

# INTERNATIONAL USE OF FUTURES AND OPTIONS MARKETS

Malick Ousmane Sy\*

Nanyang Technological Institute, Singapore

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## 1. Introduction

With the introduction of futures and options contracts on financial instruments, institutional investors now have the ability to use the futures and options markets to manage the financial risk in their business. Proper use of future and options can greatly extend the risk management possibilities for financial institutions. But optimal use requires understanding of how futures and options contracts work, how to balance risk and return in a hedged position, and how to implement the hedging strategies that futures and options trading make possible.

This paper has several purposes. The characteristics of futures contracts will be described in Section 2. The following section will describe the characteristics of options contracts, and the differences and similarities between options and futures will be outlined. In Section 4, we will describe the potential uses of futures and options by particular organizational forms. These organizational forms include corporations, investors, pension-funds, broker-dealers, financial institutions and we will consider in this section the difficulties developing countries producers face in attempting to use options and futures to hedge their revenues, using futures contracts.

## 2. Futures Markets

The specific organization of the different markets for risk management varies along a continuum. At one end are active markets for immediate and physical delivery such as a wholesale food market, where a seller is assured of disposing of products at the prevailing price. At the other are pure insurance markets such the Lloyds re-insurance pool that finances policies to protect against almost anything. Between these two extremes lies a range of markets which have evolved in line with commodity-specific problems and local circumstances. The best known examples are the organized futures exchanges.

A futures contract is a commitment to buy or sell an underlying asset at a fixed price called the futures price. Unlike a market in which individuals buy claims for immediate

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\* I would like to thank Professor Robin Barlow, University of Michigan, for helpful comments and useful discussions.

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delivery, a futures market is a market for deferred delivery. There are futures contracts on commodities, currencies, stock indexes, United States Treasury Bills, options, etc. Prior to exchange traded financial futures, the markets for futures were private markets. Generally, private futures contracts are forward contracts. While futures contracts are settled for cash each day and rewritten at the new price in the market, a forward contract is settled only at maturity of the obligation. Examples of common financial forward contracts include repurchase agreements and mortgage commitments. Cox, Ingersoll and Ross (1981) show that there are slight differences between a future and a forward contract because of the differences in settlement. Telser (1977), compared the difference between a futures contract and a forward contract to the difference between a check and cash. While with a forward market, investors are uncertain as to the creditor (like a check), with a futures market investors are guaranteed settlement (like cash) for a transaction. With a futures market unlike a forward market, it is not necessary to inspect or to grade the underlying asset. It is not necessary to look to the credit and assets of the other side of the transaction. The clearing corporation stands behind each transaction, and all defaults are in the hands of members of the exchanges.

Futures contracts are standardized with preset terms. There is a delivery month. Margin rules are known. What is to be delivered is standardized and prespecified. Price limits and trading hours are standardized. Futures contracts are general contracts, satisfying the needs of few exactly but meeting the needs of many generally. Forward contracts are private contracts. They can be very specific and tailored to the exact needs of the parties to the contract. While the explicit costs of using a futures contract are low because these contracts are standardized and easy to use, the implicit costs of using futures contracts are not necessarily low for all potential users. These implicit costs arise in trying to mold a standardized contract to fit the specific needs of the users of futures contracts. It is obvious that the more specialized the needs, the higher the implicit costs of using futures contracts when compared to forward contracts. On the other hand, the explicit costs to tailor and to monitor the performance of a forward contract might be too burdensome to one or the other or both of the parties to the contract.

The purposes of a futures market are:

- (i) to allow the open «discovery» or identification of prices that reflect both current and prospective supply/demand balances. The price of futures contract can give better signals as to the price of a commodity than the signals by prices in diverse markets.
- (ii) to attract speculators, who provide the liquidity required for buyers of futures to always find sellers and vice versa, immediately, without affecting price.

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But the very advantage of a futures market is to allow individual and other organizational forms such as corporations, pension funds, trusts, partnerships, «hedging» which can be used to moderate or even to eliminate entirely, a wide range of price uncertainties. Exchange rate unpredictability can be reduced by hedging the foreign currency. If one needs to be sure of the dollar receipts from an export whose price is denominated in Deutsche Marks, for example, then one sells Deutsche Mark futures (expressed in terms of dollars) to the value of the contract.

Similarly the risks related to borrowings where interest rates are variable as is normal in international markets, can be hedged through interest rate futures. In fact, the fastest growing application of hedging has come through multinational business and banks hedging such foreign exchange and interest rate risks. I will deeply describe the use of futures and options as a hedging technics in Section 5.

### 3. Options Markets

Along with futures contracts another revitalized tool for price risk management is options.

A call option is the right to buy an underlying security, for example, the commodities, or Treasury bond futures, at a fixed price, on or before a maturity date in the future. A put option is the right to sell an underlying security. The fixed price of an option is called its striking price or its exercise value of the option (the absolute value of the difference between the market price of the underlying security and the exercise price), which is settled in cash.

Options first traded on organized exchanges [Chicago Board Options Exchange (CBOE)] in 1973. Many more exchanges trade options on underlying securities. Exchanges have been formed to trade options on futures contracts. Options are traded on common stocks, common stock indices, futures including commodities such as gold, currencies such as the French Franc and Financial such as Euro-dollars.

Options on securities or physicals have preset terms. The date of expiration is set. The exercise price is known and changed under certain circumstances to reflect splits or spin-offs of assets. The terms are not adjusted for cash distributions such as dividends on common stock.

Buyers exercise their option only if it is in their economic interest to do so. On expiration of call options, buyers exercise their right only if the price of the underlying securi-

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ty is above the striking price, and for put options, only if the price of the underlying asset is below the striking price. Holders of put options might exercise prior to maturity, if investors in the underlying asset receive cash flow such as coupons or dividends.

An option contract is similar to an insurance contract on the underlying asset. Investors insure against possible loss in return on the underlying asset by buying put options; a put option with the same exercise price as the underlying asset insures against a decline in its price for the term of the put option. Loss, like a fully deductible insurance policy, is limited to the premium paid for the put option. On a fall in price, the investor makes a claim against the put option writer, the insurer, and receives the exercise price in return for the asset. If the price rises, the insurance is not used. Using options, investors can sell off part of the risk — insure part of the risk of investing in underlying assets. The sellers of options, like insurers generally, expect that the option premiums will cover the costs of the insurance they sell to the buyers of options. To be actuarially fair, neither side expects to continue to earn an above-normal rate of return.

Although options are similar to insurance contracts, options have been confused with futures contracts. In part the confusion arises because the terms are similar and both are derivative securities. The person who goes long or short on a future is living in the present. His account is marked to the market every day by his brokerage firm, which means that money is coming into his account or going out daily. The person who buys an option is not marked to the market. He merely owns a right, which fluctuates in value daily, but it is like being told that the value of your house went up or down last month. It doesn't make any difference to you until the time comes to sell it. One of the big differences is that the owner of a call option has no obligations of any kind. He has bought a one-way ticket running in his favour. He can never be asked to put up more money, he can never be made to exercise his option, there is no detriment whatsoever that he can ever incur by virtue of owning that call other than losing his original purchase cost. When a futures contract is purchased or sold, a commitment is made by two parties, a buyer and a seller, to purchase or sell a given quantity and quality of a commodity at a specific time and place. The price of the futures contract is agreed upon when the transaction is made on the trading floor of a regulated commodity exchange.

If we want to take a position in futures, we have only one price to use, and that is the current price for whichever month happens to take our fancy. Our only choice is whether we want to go long or short that futures contract or whether you do not. With options, there is always a choice of a number of exercise prices available, which means that we can do a great deal of fine — tuning in accordance with our exact hedging or speculative good.

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Also, the options and futures exchanges share similar concepts: the clearing corporations as guarantor of the obligations to deliver at the close of a futures contract or on the exercise of an option; the expiration month cycle with common expiration months; competing market makers on certain exchanges; the use of floor brokers and common trading locations. While there are many similarities, the fundamental difference between options and futures is the right to exercise an option. Prices will be related because a long call option combined with a short put option position is essentially the same as a long futures position. It is possible to create a futures position from an options position and it is possible to create an options position by combining short term bonds and the underlying asset.

#### **4. Use of Options and Futures by Organizational Forms & Special Case of Developing Countries**

We will illustrate the uses of financial futures and options as instruments important to increasing the operational efficiency of various organizational forms. Although this can only be an overview because there are many such uses and the uses are growing as organizations learn to use futures and options, the uses are focused around hedging and risk shifting in markets: particular attributes of holding assets are transferred to others in the market. Another aspect of the growth of these markets has been to expand the understanding of hedging and risk-shifting among potential users.

##### **4.1 Broker - Dealers**

One of the important uses of futures and options has been to reduce the cost of making markets in securities (bonds and stock). Short-selling rules and costs restrict investors including broker/dealers from taking short positions in securities quickly and at low cost. Margin rules are cumbersome and restrictive. These new markets offer a low cost alternative to broker/dealers as a way to hedge and to shift risk in the markets.

##### **4.2 Corporations**

Insuring risks by using options, or hedging risks by using futures at the corporate level mitigates the transaction costs of contracting. There are competitive ways to reduce the risk of firms: diversify asset holdings, reduce debt-to-equity ratios, and buy insurance, hedge asset holdings and hedge forward commitments. Options and futures offer firms another alternative to reduce risk and improve economic efficiency.

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other than moral pressure, it is common for such deals to collapse amidst a welter of recriminations. In fact, extra-market pricing arrangements seldom work when the actual free market prices for the products being exchanged are highly visible to all involved (as in the case of commodities traded on official exchanges).

As experience grows of these piecemeal approaches to the present difficulties facing commodity exporters it becomes ever more apparent that they impose high costs upon the countries that adopt them. In many DC large economic losses have come through commodity traders profiting from the divergences between official and informal, but available, foreign exchange rates. Less well known but equally significant trading problems have emerged when real interest rates in these countries have been kept above those paid on the world market — which has allowed commodity traders to earn more from financial transactions than from commodity trading. And counter-trade deals are notorious for the cost premium that results from the risk of large and unpredictable losses when the products offered in exchange for commodity exports are disposed of.

(i) Application of Futures and Options Contracts for Better Trading

If developing countries have not generally been successful in adjusting to the new situation in commodity markets, there remains evidence that all is not bleak. Both multinational companies as well as primary product producers in developed economies, have had to cope with precisely the same sorts of problems. Initially, their performance was no better than that of their counterparts in the developing world; but over recent years, the multinationals have adapted their financial management strategies so as to acquire greater protection — against the new forms of uncertainty in commodity markets (both in primary product and in monetary prices). In the process, they have discovered that long-term fixed price deals across national boundaries are often impossible to enforce. They have also learnt the hard way that sudden fluctuations in interest rates, exchange rates, raw material costs and selling prices are all critical determinants of any new investment and viability.

As a result, the use of various financial instruments for managing commodity price risks has increased exponentially since the early 1970s. Increased use has allowed many possible pitfalls to be recognized early and enabled corrective action to be taken in good time, thereby engendering greater reliability of these instruments. This in turn, has encouraged others to use them, while stimulating the introduction of new, tailor-made futures or options contracts, as well as a proliferation of insurance products. While many of the specific applications are new, the various tools for better trading now in common use have all been applied by specialists for the past hundred years. Thus, although

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the techniques of «hedging», «basis pricing», «spread trading» or «rolling over futures contracts» may seem somewhat arcane to those unfamiliar with them, there is in fact a great deal of experience in how these various price risk management tools perform under a wide variety of conditions. One of the more dramatic changes in the world financial system in the last few years has been the application of options and futures contracts, which were originally used in conjunction with trading primary commodities such as wheat or copper, to the «new» monetary commodities.

(ii) Hedging With Options & Futures Contracts Special Case of Commodity Producers And Exporters.

Various futures or options market techniques allow a producer to construct long-term price hedges extending out several years (even though, at any one time, futures quotations may only exist covering one year or so). This creates the opportunity for a potential supplier to «look in» a profitable price during the early years of production. Armed with this protection, the prospective producer can turn to banks for project finance. In practice, this technique has been used in some recent investments to arrange more favourable borrowing terms.

One of the simplest way for a producer to hedge his anticipated sales is by selling part or all of this output forward or futures (I assume here that forward & futures hedges are equivalents). Suppose it is currently date  $t_0$  and the producer wishes to hedge his period  $t_2$  revenue by selling a quantity  $q$  futures at the current futures price  $F_{t_2/t_1}$  for delivery in period  $t_2$ .

If his actual production in period  $t_2$  turns out to be  $X_0(t_2)$ , then his period  $t_2$  Revenue  $R(t_2)$  is given by

$$(1) \quad R(t_2) = F_{t_2/t_1} \cdot q + S(t_2) \cdot [X_0(t_2) - q]$$

By hedging, the producer trades the unknown price  $S(t_2)$  for the known futures price  $F_{t_0/t_1}$ .

Hedging using options works in a different way. A producer wishing to hedge his revenues will be mainly interested in puts. A particular put will denominate a «strike price» and the put is an option to sell the contract quantity at this price. Suppose again that the producer is anxious to hedge his period  $t_2$  revenue and purchases a put at strike  $E_2$ . If  $S(t_2)$  (the period  $t_2$  spot price)  $> E_2$  then the option is worthless since a better price can be obtained by selling cash, but if  $S(t_2) < E_2$  the option will be exercised.

If the producer purchases  $q$  of these puts at a unit price (discounted to period 2) of  $p$ , his period  $t_2$  revenue becomes

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$$(2) \quad R(t_2) = \text{Max} [E_2, S(t_2)] q + S(t_2) [X_0(t_2) - p] - pq \\ = S(t_2) \cdot X_0(t_2) + [\text{Max} (E_2 - S(t_2), 0) - p]q$$

The effect of futures hedging is to reduce the variance of the revenue distribution, while preserving the same general shape, the distribution simply becomes more concentrated about the mean. In contrast, the effect of an options hedge is to reduce or eliminate the lower tail of the revenue distribution. This contrast is illustrated in Figure 1, where we additionally suppose that the mean of both distributions is unaffected. This is a market efficiency (zero profit) assumption. In the futures hedge case it requires that the futures price  $F_{t_2/t_0}$  be equal to the expected value of the period  $t_2$  spot price  $S(t_2)$  distribution, and in the options case it requires that option price  $p$  be given as the Black (1976) fair price.

A disadvantage of hedging using the put option depicted in Figure 1 is the requirement to pay the purchase price  $p$  at date  $t_0$ . This can be overcome if the producer simultaneously writes a call option at the symmetrically positioned price. A symmetric options hedge reduces or eliminates both tails of the distribution.

Suppose the put strike is at

$(1 - \varepsilon) F_{t_2/t_0}$  and the call price is at

$(1 + \varepsilon) F_{t_2/t_0}$  the producer's revenue then becomes

$$(3) \quad R(t_2) = S(t_2) \cdot X_0(t_2) + [\max (1 - \varepsilon) F_{t_2/t_0} - S(t_2), 0] \\ - \max [S(t_2) - (1 + \varepsilon) F_{t_2/t_0}, 0] \cdot p$$

This summarizes the hedging opportunities.

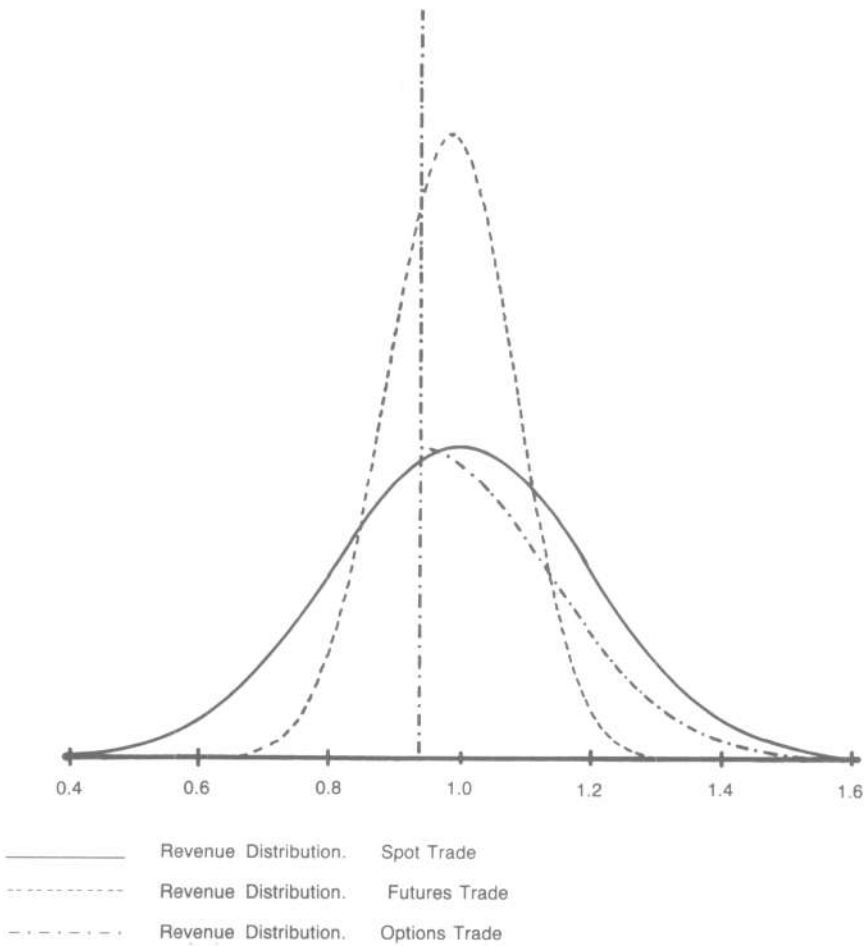
In practice, developing countries producers are not major or even substantial users of futures or options markets. Among explanations offered for the lack of DC use of futures markets are:

- (a) DC producers and governments lack familiarity with futures and options markets and in many cases are prejudiced against use of «speculative» markets.

Hedging on futures is a complicated activity. The producer must decide what quantity he wishes to hedge over what period; where there is more than one exchange, he must select the exchange which offers him the least uncertainty in geographical basis and the least exchange rate risk; he may consider it necessary to take a currency hedge in addition to the commodity hedge; he must decide in which month or months to take a position and when to roll forward; and he must be alert to movements in the temporal basis which will make maintenance of the hedge disadvantageous. Few DC producers



**Figure 1**  
SPOT, FUTURES AND OPTIONS REVENUE DISTRIBUTIONS



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will have employees with these skills, and if they are to exploit the potential of the futures exchanges they must either invest in training or recruit skilled traders in the developed economies. In general, they will be well advised to do both of these, but this may require encouragement by the exchanges and other sympathetic organizations.

- (b) DC producers and governments frequently lack the financial and management expertise necessary to exploit futures trading opportunities.

It is obviously true that individual farmers or peasant producers will be unable or unwilling to acquire the required level of expertise, but problems may also exist at the level of the state trade corporation or export ministry. However, experience in a number of commodities suggests that, it is unnecessary for producers to acquire the expertise. The predominant marketing arrangement in these trades is for producers to sell to commodity dealers than to hedge their positions on the futures market. This form of marketing arrangement is a great deal simpler for management in the producer country, and can yield all the disadvantages of direct futures market trading.

- (c) Futures contract periods may be shorter than the periods over which DC producers and governments need to hedge their revenues.

The longest dated futures contracts currently traded are 23 months, although since there is very little liquidity in these distant contracts, hedgers are in practice constrained to operate using contracts of at most 9-13 months ahead. It is frequently argued that although contract periods of this duration are sufficient to allow agricultural producers to fix their prices at the time of planting, and to provide working capital and margin security for dealers involved in the export and import of these commodities, they are far too short to be of any use to DC governments interested in stabilizing their export revenues over a planning period of several years. So far as forward and futures hedges are concerned, this view is based on a misconception, since forward and futures contracts may in principle be «rolled over» for an indefinite period. The view that contract periods are too short to be of use to DC in stabilizing their export revenues is however correct with regard to options hedging.

Consider for example, a producer wishing to hedge his period  $t_2$  output using forward sales but constrained to use 1 period forward contracts. We simplify by supposing that there is no supply variability. In period  $t_0$  the producer sells his output  $X_0(t_2)$  forward, and in period  $t_1$  he closes out his initial position by purchasing the same quantity at the spot price  $S(t_1)$  and rolls his hedge forward by selling at  $F_{t_2/t_0}$ . The total revenue from this position, discounted forward to period  $t_2$  is:

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$$R(t_2) = X_0(t_2) [F(t_2/t_0) + (1+i) [F(t_2/t_0) - S(t_1)]]$$

where  $i$  is the one period interest rate. This expression may be rearranged as

$$(4) \quad R(t_2) = X_0(t_2) [F(t_1/t_0) - i [S(t_1) - F(t_1/t_0)] + (F(t_1/t_0) - S(t_1))]$$

The first term in (4) is the period  $t_0$  forward price; the second term which will be small unless interest rates are high, is the period  $t_1$  price surprise multiplied by the interest rate and the final term is the period  $t_1$  (temporal) basis. The additional risk resulting from rolling a hedge forward relates mainly to this final term: for non-harvested commodities or for harvested commodities provided that a «period» is interpreted as a calendar year, the basis should under normal circumstances be equal to the interest rate, but if there is a shortage of stock in period  $t_1$  a backwardation or premium market will emerge, with a negative basis. Futures trading substitutes basis risk for price level risk, but in general this risk should be small and this substitution will be a good trade.

## 5. Conclusion

The use of futures and options as a standard tool in portfolio management and to some extent in corporate management is growing rapidly. Competition is forcing more and more potential users to learn about the benefits and costs of using futures and options.

Futures and options contracts increase welfare for the many organizational forms having a demand for risk-sharing (insurance) and for hedging. These derivative instruments offer an alternative low cost method of insuring and hedging asset portfolios.

Two routes are open in international commodity policy. The traditional route is to negotiate international commodity agreements which override the market price distribution in an attempt to generate a price distribution which gives DC commodity producers less variable and perhaps also higher revenues. The second route, which is currently attracting considerable attention, is to encourage DC primary producers to make use of existing, and in many cases rapidly developing, market institutions to hedge their revenues.

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## Abstract

*This paper provides a comprehensive description of futures and options markets. The similarities and differences of options and futures are showed.*

*It describes how future markets and options have permitted multinational businesses and banks to manage the risks of adverse changes in commodity prices as well as unstable foreign exchange and interest rates. It makes the point that these tools could be used by developing countries to help stabilize export earnings, facilitate additional borrowings for inventories on pre-export financing of procedures, and attract external capital for new investments.*

*The paper also outlines the principles of hedging using futures and options contracts; and finally new possible directions for international commodity policy are discussed.*



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## UTILISATION A L'ECHELLE INTERNATIONALE DES MARCHES A TERME DES INSTRUMENTS FINANCIERS (MATIF) ET DES MARCHES D'OBLIGATIONS AVEC OPTION DE CHANGE

### RESUME

*Cet article fournit une description étendue des MATIF et des marchés d'obligations avec option de change. Les ressemblances et différences entre les obligations avec option et les instruments à terme sont soulignées.*

*L'article montre comment les MATIFs et les obligations avec option ont permis à des firmes et des banques multinationales de gérer les risques de changements défavorables au niveau des cours mondiaux, et de faire face à l'instabilité des taux de change et des taux d'intérêt. Il développe l'idée que ces instruments pourraient être utilisées par les pays en développement pour stabiliser les recettes d'exportation, faciliter des emprunts supplémentaires pour inventorier les procédures de financement pre-export, et attirer des capitaux externes pour de nouveaux investissements.*

*L'article esquisse aussi les principes de couverture des opérations à terme («hedging») au moyen des instruments à terme et des obligations avec option. Enfin, de nouvelles directions possibles concernant la politique des cours mondiaux sont présentés.*

