady state. Growth rates change over time. Over the business cycle, profits take different proportions of the GNP. For example, when countries are in the advanced stages of the business cycle, wages rise at a faster pace. Therefore, P/E ratios have to be adjusted according to the current economic conditions of each country.

Example IX.20: Suppose the U.S. economy is in the advanced stages of the business cycle. On the other hand, suppose that Continental Europe is advance in the business cycle, but there is still room for improving the efficiency of firms through restructuring. Therefore, the steady state multiplier for the U.S. needs to be adjusted downward -say, by around 10%- , while the steady state P/E of Continental Europe needs to be adjusted upward -say, by 15%. ¶

◆ P/E Ratios Do Change

The P/E ratio for the U.S. S&P 500 index has varied mostly between 5 and 36 from 1872 to 2003, averaging only 14 for the entire period. The P/E ratio moved above 27 for the first time in mid-1998 and reached 36 in 1999.

Do High P/E ratios have implications for stock prices and earnings? Campbell and Shiller (1998) found that higher P/E ratios are usually followed by lower stock price growth during the following decade. Reinforcing these results, Campbell and Shiller also found that higher P/E ratios are usually *not* followed by faster earnings growth. ◆

Recall that investors do not care about returns denominated in foreign currencies. All cash flows (dividends and capital gains) should be multiplied by the exchange rate. Therefore, to make an international comparison of expected returns, analysts need to forecast currency movements, which, as we have studied already, are very difficult to forecast.

The presence of so many different factors explains why most international money managers value corporations relative to their domestic markets, before even trying to value them globally in relation to their direct product market competitors.

IV. Looking Ahead

We have studied the major differences among national stock markets. Stock markets tend to have different rules, legal frameworks, taxes, and cultural practices. These issues might affect the informational content of equity prices. In some markets obtaining reliable information is expensive and difficult. Investing in foreign equity also involves country risk. Given these problems and costs, does it pay to invest in foreign markets? This is the question that the next chapter will attempt to answer.

Related readings:

A nice description of different market structures and their implications is in **The Microstructure of Securities Markets**, by K.J. Cohen, S. Maier, R. Schwartz and D. Whitcomb.

In Chapter 13 of **A Random Walk down Wall Street**, by Burton Malkiel, there is a clear exposition of the passive and active approach.

For an overview of stock market automatization see "Automating the Price Discovery Process: Some International Comparisons and Regulatory Implications," by Ian Domowitz, in the Journal of Financial Services Research, 1992.

For an applied approach to Mutual Funds and their methods, read **How Mutual Funds Work**, by Albert J. Fredman and Russ Wiles (international funds are in Chapter 7).

For a broad overview of international accounting practices, see **International Accounting**, by F.D. Choi and G.G. Mueller.

Campbell, John Y., and Robert J. Shiller (1998). "Valuation Ratios and the Long-Run Stock Market Outlook," *Journal of Portfolio Management*, vol. 24, no. 2, pp. 11-26.

Exercises:

1. A Mexican investor buys 5,000 shares of RJR Nabisco on February 1, 1997 on the NYSE at USD 33. The exchange rate is 9.50 MXP/USD. Over the year, the investor receives a gross dividend of USD 1.50 per share; the net dividend per share received is equal to USD 1.275 because of a 15% withholding tax levied by the U.S. The exchange rate at the time of dividend payments is 8.90 MXP/USD. In November 1, the investor resells the shares at USD 36.25. The exchange rate has dropped suddenly to 8.52 MXP/USD. Ignoring commissions, what is the rate of return on the investment (in USD and in MXP), gross and net of taxes. Our investor is taxed at 40% on income and 15% on capital gains; the U.S. withholding tax can be used as a tax credit in Mexico.
2. Newly privatized Argentinean firms such as oil giant YPF have larger trading volume in New York, than in Buenos Aires, its home stock exchange. Propose an explanation for this empirical fact.
3. Suppose you have the following data (January 1980- July 1994) from MSCI: the 90 days Treasury Bill rate, ten country indexes, the World Index and the excess home currency return on an asset that is riskless in terms of the currency of each country. How would you test the mean-variance efficiency of the World Index?
4. A Jensen measure, with respect to the FT-World Index, for an international money manager is .354. The standard error of this estimate is .201. Is the managed portfolio outperforming the FT-World Index?
5. It is May 12, 1999. The DAX closed at 5173. Ms. Chambers manages a German portfolio valued at EUR 12 million. Ms. Chambers' portfolio has $\beta = .89$. She is concerned about a possible drop of the German stock market during the next two months. She does not want the value of her portfolio to drop below EUR 8 million. She decides to use DAX index put options to establish a floor. On May 12, 1999, the June put option with a strike price of 5,000 is trading at 81. (The DAX multiplier is DEM 10, but has to be divided by the conversion factor 1.9523 to get the correct EUR amount.) Ms. Chambers has estimated that $b = 3933$.
 - (1) Determine the number of options needed to establish a floor for Ms. Chambers' portfolio.
 - (2) Determine the cost of the insurance.
 - (3) For different scenarios for the DAX, show that the floor works.
6. You want to calculate the P/E ratio for the U.K. market. Assume that real economic, long term, trend growth (g) is 2.5% a year. Assume that the real bond yield is 3% and the risk premium is 3.5%. Calculate the steady state P/E ratio.
7. It is October 1998. The U.K. economy is very advanced in the business cycle. According to British expert, the earnings estimates for the FTSE-100 are in the range of 250-275. The FTSE-100 is trading around 5200. Adjust accordingly the steady state P/E ratio, calculated in Exercise 5, to determine if the U.K. market is overvalued.
8. Suppose you work for the investment consultant CFS following the ADRs of Telefonica del Peru (NYSE:TDP), the recently privatized telephone company of Peru. After decades of bad economic

policies, high inflation and state-owned industries, Peru is considered one of the world's most appealing emerging markets. It has a largely unregulated, growing economy. A stable monetary policy has put inflation under control.

It is January 6, 1997. TDP does not have a long history, its IPO was held on July 1, 1996. Its EPS in 1996 are projected to be USD 1.49, while the estimated EPS in 1997 are USD 1.89. The estimate for the annual dividend in 1996 is USD .936, for an estimated dividend yield of 4.7%. Many analysts believe that the short-term dividend growth rate will be 27%. You believe that this level will be maintained for another three years. After that, you expect the company's dividend growth rate to revert to the long-term growth forecast level, which you estimate to be 20%.

CFS estimates required rates of return using CAPM. You have the following inputs: $\beta_{TDP}=1.05$; $r_f = .16$; $E[r_m]=.20$.

Analysts believe the USD will appreciate at an average rate of 10% a year against the Peruvian nuevo sol (PEN) for the next three years. After that, analysts predict a 4% depreciation of the PEN against the USD for the foreseeable future.

On January 6, 1997, the closing price on NYSE for TDP was 19.75, while the exchange rate was 2.59 PEN/USD. What is your recommendation for TDP: a buy, a hold or a sell?