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DERIVATIVE MARKETS: ECONOMIC IMPLICATION FOR TAXATION*

CONTENTS

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INTRODUCTION

1. The present report presents the economic theories that explain the role of derivatives markets and their implications for taxation. Derivatives are financial agreements whose returns are linked to, or derived from, the performance of some underlying asset, such as bonds, currencies and commodities; derivatives include forward contracts, futures, swaps and options.

2. Derivatives markets are an integral part of the financial system. They play an increasingly important role in contemporary financial markets through three key economic functions. The first is risk management. Derivative securities provide a mechanism through which investors, corporations and countries can efficiently hedge themselves against financial risks. Hedging financial risks is similar to purchasing insurance; hedging provides insurance against the adverse effect of variables over which businesses or countries have no control. The second function is called price discovery. The ability of derivatives markets to provide information about market-clearing prices is an integral component of an efficient economic system. Futures and option exchanges widely distribute equilibrium prices that reflect demand and supply conditions. Knowledge of these prices is essential in order for investors, consumers and producers to make informed decisions. The third function is providing transactional efficiency. Derivatives lower the costs of transacting in financial markets. As a result, investments become more productive and lead to a higher rate of economic growth. Therefore, derivatives bring important social benefits and contribute positively to economic development.

3. These benefits explain the enormous growth in derivatives markets, which at the latest count, amount to more than $35 trillion, not far behind the total value of securities in the world, $48 trillion. Most of this growth has occurred in the last 10 years. In addition, the recent growth in international capital flows to emerging markets suggests that derivatives markets are likely to play an important supporting role in developing economies.

4. Because these financial instruments have developed rapidly prevailing tax rules are ill-equipped to cope with the tax problems presented by derivatives. Tax legislation now lags behind the rapid developments of commercial uses of derivatives. This has led to uncertainties in domestic and international tax treatment, which is unsatisfactory for both taxpayers and tax administrators.

5. In this context, the role of legislators and regulators is to provide a supervisory tax environment that will support a controlled growth in derivatives. In particular, this report shows that derivatives accelerate the need to harmonize tax regulations.

6. This report emphasizes the economic functions of derivatives and their implications for taxation. Many other issues arise when evaluating derivatives markets, but are outside the scope of this study. A companion report will separately analyse legal and tax issues raised by derivatives markets.

7. The report is structured as follows. Section I provides an overview of global capital markets. We describe the evolution of world stock markets and

recent trends in international capital movements. These trends strongly suggest that the financial markets of developing countries are poised for long-term growth, and that derivatives markets will be essential to support this growth.

8. Section II provides an introduction to derivatives and reviews the evolution of derivative securities markets. We also briefly explain the mechanics of fundamental derivative securities. Demonstrating the economic equivalence between positions in derivatives and those in underlying cash securities is essential for taxation purposes.

9. Section III provides a comprehensive analysis of the economic role of derivatives markets. Derivatives lead to better allocation of capital within a country and to an increased accumulation of capital, which is essential to economic growth. We describe the usefulness of financial risk management systems and explain why businesses hedge financial risk. We also show how derivatives markets provide highly visible prices that can serve as benchmarks of value.

10. Section IV turns to the subject of the taxation of derivative securities. Tax neutrality implies that transactions with similar economic purposes should be taxed equally. Taxation should not penalize the use of derivatives relative to underlying cash markets. This section explores the implications of using derivatives to hedge commercial positions and to implement synthetic investment. Withholding taxes are also addressed. Another issue is whether derivatives can be viewed as potential sources of taxation revenues.

11. Finally, section V summarizes the main results and provides some concluding comments.

I. THE GLOBALIZATION OF CAPITAL MARKETS

A. Trends in recent capital flows

12. Since the 1980s, international capital markets have undergone unprecedented changes. The increased liberalization of financial markets has led to a sharp growth in the flows of cross-border investments. From the investors' viewpoint, this growth has been spurred by the search for higher returns and diversified investments. From the recipients' viewpoint, the growth has been spurred by the pressing need for capital, which is now viewed as an essential tool for long-term economic growth.

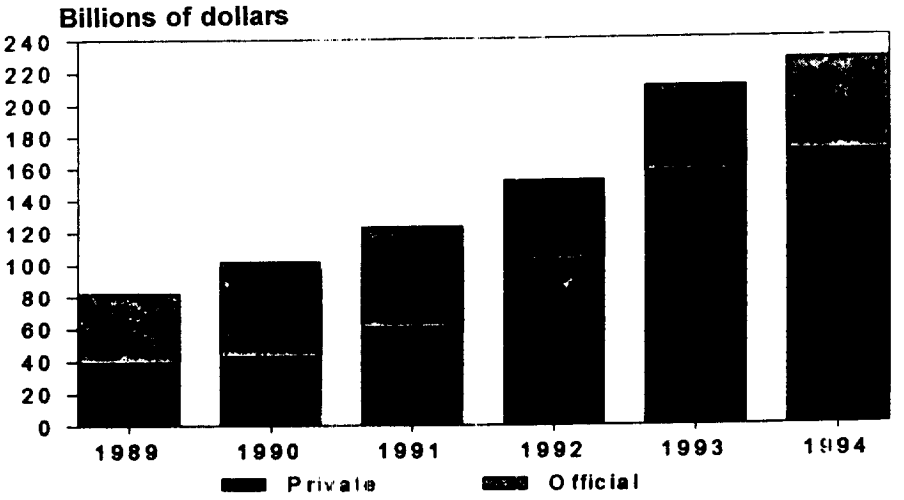
13. Let us first examine the viewpoint of investors. In recent years, there has been a marked change in the perception of mutual funds and pension funds investors, who have become convinced of the benefits accruing from foreign investing. A number of studies have shown that investing in foreign stocks is beneficial because it helps to reduce portfolio risk. These diversification benefits can be traced to the fact that national stock markets often follow different cycles - in other words, the correlations across national markets are much lower than typical correlations within markets. These arguments have been forcefully conveyed to United States of America pension funds, for instance, which have now invested $300 billion of their assets in foreign securities.

This represents 8 per cent of their total assets of $4,000 billion, up from 4.5 per cent at the end of 1992. It has been reported that most United States pension funds have a target of 15-20 per cent for international investments. This implies a further capital flow of $300 billion for United States pension funds only. Extrapolating this trend to all global investors implies capital flows of hundreds of billions of dollars.

14. From the current viewpoint of developing countries, these prospective capital flows are essential to their economic development. During the 1990s, more than 50 developing countries have created capital markets. During this period, 3 billion people have abandoned communism or command-based economies. Across the globe, eastern Europe, Asia, Latin America and much of Africa need capital to start or expand their market economies. There is also an increased realization that countries are now competing for a limited pool of global capital. China alone, for example, estimates that it will need to raise $1,000 billion in capital to satisfy its planned demand for energy over the next 20 years. Paradoxically, developed economies such as the United States and those of Europe also badly need capital to finance their public sector deficits.

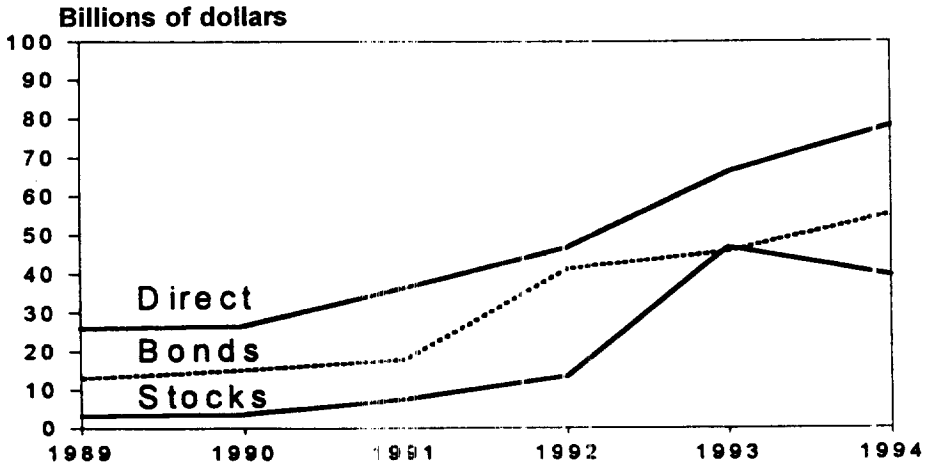
15. These trends are reflected in the changing composition of capital flows into emerging markets. Figure I breaks down these flows into private and official flows. Official flows represent official assistance programmes; private flows represent bank loans, direct investment and portfolio flows. Over the past five years, the growth of capital flows into emerging stock markets has been truly remarkable. Capital inflows have increased from $80 billion to more than $200 billion in 1994. The remarkable aspect of this growth is that it has been exclusively driven by private capital flows.

Figure I. Capital flows into emerging markets



16. The structure of private capital flows is presented in figure II. As of the end of 1994, direct investment (where the owner maintains some control over the corporation, typically defined as more than 10 per cent ownership) accounted for $80 billion. Debt inflows amounted to $55 billion. The fastest growth occurred in equity investments, which amounted to $40 billion last year.

Figure II. Private capital flows into emerging markets



17. In the near future, these flows are likely to slow down following the loss of investors' confidence due to the Mexican economic crisis. However, unless the Mexican crisis extends to many other countries, this slow-down is likely to be only temporary. Institutional investors are still targeting higher allocations to emerging markets, and developing countries still need capital.

B. Trends in global capital markets

18. Tables 1 and 2 present a summary of stock markets in developed and emerging economies. As of the end of 1994, the total capitalization of equities in developed economies was about $12,800 billion. In emerging economies, the total value of equity markets was only $970 billion.

19. The tables also compare the extent of development of the stock market in relation to the economy as measured by the gross domestic product (GDP). These numbers are aggregated in table 3, which compares stock market capitalization and GDP across broad geographical regions. For the United States, the ratio of stock market size to GDP is 77 per cent. This figure is higher is Japan, at 89 per cent, and lower in Europe, at 46 per cent. Nevertheless, the table shows that the relative size of stock markets is much lower for emerging countries, at only 29 per cent of GDP, and it is bound to increase in the future.

Table 1. Global stock markets, developed markets: market value, GDP and derivatives

	Stock market capitalization	Annual GDP	Introduction of stock index futures
	Billions of dollars		
Austria	26.9	181	August 1992
Belgium	80.9	211	September 1993
Denmark	50.8	134	December 1989
Finland	26.7	84	May 1988
France	441.8	1 253	August 1988
Germany	473.2	1 713	November 1990
Ireland	12.5	22	January 1990
Italy	158.6	1 008	December 1994
Netherlands	210.8	314	May 1987
Norway	34.1	98	September 1992
Spain	105.1	478	January 1992
Sweden	122.8	186	April 1987
Switzerland	254.9	234	November 1990
United Kingdom	1 147.1	941	May 1984
Australia	208.2	284	February 1983
Hong Kong	245.2	105	May 1986
Japan	3 747.9	4 216	September 1988
New Zealand	17.3	44	September 1991
Singapore/Malaysia	269.9	50	March 1993
Canada	303.3	588	May 1987
United States	4 900.0	6 378	April 1982
Memorandum items:			
Europe	3 145.6	6 859	
Pacific	4 488.6	4 699	
North America	5 203.3	6 966	
Total	12 837.6	18 523	

Source: Morgan Stanley Capital International for market values (December 1994), International Monetary Fund for GDP (1993) and Futures Magazine for date of introduction of stock index futures.

Table 2. Global stock markets, emerging markets: market value, GDP and derivatives

	Stock market capitalization	Annual GDP	Introduction of stock index futures
	Billions of dollars		
Taiwan, Province of China	160.2	a/	
Republic of Korea	125.1	331	
Thailand	79.7	111	1995
India	65.4	263	
Philippines	30.2	54	
Indonesia	22.2	145	
China	19.3	545	
Pakistan	7.7	48	
Sri Lanka	1.7	10	
Brazil	111.5	468	February 1986
Mexico	83.1	376	
Chile	44.9	44	April 1991
Argentina	18.7	256	
Colombia	11.4	46	
Peru	5.3	41	
Venezuela	3.3	59	
South Africa	137.9	117	1987
Nigeria	2.0	37	
Zimbabwe	1.3	6	
Turkey	15.2	126	
Portugal	11.2	79	
Greece	8.0	73	
Jordan	2.8	6	
Poland	1.5	86	
Hungary	0.7	36	1995
Memorandums items:			
Far East Asia	511.5	1 507	
Latin America	278.2	1 291	
Africa	141.2	160	
Europe/Middle East	39.4	406	
Emerging markets	970.3	3 364	

Source: International Finance Corporation for market values (December 1994), International Monetary Fund for GDP (1993) and Futures Magazine for date of introduction of stock index futures.

a/ Not available.

Table 3. Global Stock markets and GDP

	Stock market capitalization	Annual GDP	Ratio: stock/GDP
	Billions of dollars		(percentage)
Europe	3 146	6 859	45.9
Pacific (excluding Japan)	741	483	153.4
Japan	3 748	4 216	88.9
Canada	303	588	51.6
United States	4 900	6 378	76.8
Emerging	970	3 364	28.8
World	13 808	21 887	63.1

Source: Author's calculations

20. Along with this growth of primary capital markets, equities, bonds and loans, derivatives have enjoyed immense success in the last 10 years. Table 1 shows that, without exception, all stock markets in developed countries have an associated derivatives market in stock index futures. Outside the United States and the United Kingdom of Great Britain and Northern Ireland, most of these markets have been created in the last five years. Table 2 also shows that these instruments are severely lacking in emerging markets.

21. Investors, used to efficient derivatives markets in developed countries, will surely require derivatives in emerging markets to better manage financial risks. As an example of the integral role that derivative securities now play in world markets, some large international investment firms will invest in only those government bonds on which futures contracts are available. They rely on the futures markets to help assure accurate pricing and as a risk management tool. Therefore, it can be expected that derivatives will experience an explosive growth in emerging markets. We now turn to a more formal analysis of derivatives markets.

II. THE DERIVATIVES MARKETS

22. Derivatives instruments have enjoyed enormous success because they allow users to disaggregate financial risks, to bear those they can manage and transfer those they are unwilling to bear. Derivatives are particularly effective risk management instruments. For taxation purpose it is essential to review the economic function of basic derivatives instruments.

A. Definition of derivatives

23. Derivatives are defined as contracts whose value "derives" from some underlying asset, such as stocks, bonds, currencies or commodities. In their purest form, derivatives include forward contracts, futures, swaps and options. These are private contracts. In contrast with a stock, issued by a company and purchased by an investor, a derivative contract is created out of thin air, and is just a private agreement between a buyer and a seller that specifies how the value of the contract evolves over time. Thus, it is a zero-sum game. Every dollar, or billion dollars, lost by one party is gained by the other.

24. Because the term "derivatives" is so general, it is very important to distinguish between different sectors of the market. Derivatives can be traded either on organized exchanges with a physical location where all trades occur, or over a decentralized network of financial institutions called the over-the-counter (OTC) market.

25. In addition, some securities such as collateralized mortgage obligations (CMOs) and "structured notes" are sometimes defined as derivatives. The mortgage market is very large, reaching $3 trillion in the United States, and is fast expanding in other countries as a means to securitize home-owner loans. Although the pay-offs on these securities is linked to some underlying variable, the primary function of the securities is to raise capital, unlike derivatives whose primary function is risk management. Therefore, such securities are not covered in this report.

26. In the United States, a wide variety of contracts are traded on organized exchanges. For instance, wheat futures are traded on the Chicago Board of Trade (CBOT), currency contracts are traded on the Chicago Mercantile Exchange (CME) and stock options are traded on the Chicago Board Options Exchange (CBOE). These are all accessible to individual investors through any broker. The OTC market includes all major commercial and investment banks, and is accessible only to large corporations or investors.

B. Basic derivatives instruments

27. There is a whole array of instruments called derivatives, but the majority constitute variations on three basic instruments: forwards/futures, swaps and options. For tax purposes, it is essential to analyse the economic relationship between the positions in these derivatives and those in the underlying assets.

1. Forwards/futures

(a) Foward contracts

28. Forward contracts are private agreements to exchange a given asset at a fixed point in the future. The terms of the contract are the quantity, date and price at which the exchange will be carried out. This price, called the forward rate, can be computed in relation to the spot rate, which is the cash price of the asset for immediate delivery. Forward contracts are traded on OTC markets

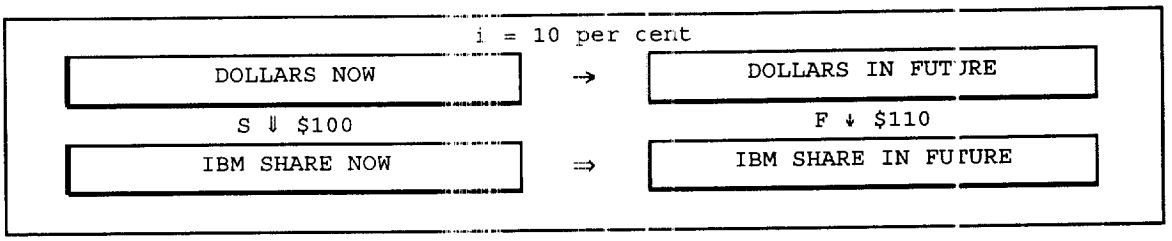
and generally held until expiration. Box 1 shows how forward contracts are constructed and priced.

Box 1. Pricing forward contracts

To understand the economic implication of a forward contract, consider an agreement to buy one share (S) of International Business Machines Corporation (IBM) in one year. Assume the current price of IBM is $100, and the annual interest rate (i) is 10 per cent. Assume also that IBM pays no dividends. An investor has two alternatives, which are economically equivalent: (a) buy one share of IBM (convert $100 into one share) and hold for one year or (b) enter a forward contract to buy IBM in one year. The forward rate is set so that the initial value of the contract is zero. Since the contract costs nothing, the whole amount of $100 can be invested to earn $10 interest.

After one year, the two alternatives lead to a position in one share of IBM. Therefore, their initial cost must be identical. This implies that the forward price (F) for IBM must be $110.

A "synthetic" purchase of an asset



Such a transaction, however, has far-reaching consequences for taxes. It converts capital gains into income, and unrealized gains into realized gains.

Assume first that the IBM share is sold at the end of the year for $115. Then path (a) will generate a $15 capital gain on IBM, but path (b) creates two operations: a loan with $10 in interest, and a gain on the forward purchase of $115-$110, or $5. From an economic viewpoint, that is, without taxes, it is not important how the $15 total gain is generated. However, the tax system may tax the interest and capital gain at a different rate, thus creating distortions in the economic equivalence. Further, if IBM is not sold at the end of the year, the interest earnings under path (b) would still be taxed as ordinary income, whereas no tax would be due under path (a).

(b) Futures contracts

29. Futures contracts are akin to forward contracts, but are standardized and negotiable. In contrast to forwards, which are tailored to customers' needs, futures have a limited choice of expiration dates and trade in fixed contract sizes. In addition, futures offer standardization of counterparty risk, owing to the fact that an independent clearing-house acts as an intermediary in all trades. This standardization ensures an active liquid market for futures

contracts. Liquidity refers to the ability to trade easily a security. As a result, few futures contracts are held until expiration. For instance, an investor who purchased a futures contract can go back to the exchange before expiration and sell the same contract, thus offsetting the initial position. Futures contracts are traded exclusively on organized exchanges.

2. Swaps

30. Swaps are agreements between two companies to exchange cash flows in the future according to a prearranged formula. Swaps can involve interest rate swaps, where fixed rate debt is exchanged for floating rate debt, or currency swaps, where one currency is exchanged against another.

31. Payments for interest rate swaps involve the exchange of interest at regular intervals. Since the notional amount is generally the same for the two sides of the swap, there is no need to exchange principal. Moreover, interest payments are generally netted against each other. For instance, in a $100 million fixed-for-floating swap, a firm would agree to receive a fixed rate of 10 per cent against a floating payment indexed to the London interbank offered rate (LIBOR). If LIBOR was currently 8 per cent, the firm would receive $10 million, and pay $8 million, for a net payment of $2 million only. Swaps may also involve lump-sum payments to compensate for an imbalance in the value of interest flows being exchanged.

32. These netting arrangements decrease the possible losses in case of default, and are now spreading to currency swaps. In the example in box 2, the Bank receives 500 million yen and pays $9 million. The net payment, at the current rate of 100 yen/dollar, would be $4 million. This netting arrangement effectively blurs the distinction between interest payments in different currencies.

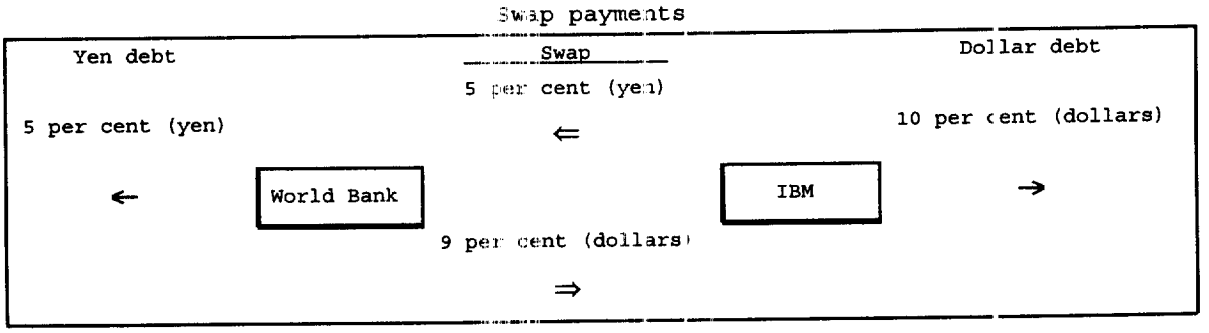
33. Because swaps involve a series of future payments, they can be regarded and valued as portfolios of forward contracts. Thus they create taxation problems similar to those encountered for forward contracts.

Box 2. A currency swap

Consider two institutions that wish to borrow in different currencies. IBM, for instance, wishes to raise 10,000 million yen ($100 million at the rate of 100 yen/dollar) over 10 years; the World Bank wishes to raise $100 million over the same period in United States dollars. Respective capital costs (percentages) are given below.

	Yen	Dollar
World Bank	5.0	9.5
IBM	6.5	10.0

Note that the World Bank has access to cheaper capital in the two markets: it has an "absolute" advantage, using the parlance of international trade. However, perhaps because the World Bank has easier access to the yen market, the World Bank has a "comparative" advantage in issuing yen-denominated debt. Relative to IBM, its funding costs are 1.5 per cent cheaper in yen, and only 0.5 per cent cheaper in dollars. This provides the basis for a swap that will be to the mutual advantage of both parties. If both institutions issue funds in their final desired currency, the total cost will be 9.5 per cent (World Bank) + 6.5 per cent (IBM) = 16.0 per cent. In contrast, the total cost of raising capital where each has a comparative advantage is 5.0 per cent (World Bank) + 10.0 per cent (IBM) = 15.0 per cent. The gain to both parties from entering a swap is 16.0 per cent - 15.0 per cent = 1.0 per cent. For instance, the swap described below would split the benefit equally between the two parties.



The Bank issues yen debt at 5.0 per cent, then enters a 10-year swap whereby it promises to pay 9.0 per cent in dollars in exchange for receiving 5.0 per cent interest payments in yen. Its effective funding cost in dollars is therefore 9.0 per cent, which is less than the 9.5 per cent it would have paid in dollars. This example illustrates how institutions use swaps to lower funding costs. Since 1981, the World Bank estimates that swaps have saved $845 million in borrowing costs.

3. Options

34. Options are instruments that give their holder the right to buy or sell an asset at a specified price on or before a specified expiration date. Options to buy are call options; options to sell are put options. Because options confer a right, but not an obligation, the buyer of the option will exercise the option only if it creates a profit at expiration.

35. Since the value of an option at expiration cannot be negative, buying an option must entail an upfront payment, much like an insurance "premium". In contrast, the seller of an option receives the premium, and faces the possibility of having to make a payment in the future. Options are traded both on exchanges or OTC markets and involve either cash instruments or futures as underlying assets. Options on interest rates are called caps or floors, and their combinations, collars.

36. Options are fundamental instruments - the "quarks" of finance - which can serve as building blocks for nearly any financial contract. Options are also very important because they appear, or hide, in many common assets such as mortgages, common stocks and convertible debt.

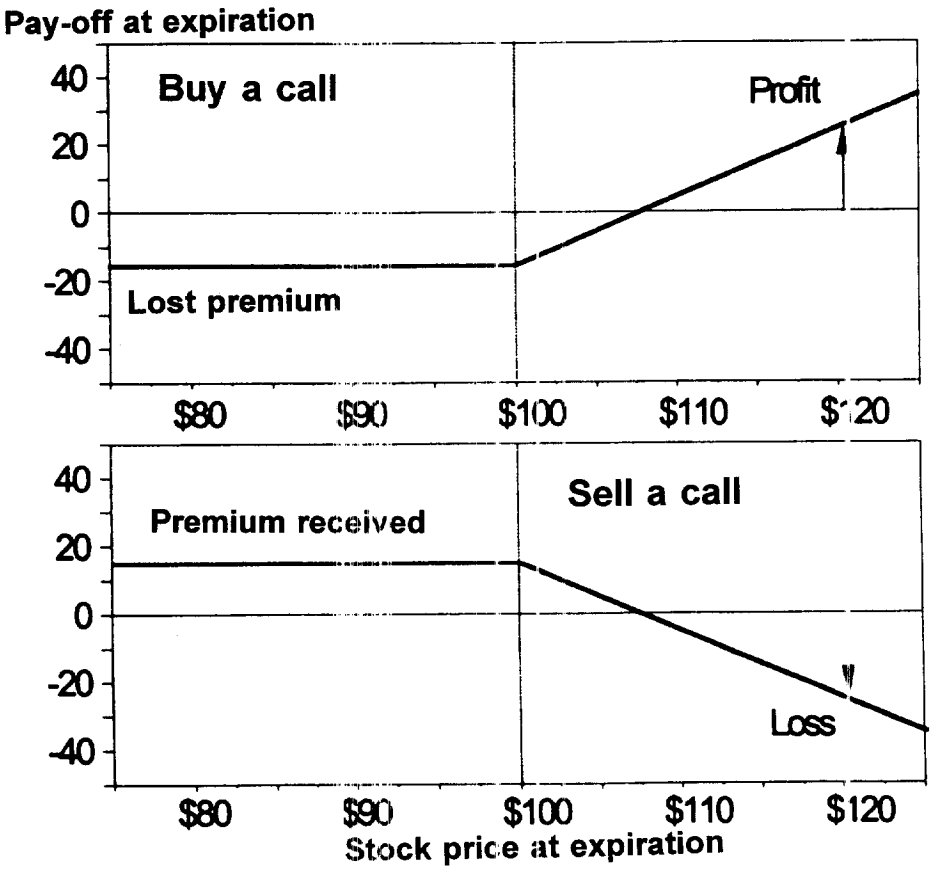
37. To see how an option works, take an option on a share of IBM which trades at $100, with a delivery price of $100 in one year. If IBM stays below $100, the holder of the call will not exercise, since the option is not profitable. In contrast, if IBM goes to $120, the holder will exercise the right to buy at $100. He will pay $100 and acquire the stock now worth $120, for an unrealized profit of $20.

38. More generally, instead of actually buying the asset, it is sufficient to define a pay-off at expiration. For instance, the contract can specify that it will pay $20 if IBM trades at $120, and so on. The latter method is called cash settlement, and is much easier to implement for some assets. Imagine for example an option on a basket of a hundred stocks, such as the Standard and Poor's (S&P) 100 option traded on CBOE. It would be difficult to take delivery of all these stocks. Instead, cash settlement simply realizes the profit from the exercise without there having to be physical ownership of the underlying asset. From a tax viewpoint, however, cash settlement creates a realized profit.

39. Figure III displays the pay-off at expiration from a call option on IBM stock. The horizontal axis represents the future value of the stock price; the vertical axis plots the dollar pay-off at expiration. The top panel shows the pay-off from buying a call option, and the bottom panel shows the pay-off from selling a call option. Let us say that the market determines that the option premium is $15. This is a "sunk" cost, that is, payable whatever happens later.

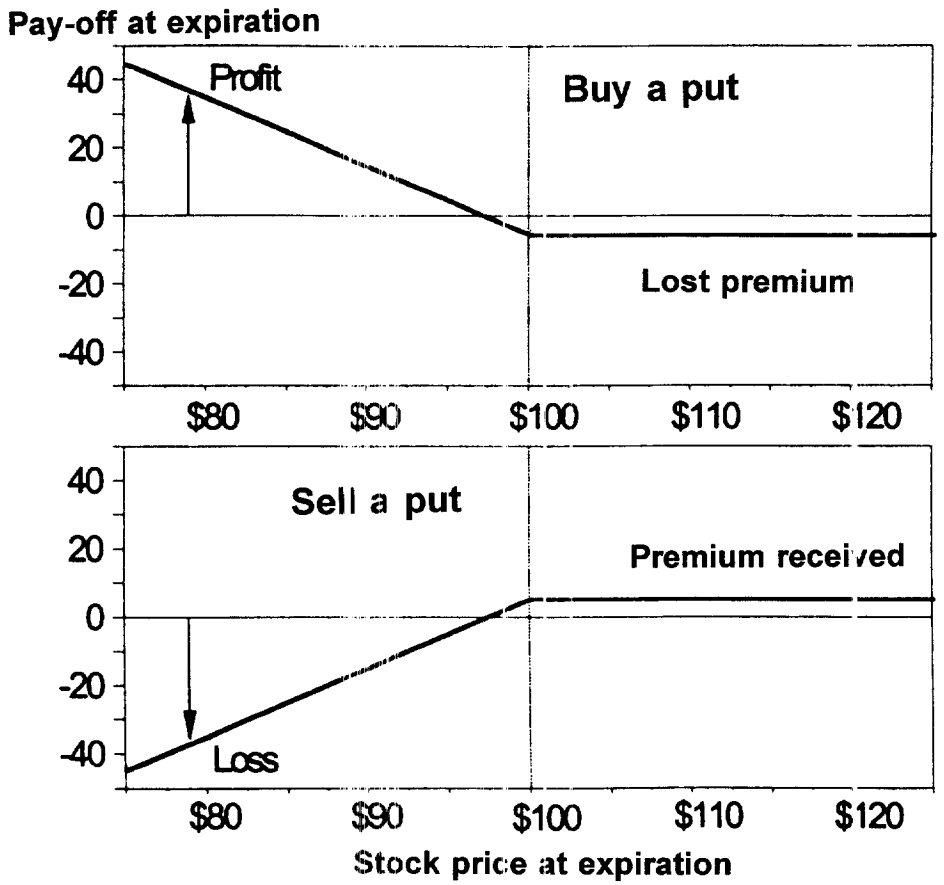
40. If prices stay lower than $100, the option will not be exercised, and its cost is the (future) value of $15. Only if prices were to go above $100 would the buyer exercise. Also note that the sum of pay-offs from buying the call and selling the call is zero, since options are private contracts. The summation of the two panels is identically zero.

Figure III. A call option



41. Next, figure IV displays the pay-off at expiration from a put option on the stock of IBM. Here, the option will be exercised if the stock price moves below $100. Thus large profits or losses occur on the down side.

Figure IV. A put option



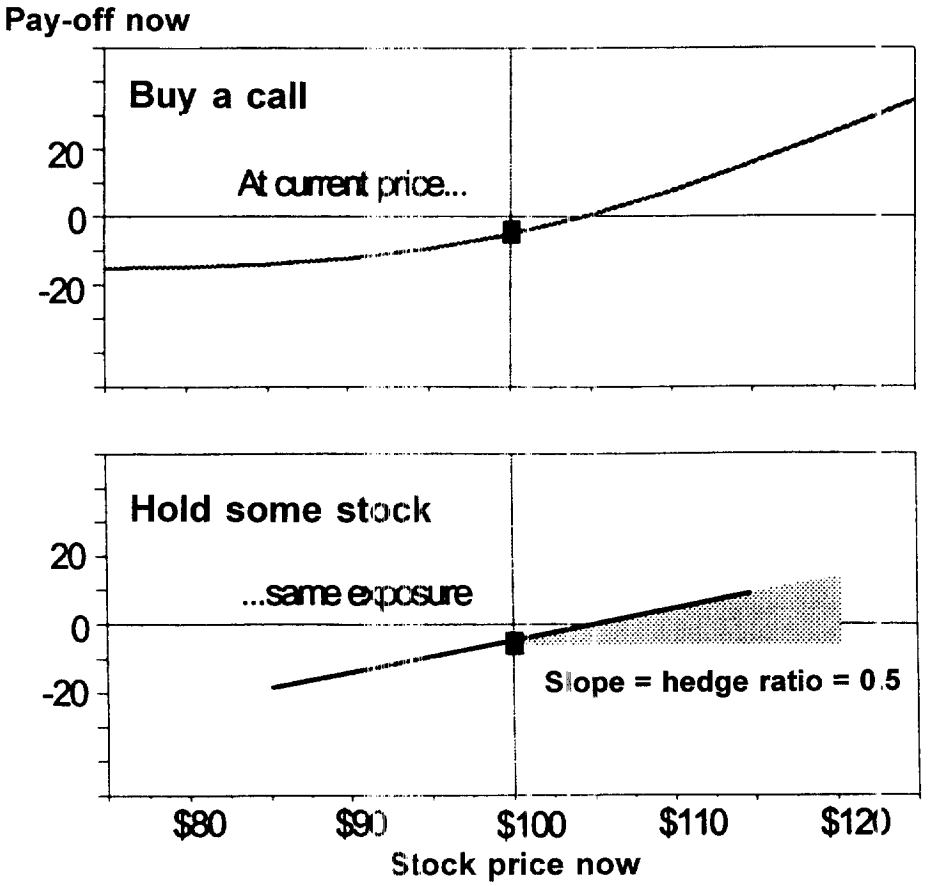
42. The graphs are instructive for a number of reasons. First, they show that positions in forward contracts or in underlying cash markets can be replicated by combinations of positions in options. For instance, buying a call and selling a put with the same strike prices and expiration are equivalent to a position in the underlying asset. This is because the combination provides the same potential for profit on the upside and for loss on the downside as holding the asset. However, even though the positions are economically equivalent, the problem is that they may be taxed differently, therefore creating opportunities for tax arbitrage.

43. The graphs also show that selling options is similar to selling insurance. The seller collects the premium, which can be profitable until a large movement occurs. Thus option values are greatly affected by the extent to which prices oscillate around their average value, that is, their volatility. Options are therefore bets on volatility.

44. When evaluating options, the issue is whether the premium is fairly priced. A major breakthrough in finance theory occurred when Professors Black and Scholes discovered a valuation formula that allowed traders to price options easily and accurately. In addition, their analysis revealed how options could be replicated by a policy of dynamic trading in the underlying asset.

45. They showed that holding a call option is equivalent to holding a fraction of the underlying asset, where the fraction dynamically changes over time. This is illustrated in figure V, which displays the current value of a call as a function of the current price. Before expiration, the value of the call is a smooth increasing function of the current stock price, and will converge to the broken lines in figure III at expiration of the contract.

Figure V. Dynamic replication of a call option



46. By dynamic hedging, the purchase of the call can be replicated by a partial position in the underlying asset. The size of the position increases when the stock price increases. It decreases as the stock price falls, as in a graduated stop-loss order. The fraction to hold is also called the hedge ratio, or "delta" (Δ), of the option. This dynamic equivalence, however, is only valid if the model and assumptions used to create the hedge ratio are correct.

47. To summarize, derivatives can generally be replicated by taking positions, either static or dynamic, in underlying cash markets. Table 4 summarizes the economic equivalence between derivatives contracts on foreign currencies and cash markets. Note that the static equivalences are perfect, except for tax consideration.

Table 4. Economic equivalence: currency derivatives

Derivative		Position in foreign currency (FC)		Position in domestic currency (DC)
Buy forward contract	=	Buy spot contract	+	
		Invest FC	+	Borrow DC
Buy currency swap	=	Buy spot contract	+	
		Invest FC bond	+	Borrow DC bond
Buy currency option	=	Buy FC in amount Δ (dynamically changing)	+	Borrow DC
Buy call, sell put	=	Buy FC	+	Borrow DC

C. Growth of derivatives markets

48. Financial innovations have been occurring for several thousand years in parallel with economic development. The earliest type of financial agreement that we know of is a loan from one person to another; without loans, separating the production decision from the consumption decision is possible only through storing goods. A loan allows more efficient use of resources, and makes both parties share the risk of crop failure. Without this arrangement, the farmer might be reluctant to commit all of his capital to farming. This financial contract thus provides a risk-sharing arrangement, which is beneficial to all involved parties. In market-based economies, financial innovations such as derivatives can be viewed as mechanisms to allocate capital efficiently and share risks.

49. The earliest options were listed on the Amsterdam Stock Exchange, opened in 1611, which was the first true market for financial securities. A major step in the evolution of derivatives markets was the opening of commodity futures exchanges in Chicago and New York during the nineteenth century. By the 1840s, Chicago had become a commercial centre for mid-western farm States. To facilitate trading in agricultural products, CBOT was established in 1848. Commodity exchanges greatly lowered the costs of aggregating, transporting, storing and processing commodities. Initially, the main purpose of CBOT was to

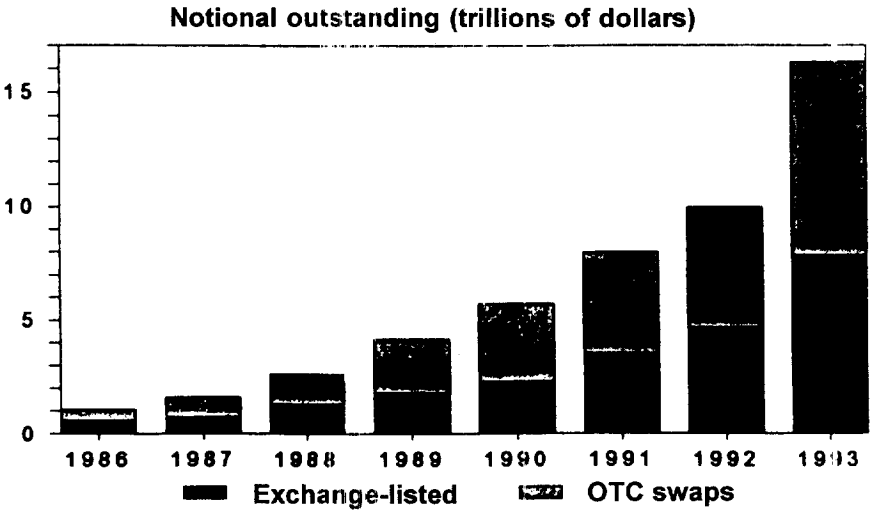
establish quality and quantity standards for grain contracts, but this soon turned to creating contracts for delivery in the future.

50. CBOT established general rules that formed the foundation of trading practices, which are still largely followed nowadays. For example, traders were able to offset contracts. This meant that traders did not have the obligation to deliver the grain; they could eliminate this obligation by simply selling contracts they had previously bought. A further major development occurred in 1981, when cash settlement was allowed in the United States. Cash delivery implies that if a futures contract is held to maturity, the trader who purchased it will simply receive the difference between the spot and futures prices, paid in cash, instead of the underlying asset.

51. The 1970s witnessed further fundamental developments in derivatives markets. CME and CBOT launched futures on financial instruments at a time of increased volatility in exchange rates and interest rates. Stock options were also introduced for the first time by CBOE. Merton Miller, a recipient of the Nobel prize in economics, has called financial futures the "most significant financial innovation of the last twenty years'.

52. These financial futures and options were the impetus for the explosive growth in derivatives. Futures and option exchanges are now sprouting all over the world. Figure VI displays the growth of derivatives markets from 1986 to 1993, the last year for which full data were available for OTC derivatives. The graph shows the dollar value of outstanding (existing) positions in exchange-traded derivatives and OTC swaps. From 1986 to 1993, the market grew from $1 trillion to more than $15 trillion. Most of the recent growth in futures volume has occurred outside the United States.

Figure VI. Growth of derivatives



53. The activity of these markets can also be expressed in terms of daily trading volume. About 450 million contracts are traded daily on organized exchanges. To give an idea of the amounts involved, the dollar value of the transaction volume on most stock index futures is now greater than the total volume in underlying stocks. In the OTC market, the daily trading volume is now more than $15 billion. 1/

54. Table 5 presents the latest estimates of the size of the total derivatives markets. The table is more complete than the previous graph, because it also includes OTC forwards and options. As of June 1994, derivatives markets amounted to about $35 trillion. In comparison, the total value of the stock, bond and cash markets was about $48 trillion. Thus derivatives are now about as important as the primary securities markets.

Table 5. Size of the global derivatives market
(Billions of dollars)

Exchange-traded derivatives	
Futures	
Interest-rate futures	6 440
Stock-index futures	150
Currency futures	28
Options	
Interest-rate options	3 190
Stock-index options	190
Currency options	250
Individual stock options	50
Total exchange-traded	10 698
Over-the-counter derivatives	
Forwards	
Currency forwards	9 000
Interest-rate forwards	3 500
Options	
Interest-rate options	2 000
Currency options	800
Swaps	
Interest-rate swaps	8 000
Currency swaps	1 100
Total OTC	24 400
Total derivatives	35 098
Conventional securities	
Bonds	18 600
Cash	15 500
Stocks	13 700
Total securities	47 800

Source: Author's calculations and Wall Street Journal, 25 August 1994. Data as of June 1994, except for OTC derivatives, which are recorded as of December 1993.

55. The growth of derivatives markets can be explained by two views. One is that innovation is a response to changes in the tax code and regulation. Another view is that it makes markets more complete by increasing the opportunities for risk-sharing among investors. A study of recent innovations (Finnerty, 1988) categorized risk reallocation as a primary factor responsible for the financial innovation in a majority of cases. As can be seen from table 6, tax and regulatory reasons were a primary factor in a minority of cases.

Table 6. Factors behind introduction of derivatives

Instrument	Risk reallocation	Increased volatility	Technological innovation	Regulatory
Stock options	x		x	
Interest-rate futures	x	x	x	
Interest-rate swaps	x	x		x
Interest-rate options	x	x		
Currency futures	x		x	
Currency swaps	x	x		x
Options on futures	x	x	x	
Stock-index futures	x	x	x	

56. According to the risk-sharing viewpoint, three factors can be viewed as responsible for the growth of the derivatives market:

(a) Increased volatility in the world economy. In the 1970s and 1980s, financial asset prices became quite volatile. This was due to various factors, such as the breakdown of the fixed exchange rate system, the oil shocks, excess government spending and inflationary policies These fundamental imbalances created a need for derivative products, which then took a permanent place in the panoply of financial instruments;

(b) Technological innovation. Technological changes have arisen from advances on two fronts: physical equipment and academic work in finance theory. On the one hand, the advent of cheaper communications and computing power has led to financial innovations, such as global 24-hour trading and on-line risk management systems. On the other hand, breakthroughs in modern finance theory have allowed institutions to create new instruments and better understand the dynamic management of financial risks. Such an instrument, for instance, is the celebrated Black-Scholes model (Black and Scholes, 1973), which is used to price and hedge options;

(c) Political developments. In the 1960s, Governments were viewed as the principal vehicle for economic growth. Widespread dissatisfaction with these

policies led to major political changes in the 1970s. Those changes created a worldwide movement towards market-oriented policies and deregulation of financial markets.

III. THE ECONOMIC ROLE OF DERIVATIVES

57. The present section discusses the economic benefits of derivatives markets. We will show that derivatives markets, as part of an efficient capital market, help to stimulate economic growth and should be strongly encouraged. 2/

A. Derivatives markets and economic growth

58. As part of well-functioning capital markets, derivatives markets help to promote economic growth. Efficient capital markets ensure that resources are efficiently allocated to their most productive uses. In turn, productivity improvements are primary factors in long-term economic growth. Indeed, the empirical evidence points to a positive relationship between growth and indicators of financial development. 3/

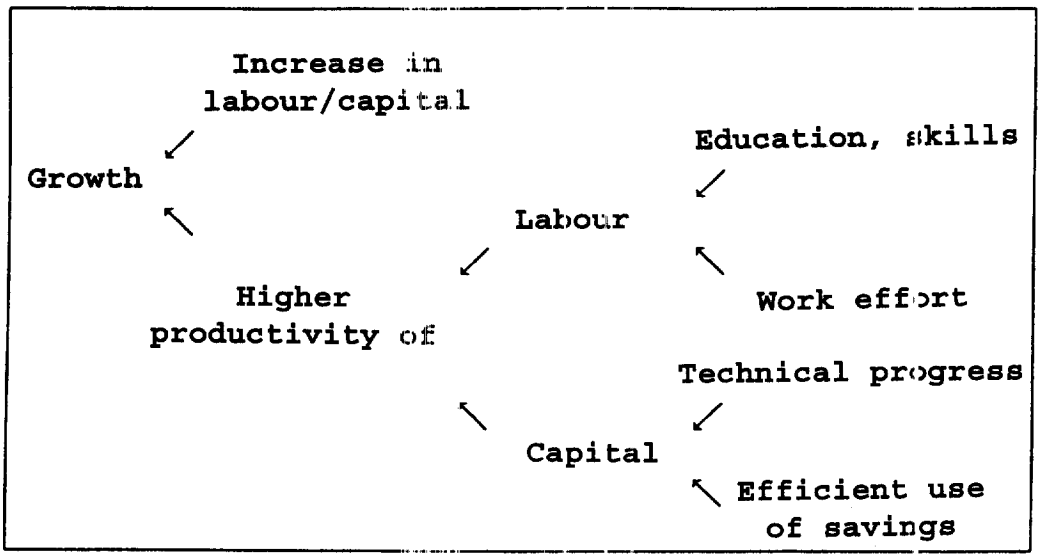
1. Finance and economic growth

59. Consider the case of Hong Kong, Japan, the Republic of Korea and Singapore. Over the last decades, these countries' growth rates in per capita income have been among the world's highest, yet they have poor land and mineral resources. The biggest difference between rich and poor countries is the efficiency with which they have used their resources. The financial system's contribution to growth precisely lies in its ability to increase efficiency.

60. Figure VII describes the factors driving economic growth. About half a country's output growth can be traced to increases in the stock of labour and capital. The other half is explained by higher productivity. More productive labour is due to better education, skills and work effort. More productive capital is due to technological development and more efficient use of capital. This is why finance is a key aspect of economic growth.

61. In a recent study, King and Levine (1993a, 1993b) analysed the effect of financial markets, using measures of intermediation (the size of commercial bank credit relative to central bank credit) and asset distribution (the relative size of credit going to private enterprises as opposed to the public sector). They found that high levels of financial development were strongly related to the growth rate of physical capital, and to efficiency. Furthermore, finance led economic growth. For a broad cross-section of countries over the period 1960-1989, they found that the level of financial development measured as of 1960, was among the most important forecasting variables for growth, coming only after secondary school enrolment. Difference in financial systems can explain differences in real growth rates of 1 per cent per annum.

Figure VII. Components of economic growth



62. An efficient financial system is critical to ensuring that prudent macroeconomic policies will translate into sustained economic growth. The architecture of a financial system for emerging economies generally proceeds along a three-step path comprising:

(a) An efficient banking system that provides a payment system as an artery for any market economy;

(b) A secondary market in financial assets, money market instruments, bonds and equities that provides a means to identify the cost of capital and to allocate capital among competing uses;

(c) A regulatory framework that ensures that capital markets function efficiently.

63. Once these steps are in place, trading in derivative instruments can take place. To price and hedge these instruments require a liquid market for the underlying asset. Most emerging economies are still in the process of building this architecture, and therefore have no derivatives markets. However, with stock markets developing rapidly all over the world, derivatives markets should be established soon. The contribution of derivatives markets to economic growth is detailed next.

2. Effects on the allocation of capital

64. Derivatives markets have a positive effect on the allocation of capital. Suppose for instance that a firm has developed a new product that might find a profitable market. In addition to the business risk of the project, the firm also faces substantial financial risks, owing to movements in inflation, in

future interest payments, and possibly in foreign exchange rates. Derivatives may increase the willingness of entrepreneurs to invest in risky projects by providing them with an opportunity to be protected against financial risks. In addition, the price discovery function of derivatives markets leads to better, more informed capital decisions. Therefore capital is directed towards more efficient uses.

3. Effects on the accumulation of capital

65. Derivatives markets also have a positive effect on the accumulation of capital. The economic growth of a country is driven by productivity improvements resulting from capital investment. In a closed economy, the total pool of investment derives from national savings. However, investment will be less than savings because of frictions, or costs, in the financial system. Reducing these frictions leads to a higher level of investment and ultimately, of economic growth. Also, in an open economy, derivatives markets may increase the inflows of foreign capital, given that some market risks can be easily hedged, and thus lead to a higher level of investment.

66. Admittedly, there are some costs incurred in establishing derivatives markets, because productive resources are diverted to running the exchanges, executing trades and keeping records. These costs, however, must be balanced against the benefits of derivatives trading.

67. Because derivatives involve very low transaction costs, they raise the net amount of capital that can be invested in productive resources. For instance, investors may want protection against a decline in the market; instead of selling stocks, they can simply sell index futures contracts, at much lower cost. Lower transaction costs increase the net pool of savings.

68. Derivatives markets are also beneficial because of their risk-sharing function. Derivatives, for instance, help to lower the cost of raising capital. Suppose that a firm hires an investment bank to raise capital through a bond issue. The bank establishes a public offering price and underwrites the total issue, that is, commits to selling the entirety of the bonds at a fixed price. The firm then receives the proceeds from the sale minus an underwriting fee; this fee compensates for transaction costs, as well as for market risks of holding an inventory of bonds. The risk, however, can be effectively hedged through selling bond futures, thereby lowering underwriting fees to issuing corporations. This increases the pool of capital available to corporations.

B. Economic functions of derivatives

69. Derivatives markets provide three essential economic functions: risk management, price discovery and transactional efficiency. The first function refers to the ability of traders to offset financial risks through derivatives. The second refers to the better allocation of resources in the economy that is created by the wide availability of an equilibrium price that serves as a measure of value. The third function refers to the increased efficiency of transacting through derivatives. Derivatives markets reduce the costs of

trading and raising capital, thereby enhancing their risk management and price discovery functions. Because of these low costs, investors can hedge financial risks efficiently, or implement "synthetic" investments with derivatives.

1. Risk management

70. Derivatives markets are important because they provide the possibility of effective risk management through hedging. 4/ Hedgers use derivative contracts to shift unwanted price risk to others - speculators who willingly assume risks in order to make profits, or traders with different risk profiles. Markets provide mechanisms to exchange not only products, but also risks. Without derivatives markets, these risks could not be managed efficiently, and the cost of risk to society would be higher. As a result, we would all be worse off.

71. In other words, derivatives are innovations in risk management, not in risk itself. Risk exists because there is uncertainty in the world. Derivatives are sometimes considered harmful instruments because they are associated with gambling. This comparison, however, is misleading, because gambling entails the assumption of newly created risks (such as in roulette and poker). In contrast, speculation entails the assumption of existing risks (such as drought and inflation risk) and must be viewed as the necessary concomitant of hedging.

72. The unbundling of risk allowed by derivatives has led to efficient risk management techniques. Risk management involves the structuring of financial contracts to produce gains (or losses) that counterbalance the losses (or gains) arising from movements in financial prices. Thus the purpose of risk management is to stabilize total profits.

73. Movements in exchange rates, for instance, affect firms involved with international trade or utilizing international financing. Consider a manufacturer of Côte d'Ivoire who finances a new investment with a franc loan. Assume that, because of barriers to trade, revenues are primarily determined in the domestic currency, the Communauté africaine financière (CFA) franc. This manufacturer has exposure to currency movements. If the local currency depreciates, profits will be adversely affected; this is because revenues will stay constant in the local currency, whereas costs will be higher owing to the higher value of franc payments. As a result, the manufacturer may go bankrupt for reasons that have nothing to do with the business.

74. In the absence of views on financial markets, there are many arguments why financial risks should be hedged. In general, hedging is useful when agents are risk-averse or when there are "frictions" (costs or taxes) in capital markets.

Risk-aversion

75. Hedging may be useful if corporations or investors prefer stable profits. Managers, for instance, may have a substantial amount of capital tied to the firm, either through ownership or through compensation plans where bonuses depend on profits. If risk-averse, they will try to hedge financial risks to reduce the volatility of firm profits. Whether this benefits shareholders is another question, especially if shareholders can diversify across many stocks

and therefore do not worry as much about firm-specific risk as about market-wide risk.

76. Hedging may also be beneficial to countries that depend heavily on exports of a small number of commodities. Chile, Zambia and Zaire, for instance, rely heavily on copper exports. These countries are not well diversified, and could experience large shortfalls in revenues due to falls in commodity prices. With limited access to international capital markets, these countries might have to make deep cuts in social or infrastructural programmes. 5/ Box 3 illustrates how Mexico, for example, is hedging oil price risk.

Box 3. Mexico's oil-hedging strategy

In 1990, Mexico used risk management techniques to protect its crude oil export earnings against a price fall. Mexico used options that gave the right to sell oil at a fixed price and entered forward sales of oil. Its goal was to guarantee a minimum price of $17 a barrel, the price used as the basis for its 1991 budget. The following year, as oil prices fell following the end of the Gulf war, Mexico made a profit on the financial hedges that helped to offset the decline in export earnings. This was very important, since most import expenditures were denominated in United States dollars.

It should be noted that, in this example, the financial hedge created a profit; however, this was not the purpose of the hedge. Oil prices might just as well have increased, in which case the financial hedge would have created losses; these losses, however, would have been offset by higher export earnings. Thus, the purpose of financial hedging is not to create additional profits, but rather to create stable earnings.

Taxes

77. Hedging may lower the average tax burden in situations of increasing marginal income tax rates, or when losses create insufficient tax credits. Assume a situation where, without hedging, profits can be $300 million or -$100 million with equal probability. With hedging, the dispersion of profits is reduced, for instance to either $200 million or zero. Note that in both cases, the expected profit is the same, $100 million. If profits are taxed at 40 per cent, then the expected tax (E) without hedging is 0.5 X (40 per cent of $300 million) + 0.5 X $0 = $60 million. With hedging, the expected tax (E) = 0.5 X (40 per cent of $200 million) + 0.5 X $0 = $40 million. A policy of not hedging leads to large profits in some years, taxed at high rates and losses in other years that may not be credited against future profits; in contrast, a policy of systematic hedging will lead to stable profits. The net effect of hedging is to pay less taxes, on average.

Bankruptcy costs

78. Hedging is also useful if bankruptcy is costly. This may be the case because of direct costs such as legal fees or because the firm cannot be managed efficiently when undergoing bankruptcy proceedings. If hedging averts the possibility of bankruptcy, then hedging is useful.

Financing costs

79. When faced with the need to raise funds, a firm can use internal financing, generated by the firm's own cash flows, or external financing, such as through issuing bonds or stocks, or taking a bank loan. Hedging is useful when external financing is more costly than internally generated funds. If a firm does not hedge, there will be more variability in cash flow due to financial risk. When there is a shortfall in earnings, firms can either cut back on investments or raise funds externally. Cutting back on investments, however, may cause serious harm. If, instead, the shortfall is met by external financing, this will involve additional costs, such as underwriting fees or additional costs imposed by outside lenders. As can be seen, these costs are avoided by hedging.

2. Price discovery

80. The second major function of derivatives markets is price discovery. Price discovery is the process of providing equilibrium prices that reflect current and prospective demands on current and prospective supplies, and making these prices visible to all. As a result, derivatives markets are important not only because of the actual trading that takes place, but also because of their guidance of the rest of the economy to optimal production and consumption decisions. Futures on pollution rights, for instance, allow firms to make better investment decisions, because firms can now explicitly factor the cost of pollution into the decision to build a new plant or to close an old one.

81. Futures markets also create intertemporal price discovery, by setting prices for delivery at a series of dates in the future. Futures prices reflect current market expectations about what cash prices will be at specific points in the future. This is socially useful because it allows producers to make better production, consumption and storage decisions. For storable commodities, higher future prices signal the need for greater storage or production, thus smoothing the supply of a commodity over time and helping to avoid over- and undersupply conditions. Peck (1985) showed that stocks of corn are quite responsive to changes in storage costs implicit in futures prices; over the period 1971-1981, the United States, the only exporter with an active grain futures market, was the least destabilizing major exporter in the world market. Thus, futures markets help to stabilize prices by facilitating optimal production and storage decisions by firms.

82. Additionally, the price discovery process in beneficial for the following reasons:

Search costs

83. Exchange markets, in particular, provide highly visible prices that can serve as a benchmark of value. In theory, hedgers and speculators could trade with financial institutions. However, a search process is necessary to make sure that the proposed price is fair. Instead, by going to an exchange, one has direct access to centralized competitive trading, which ensures that the price will be fair. Thus, costly searches are avoided.

Quality differences

84. The price discovery function is also useful for commodities, for which differences in quality can lead to a multitude of cash prices. For instance, the fact that there is a wide variety of grades of oil makes it difficult to compare oil prices in different locations. Instead, crude oil futures create one reference price. In turn, this can be used to derive the fair price of other grades. Another example is that of government bond markets, where many bonds are outstanding, with different maturities and coupons. Individually, these are not in sufficient supply to support a large amount of trading. Instead, bond futures contracts create one reference price, which can be used to derive the fair value of individual bonds.

Volatility discovery

85. Another important function of options markets is the discovery of volatility, or risk of financial assets. Options are assets whose price is influenced by a number of factors, all of which are observable save for the volatility of the underlying price. Traditional option pricing models can then be used to recover an "implied" volatility from the option price. This volatility is the market's assessment of the possible range of values for the asset price over the life of the option. This information is particularly useful for hedging decisions. For instance, knowing the volatility of exchange rates allows firms to infer a distribution of future exchange rates and assess worst-case scenarios, which is helpful in deciding whether the risk should be hedged or not.

3. Transactional efficiency

86. Derivatives markets allow institutions to transact more efficiently than would be possible otherwise. They reduce the direct cost of transacting in financial markets and also provide, through clearing-houses, an efficient mechanism to deal with counterparty risk.

Cost savings

87. Generally, derivative contracts offer greater liquidity and lower transaction costs than underlying cash markets. In addition, opening up derivatives markets allows market-makers in underlying cash markets to hedge efficiently, and appears to have enhanced liquidity in some of the cash markets. Finally, derivatives markets allow institutions to take advantage of less than perfectly competitive financial markets. Interest rate and currency swaps, for instance, are widely used by corporations to lower their cost of capital.

88. Liquidity measures the ease and speed with which transactions can be executed; it is also related to market impact, which is the adverse price movement due to the execution of a trade. A liquid market also means that customers who have positions can feel confident that they can exit the market. Assume for instance that a pension fund must purchase $100 million worth of stocks. A transaction of this size may be effected the same day in the futures market, at prevailing prices. In contrast, such a transaction in the stock

market may take more time and, in addition, put upward pressure on prices, which leads to higher total costs.

89. Direct transaction costs can be broken down into commissions, fees, taxes and bid-ask spreads. In the United States, the total costs of buying and selling stocks are estimated to be about 0.90 per cent; these costs are only 0.09 per cent in futures markets. Thus, futures provide a ten-to-one transaction cost advantage over cash markets. This advantage is even greater in foreign equity markets. Costs for cash and futures are estimated at 3.10 per cent and 0.25 per cent in Japan, and 1.75 per cent and 0.50 per cent in the United Kingdom. Therefore, dealing with futures is considerably less costly than dealing in the underlying markets.

Standardization of counterparty

90. Organized exchanges with clearing-houses offer a major additional benefit relative to other markets. They essentially eliminate the credit risk of the counterparty, which leads to more efficient transactions because traders need not worry about the integrity of the counterparty.

91. After a trade on an exchange is confirmed, the clearing corporation interposes itself between all buyers and sellers and becomes the legal counterparty to all contracts. This solves the danger of trading with strangers. In turn, the clearing-house guarantees that the terms of the contract will be fulfilled by, first, requiring the posting of a margin as collateral and, second, by marking-to-market the contract on a daily basis. Marking-to-market entails the daily settlement of gains and losses. This is particularly important in the context of growing regulatory concerns about credit or default risk.

C. The view of regulators

92. A major concern from the viewpoint of legislators and regulators are the risks posed by derivatives to the overall economy. In the last year, derivatives were blamed for a raft of colossal losses, ranging from the $1.4 billion loss of Metallgesellschaft and a $1.7 billion loss in Orange County to a $1.4 billion loss of Barings. These losses, generally due to a lack of supervision and to a very volatile financial environment, have created concerns among public officials. These losses have emphasized the need to assess critically the market exposure of all financial contracts and led to a generalized trend towards marking-to-market. For instance, the Bank for International Settlements is moving towards marking-to-market principles for banking institutions. Also, risk management systems such as the RiskMetrics system recently put forth by J. P. Morgan represent the market's response to the need for better control of financial risks.

93. A number of landmark public policy studies, however, have concluded that derivatives are socially beneficial to the economy. 6/ More generally, many countries in Europe and Asia, with banking traditions very different from the United States, have created regulations that actively promote the success of derivatives markets.

94. An industry-funded report by the Group of Thirty (G30), issued in 1993, also states that derivatives activity "makes a contribution to the overall economy that may be difficult to quantify, but is nevertheless both favourable and substantial". The general view of the G30 is that derivatives do not introduce risks of a greater scale than those already present in financial markets. The G30 report also makes "best practices" recommendations for managing derivatives. Box 4 details recommendation 23, which covers the tax treatment of derivatives.

Box 4. "Tax treatment" recommendations from the Group of Thirty (G30)

In 1993, the Group of Thirty provided an authoritative review of the OTC derivatives markets. The study examined the risks associated with derivative products and gave an overview of industry practices and performance. It also provided a set of sound management practices.

The G30 noted that the tax treatment being applied to derivatives transactions dated back to before they had come into general use, which led to considerable uncertainty in determining how gains and losses should be taxed according to their uses. The following recommendation was made to legislators and regulators:

> Legislators and tax authorities are encouraged to review and, where appropriate, amend tax laws and regulations that disadvantage the use of derivatives in risk management strategies. Tax impediments include the inconsistent or uncertain tax treatment of gains and losses on the derivatives, in comparison with the gains and losses that arise from the risks being hedged.

IV. TAXATION OF DERIVATIVES

95. In developed markets, derivatives are already well established as essential risk management tools, but their taxation leads to considerable uncertainty. As noted by the G30 report, the tax treatment being applied to derivatives transactions dates back to before they came into general use. Derivatives will inevitably also appear in many emerging markets, where regulators can benefit from the experience of developed countries.

96. The economic theory developed in the previous section has shown that derivatives are particularly effective tools for risk management. They can be used in two functions: hedging and synthetic investments. Hedging involves a simultaneous position in a cash market and in a derivative instrument. Synthetic investment involves a position using derivatives that replicates a cash position.

97. The ultimate goal of a tax system is tax equity and neutrality. Equity, or fairness, implies that different individuals or corporations should be taxed equally; so should transactions with similar economic purposes. Neutrality implies that the tax system should not bias investment decisions towards less productive purposes that have a tax advantage. Taxation should not penalize the use of derivatives relative to underlying cash markets. Therefore, derivatives must be taxed as they would be if transactions were undertaken in the actual cash market. As we show, this principle has implications for withholding taxes.

98. Across countries, there is a wide variety of methods used to tax financial futures. Some countries tax profits and losses on futures as ordinary income, some as capital gains and losses. In addition to differences in taxation rates, countries also differ with respect to the time at which profits and losses on financial futures are recognized. Three principles seem to be used:

(a) Realization principle, under which profits and losses are recognized at the closing or expiration of the contract;

(b) Mark-to-market principle, under which profits and losses are recognized during the year that the position is held open;

(c) Matching principle, under which profits and losses are recognized at the same time as a hedge item.

The matching principle best meets the goals of neutrality towards hedging transactions. The realization principle meets the goal of neutrality between positions in synthetic instruments and those in actual cash markets.

99. Another issue is whether derivatives can be viewed as potential sources of taxation revenues. This appears tempting since the taxes will be mainly borne by foreign investors. The issue of the impact of taxes, however, must be very carefully addressed because derivatives markets thrive on low transaction costs. This issue is addressed in a later section.

A. Hedging transactions

100. Hedging transactions involves a simultaneous position in the cash market (either actual or anticipated), and in a derivatives contract. The purpose of hedging is to create a pattern of cash flows that offsets the pattern of cash flow on the underlying market. To be an effective hedge, the derivatives transaction must be treated in a manner consistent with the taxation of the underlying transaction. Many users of derivatives markets (40 per cent of end-users surveyed in the G30 report) indicate that the inconsistency of tax treatment of hedges is a major concern.

1. Tax treatment of hedges

101. Corporations and investors should be able to identify a particular derivatives transaction as a "hedging transaction". In this case, the derivatives transaction should be taxed:

(a) At the same rate as the underlying position;

(b) At the expiration of the hedge.

Differences in tax rates could cause a perfect pre-tax hedge to be imperfect after tax, and differences in the timing of tax payment will involve additional costs. These two principles will ensure that the transaction minimizes the variability of after-tax cash flows, which is the primary objective of hedging.

102. Even if the derivatives instrument is a futures contract, which is marked-to-market daily, the realization of gains and losses should be deferred until the hedging transaction is complete. This transforms a realized profit on the futures contract into an unrealized profit until the end of the hedge.

2. Straddles

103. This distinction between realized and unrealized profits is particularly important for "straddles". Straddles involve offsetting positions in two contracts that are highly correlated, but are not designated as hedges. They can be used as tax shelter devices to realize losses in one year and defer gains in another year. Straddles, for instance, can involve positions in stocks and options tied to similar securities.

104. A typical example is a long position in a stock covered by the sale of a call option that is "deep-in-the-money". Going back to figure V, this corresponds to the case where the current price is well above the exercise price of $100. In this situation, the option price moves in a one-to-one ratio with the stock price (its hedge ratio is close to one). Because the correlation between the option return and stock return is close to perfect, the net position is close to riskless, yet one leg can be used to realize losses in one year. Box 5 illustrates a case where two forward contracts can be used to create straddles.

Box 5. Using a straddle to defer tax payments

This hypothetical situation illustrates how forward contracts on a foreign currency, the deutsche mark (DM), can be used to construct a straddle. In November 1995, an investor buys a DM forward contract expiring in March 1996 and sells a DM June 1996 contract. He is said to be "long" the March contract and "short" the June contract. These positions can be achieved for instance in the futures market, with only a small margin as down payment.

The value of the two contracts is derived from movements in the spot exchange rate. As a result, the two contract values are highly correlated. If the DM appreciates relative to the dollar before the end of the year, one contract will show a gain, the other a loss.

By December 1995, the trader could realize the loss on the losing side by closing the short DM March contract. The remaining exposure can then be hedged by opening a new short position in a DM September 1996 contract. These operations effectively create a realized loss in the current year, while postponing the gain to the next year.

105. Taking losses on such straddles is disallowed under United States tax rules. The basic principle is that realized losses cannot be taken if there exists an unrealized gain on the open end of the straddle, as is the case for a hedge.

B. "Synthetic" investments

106. Derivatives can also be used to create patterns of pay-offs similar to those in the underlying cash markets, before taxes. Again, economic efficiency dictates that the taxation level be similar for transactions in cash or derivatives markets. Taxation, however, may pose difficulties if capital gains taxes differ too much from ordinary income tax rates, or if capital gains are taxed at different rates depending on whether they are short-term or long-term. This is because derivatives contracts may blur the distinction between capital gain and income. This is illustrated using two common instruments.

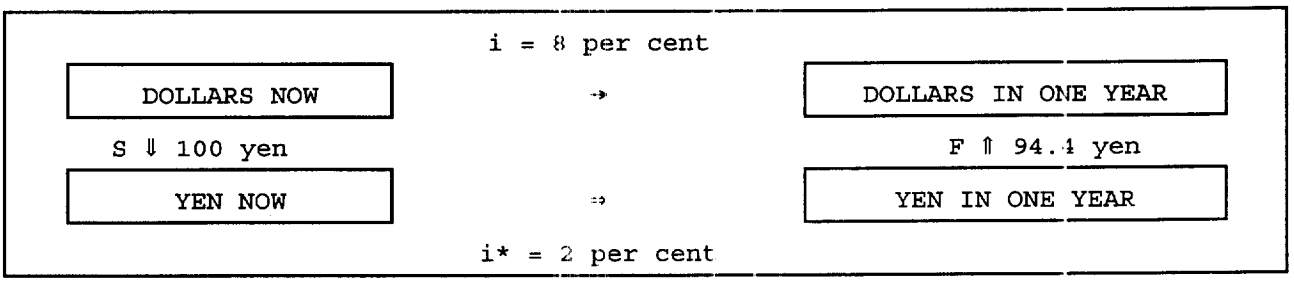
1. Forward contracts

107. The economic function of a forward contract is to fix a price in the future. Consider for instance a United States investor who can invest for one year either in United States dollars at an 8 per cent rate or, synthetically, through a covered investment in Japanese yen. The spot rate is 100 yen per dollar and yen deposits return a low rate of 2 per cent. By interest parity, the forward rate must be set at

$$100 \times \frac{1 + 2\ per\ cent}{1 + 8\ per\ cent} = 94.4$$

This forward rate ensures that, before taxes, an investment in one-year dollar deposits or in one-year covered yen deposits has the same return. Defining r_{US} as the dollar interest rate, r_Y as the yen interest rate and S and F as the spot and forward rates, we have $1 + r_{US} = (S/F)(1 + r_Y)$.

A synthetic investment



108. Discrepancies can arise, however, if part of the transaction is taxed at a capital gains rate that differs from the ordinary income tax rate. For such investors, a lower rate of taxation can be obtained by investing in covered yen. Define τ_I as the income tax rate and τ_G as the capital gains tax rate. After taxes, the dollar investment will return

$$r_{US}(1 - \tau_I)$$

and the yen investment

$$r_Y(1 - \tau_I) + \frac{S - F}{F}(1 + r_Y)(1 - \tau_G)$$

where the last term represents the after-tax capital gain on the forward contract.

109. Most countries tax capital gains at a lower rate than ordinary income. Suppose that the return on the forward contract is taxed at the capital gains rate τ_G = 28 per cent; the tax rate on ordinary income is τ_I = 40 per cent. With the same numbers as before, the after-tax returns on a million dollar investment will be, respectively,

$$\$1,000,000 \times [8\ per\ cent\ (1 - 0.40)] = \$48,000$$

and

$$\$1,000,000 \times [2\ per\ cent\ (1 - 0.40) + \frac{100 - 94.4}{94.4}(1 + 2\ per\ cent)(1 - 0.28)] = \$58,000.$$

The covered yen investment therefore presents a tax arbitrage opportunity since the return is $10,000 higher after taxes than from investing in dollars. More generally, if forward contracts are priced on a before-tax basis, investors with favourable capital gain tax treatment will prefer investments denominated in currencies with low nominal interest rates. Conversely, borrowers will prefer to borrow in currencies with high nominal interest rates.

110. This arbitrage can be avoided by taxing the forward contract as ordinary income. Also, for financial institutions for which foreign exchange gains and losses are part of the "normal conduct of business", there is no tax arbitrage opportunity.

2. Stock index futures contracts

111. Stock index futures are used extensively by portfolio managers as substitutes for investing in the underlying cash markets. These contracts can be used:

(a) To protect a portfolio of selected stocks against general market downturns;

(b) To synthetically hold stocks in a national market;

(c) To implement tactical asset allocation models, where positions are rapidly changed either across national stock markets, or between stocks and bonds within a country.

Given that futures are much cheaper to use than underlying cash instruments, typically by a factor of at least 10 to 1, and much more liquid, portfolio managers now routinely use futures as part of their regular panoply of financial instruments.

112. Using futures instead of the underlying stock market is also quite convenient because the initial cash investment is minimal, as it is typically limited to the margin. Take for instance a United States investor who wants to invest $100 million in Brazilian stocks. The exposure can be achieved by buying IBOVESPA stock index futures contracts worth a notional $100 million. Perhaps $5 million will be required as margin.

113. In the mean time, the investor has full use of the remaining $95 million, which can be invested short-term (a) in the Brazilian currency, or (b) in United States dollars. In the first case, the investor has full exposure to the foreign currency. In the second case, the investor has effectively hedged against movements in the exchange rate.

114. The taxation of stock index futures, however, also raises difficult issues. Assume that, over a year, the stock market returns 15 per cent, of which 3 per cent is due to dividends. An investor in the stock market would then pay ordinary income tax on the dividend payment, and capital gains tax on the 12 per cent capital appreciation if realized. An equivalent position can be achieved by buying stock index futures, and investing the cash equivalent in a

short-term deposit. If the short-term rate is 5 per cent, the futures contract will increase in value by 15 per cent-5 per cent = 10 per cent over the year. Thus, the capital gain tax will apply to the 10 per cent appreciation only. The 5 per cent cash return will be taxed at the ordinary income tax rate.

115. To maintain the economic equivalence between positions in cash and futures markets, tax rates must be applied equally to both markets. For instance, if foreigners are exempt from capital gains taxes on the cash market, futures profits should not be taxed either. Any attempt to tax futures will simply choke off the stock index futures market.

C. Withholding taxes

116. Cross-border portfolio incomes originate from interest on deposits or bonds and from corporate dividends. For countries that apply the residence principle to taxation, the world-wide income of investors is taxed at their place of residence. Therefore, there is no need for withholding taxes because all income is ultimately subject to taxation.

117. This principle breaks down, however, if some foreign source income is not reported. In this situation, tax evasion can be addressed by exchange of information and cooperation between tax agencies. These mechanisms, however, are imperfect. Also, some countries try to gain a comparative advantage by creating "tax havens" in an attempt to lure foreign investors with very low or zero tax rates.

118. Because of these difficulties, withholding taxes may be applied to income going to non-residents as a second-best attempt at taxation. Statutory rates may be lowered through bilateral taxation agreements with countries that either enforce taxation of foreign income or are not considered tax havens.

119. In theory, this does not constitute double taxation as long as:

(a) The withholding tax rate is lower than the final rate of taxation;

(b) The withholding tax can be taken as a credit against final taxes;

(c) The definition and attribution of income are consistent across tax jurisdictions.

Therefore withholding taxes can be viewed as a second-best attempt to provide a level playing-field for global investors. It should be noted, however, that some investors such as United States pension funds, which are a driving force behind international investments, are not liable to domestic income taxes. Therefore, pension funds have a preference towards investments that allow them to avoid paying withholding taxes.

120. Derivatives instruments, for instance, can be used to avoid paying withholding taxes. In the previous example of stock index futures, the entire dividend is subsumed in the appreciation of the futures contract, and is therefore not subject to a withholding tax. No country currently imposes

withholding taxes on payments to non-residents arising from domestic trades in financial futures contracts.

D. Tax revenues

121. An important issue, especially for developing countries, is whether tax revenues can be extracted from derivatives markets. When evaluating the potential for revenue generation from taxes, however, one must keep in mind the response of market participants.

122. A transaction tax, for instance, looks appealing because of the potential large volume of transactions. Transaction tax revenues can be written as

$$R = \tau\ (P + \Delta P)(Q + \Delta Q) + \Delta OR$$

which says that revenues are obtained from the tax rate τ times the transaction price (including the price change ΔP due to the tax) times the volume of trading (including the volume change ΔQ due to the tax) plus the change in other tax revenue (ΔOR) due to the imposition of the tax.

123. Transaction taxes have been proposed as recently as in 1990 in the United States, when there was a proposal to tax all transactions in the secondary market for equities at a 0.5 per cent rate. Initially, the "static" evaluation of tax revenues was estimated from

$$R = \tau\ (P)(Q)$$

which assumes no change in the behaviour of market participants. Using this approach, it was estimated that, based on an annual volume of trading of $2,200 billion, the tax would bring in $11 billion annually.

124. This number was severely flawed, however, for a number of reasons. First, the tax would have reduced the level of stock prices (ΔP). This is because the price of an asset represents the present value of future benefits to the holder; transaction costs reduce the flow of benefits and increase the discount rate owing to the loss of liquidity. It has been estimated that a 0.5 per cent tax would reduce stock prices by 35 per cent. 7/

125. Second, the volume of trading would have been reduced (ΔQ). Experience shows that investors react to a transaction tax either by shifting trading to markets with similar instruments that are less heavily taxed, or by reducing the volume of trading. Typically, a 0.5 per cent tax reduces volume by 30 per cent. Box 6 illustrates the Swedish experience in transaction taxes.

126. Third, the tax lowers capital gains receipts because of less frequent realization of lower profits (ΔOR). Overall, the net revenues from the tax were likely to be $5 billion, which was much lower than the static $11 billion estimate. 8/ The lessons from this experience are that the use of static tax models can lead to substantial overestimates of potential tax revenues.

127. The United States derivatives industry voiced strong opposition to a transaction tax, because its very existence was at stake. The transaction tax would have severely reduced the cost-effectiveness of derivatives. Assume for instance that trading in stock index futures costs 0.1 per cent, versus 1 per cent in the cash markets. Imposing a transaction tax of 0.5 per cent would have increased the cost of trading futures by a fivefold factor. This would have had a devastating effect on futures trading in the United States. Many investors would simply have shifted trading to London, where futures trading is not subject to such taxation. The transaction tax was never passed.

Box 6. The Swedish experience with transaction taxes

Sweden started to impose transaction taxes on equities in 1984, partly to raise revenues and partly to penalize a financial service sector that was viewed as "unproductive and antisocial". The taxes reached 2 per cent of the principal for round-trip trades. As a result, the volume of trading in Swedish shares fell in Sweden, and moved to London and New York.

Then, in 1987, a transaction tax was also imposed on money market instruments, with the goal of reducing "socially worthless activities". The tax was applied to fixed-income securities including derivatives, and reached a maximum of 0.15 per cent of the face amount. As a result, trading in futures on bonds and bills fell by 98 per cent. In the cash market, trading was shifted to similar debt instruments that were not taxed.

Beginning in 1989, the political climate started to change. The taxes had raised disappointing revenues, and had increased the cost of government borrowing. On 1 December 1991, all remaining transaction taxes were eliminated.

128. The effect of taxation must also be viewed in the context of global competition for new products. When creating a successful product, the first mover achieves liquidity and economies of scales that are hard to replicate, because they lead to a dominant position. Excessive government regulation or taxation can also drive a market to another country. Once established abroad, these markets may be difficult to dislodge because investors are attracted to liquidity. 9/

V. CONCLUSIONS

129. In the last decade, derivatives markets have revolutionized the management of financial risks. As part of the expanding range of financial services made possible by technological innovations, derivatives provide unparalleled leveraging and hedging opportunities. They also create important additional social benefits, such as the dissemination of uniform prices based upon which investment decisions can be made, and the lowering of transaction costs in capital markets. All of these have positive effects on the allocation and accumulation of capital and contribute to higher economic growth. Derivatives markets will also support international capital flows, which are essential to developing countries. The general consensus is that derivatives should be encouraged, provided their use is accompanied by appropriate risk management policies.

130. Derivatives, which used to be the exclusive practice of developing economies, are now becoming a global phenomenon. Many developing countries are now considering establishing futures and options markets. To support an orderly growth of the derivatives market, it is essential to ensure that taxation policies do not hinder or differentially affect global capital flows. From the preceding discussion, two broad conclusions emerge.

131. First, tax neutrality implies that transactions with similar economic purposes should be taxed equally. Taxation should not penalize the use of derivatives relative to underlying cash markets. Also, derivatives transactions entered for the purpose of hedging a particular commercial transaction should be taxed in a manner that is consistent with the taxation of the commercial transaction. Thus, the most important recommendation is that countries contemplating opening futures markets should implement tax legislation that provides for the recognition of gains and losses at the same time that a loss or profit on a hedged item is recognized and at the same rate.

132. Second, the revenue-generating potential of taxes on derivatives must be very carefully reviewed since derivatives thrive on low transaction costs, and could be driven to foreign markets if taxation is excessive. The creation of offshore markets would deny the local economy many of the benefits of a locally established and regulated derivatives market.

Notes

1/ For a survey of the recent evolution in global derivatives markets, see E. Remolona, "The recent growth in financial derivative markets", Federal Reserve of New York Quarterly Review, vol. 17 (1993), pp. 28-43.

2/ For a further analysis of the economic function of derivatives, and their implications for the Brazilian economy, see P. Jorion, The Importance of Derivative Securities Markets to Modern Finance (Chicago, Illinois, Catalyst Institute, 1995).

3/ See, for instance, the review in M. Pagano, "Financial markets and growth: an overview", European Economic Review, vol. 37 (1993), pp. 613-622.

4/ For a survey of how firms in developing countries manage risk, see J. Glen, How Firms in Developing Countries Manage Risks, International Finance Corporation Discussion Paper, No. 17 (Washington, D.C., World Bank, 1993).

5/ M. Debatisse and others, Risk Management in Liberalizing Economies: Issues of Access to Food and Agricultural Futures and Options Markets, World Bank Technical Report, 12220 ECA (Washington, D.C., World Bank, 1993), provide a comprehensive survey of risk management techniques by developing countries. They report very little recorded use of commodity futures by developing countries.

6/ See Board of Governors of the Federal Reserve, Commodity Futures Trading Commission and Securities and Exchange Commission, A Study of the Effects on the Economy of Trading in Futures and Options (Washington, D.C., 1984) and reports from the United States Congress (Safety and Soundness Issues Related to Bank Derivatives (Washington, D.C., 1994), and the United States General Accounting Office (Financial Derivatives: Actions Needed to Protect the Financial System (Washington, D.C., 1994)).

7/ In another example of the impact of taxes on prices, the Israeli Government approved a 20 per cent capital-gains tax on stock transactions in August 1994. The Stock Market fell by 10 per cent upon the making of the announcement.

8/ See Hubbard in Securities Transaction Taxes: False Hopes and Unintended Consequences (Chicago, Illinois, Irwin, 1995).

9/ A case in point is the Japanese financial markets, where trading activity in derivatives is actively discouraged by the Ministry of Finance. As a result, a substantial proportion of trading on the Nikkei 225 stock index futures has shifted to Singapore. The Japanese derivatives markets are the only ones in the world to have experienced a sharp decline in transaction volume over the last few years.

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