A Short Lesson in Financial Futures

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Few would disagree that one of the most notable innovations on financial markets over the past two decades has been the development of Financial Futures (FFs). Indeed, since the time when the first FFs were traded in the early 1970s on the Chicago Mercantile Exchange, the rapid growth in both trading volume and the number of organized FF exchanges around the globe (now including LIFFE in London, MATIF in France, SOFFEX in Switzerland, HKFE in Hong Kong, SFE in Sydney Australia and our own IFOX in Dublin) represents one of the success stories of financial world in recent times.

In order to understand these recent developments, it is essential to understand what FFs are, how they are traded and who trades them. The discussion below focuses on each of these in turn. In addition, some of the more technical aspects of FFs will be detailed. Attention will be focussed on the way in which they are priced, and also on the complex trading strategy of program trading.

The Instrument

The FF instrument itself is very basic. It consists of an agreement to buy or sell a fixed amount of an underlying asset (say equities, but contracts on currencies, interest rates and stock indices are also written) for a predetermined price at a fixed future date. Futures contracts have been traded on commodities for over 100 years. The principle is identical, the only difference being that the contract is written on say Premium May 1992 Coffee or Grain, rather than financial securities.

FF contracts are liquid, and can be (and usually are) traded prior to the delivery date. In fact on some exchanges, less than 1% of FF contracts actually go to delivery. At the delivery date, those with positions (a "short position" means that you have sold contracts and a "long position" means that you have bought them) on FF contracts can close out those positions by taking an equal and offsetting position in the same contract. For example, those on the short side of the market, who have sold FF's, can close out by buying an equal number of contracts written on the same security[1].

Trading with financial futures

The essence of FF trading is the existence of two parallel markets in the same underlying stock; one being a cash or "spot" market and the other being a futures market (Breen,1988:11). The spot price, P_s, is the amount paid (or received) for the actual underlying stock. The futures price, P_f, is that which is stipulated in a FF contract. The difference $(P_f - P_s)$ represents the profit on closure, which can be either positive or negative.

At the time at which a futures contract is written, it would be unusual to find $P_s = P_f$. This is because P_f reflects a set of assumptions about the future path of P_s, right up until the delivery date. However, as the delivery date approaches, P_f is likely to converge on P_s as the risk of market

1 Some exchanges allow cash settlement on particular contracts based on the difference between the contracts value on the last day of trading and its value on the second last day (O'Dea,1990:36).

volatility and hence large changes in P_s diminishes. At the delivery date itself, $P_f = P_s$.

It is clear from the above that FFs are highly liquid, standardized contracts. This is by virtue of their homogeneity, which enables them to be traded with relative ease on secondary markets. It is worth noting that FFs tend to be traded by "open outcry" (physically auctioned on the trading floor). This keeps transactions costs well below those applying to over-the-counter trades, and further enhances liquidity. However when open outcry is used, there is no time on the trading floor to check the credit-worthiness of other traders making bids or offers. This led to the establishment of the clearing house, which oversees all trading on the exchange. It processes, matches and underwrites trades, thus effectively becoming a third party to all transactions, and eliminating credit risk[2].

It is partly as a consequence of its role in eliminating credit risk that clearing houses developed the system of calculating (and overseeing payment of) gains and losses on FF contracts. This procedure is known as the "margining system". At the outset of a trade, clients are required to put up an "initial margin". The size of this is determined by the exchange and the clearing house, but also by the broker's evaluation of his client's credit-worthiness. This margin is deposited into a "margin account", out of which all daily losses are paid and into which all daily gains flow. In some cases the level of sophistication of the exchange is such that transactors can actually receive interest on their margin accounts.

The correlation between credit risk and the size of the initial margin is easily observable. In September 1987, for example, a "hedger" (a safe investor) in the Standard & Poors 500 stock index futures contract would have been required to put up $5000, whereas a "speculator" (relatively risky investor) had to show $7500 up front. In tandem with this, those who set margins take some cognizance of market risk. In June 1987, for example, the initial margin for the FTSE 100 index on LIFFE (with a face value of £60,000) was £1,000 (or 1.6%). However, as market volatility increased with the approach of Black Monday in October, the face value of the contract fell to £42,000 and the initial margin increased to £15,000 (or about 35.7%) (The *Economist*, 1987:87). These additional margins are known as "variation margins".

So while the putting up of margins by all transactors at the outset of any trade is a *bone fide* act, the margining system, in general, is a highly efficient way of managing the risk of daily price movements. Contracts are simply revalued daily (this procedure is known as "marking to margin"), with gains/losses being debited or credited to margin accounts. This is essential to the risk management structure of any organized, regulated FF exchange[3].

Having discussed the nature of trading, the next step is to examine who the traders are, and how they act/interact within the market.

Traders on financial futures markets

In any FF market, we can identify at least two types of traders: hedgers, who buy or sell a position in the futures market to counterbalance an existing or anticipated position in the spot market; and speculators, who have no spot position necessarily, but rather seek to profit by correctly predicting future price movements (Kobold, 1986:32).

2 The clearing house is always fully matched and in the absence of default, has no position of its own.

3 Another way of limiting the risks associated with price volatility is to use a "price-limit" system in conjunction with the margining system. This is the procedure that is adopted on the IFOX exchange.

Fitzgerald (1986) argues that FF markets were developed to facilitate the needs of these two users. When viewed in this light, FF markets represent an efficient system for transferring risk among agents. Hedgers try to minimize potential losses from risk exposure in certain markets. Speculators, on the other hand, search for profits and will be willing to take on the risk dumped by the hedgers, in the anticipation of a high expected return. It is the existence of low transactions costs and the possibility of being paid winnings or losses daily via the 'margining system' that encourage this transfer of risk[4]. Speculators increase the liquidity of the market, which makes it easier for hedgers to open and close positions when they want.

An investor's options are not limited to FF hedging. They could, for example, hedge by borrowing cash now and buying bonds in the underlying security, using the expected cash flow receipts to pay off the current borrowing in the future. This, however, would be an expensive and quite difficult hedge. An easier and cheaper alternative is provided by FFs. The exchange itself reduces search costs involved in trying to dump risk, and the standardized nature of FFs means that contracts are liquid and can easily be transferred to third parties. If trading is "screen-based", as on IFOX, there is little documentation of trades, no trading delays and almost immediate settlement of margin debts, thus reducing brokerage costs. In sum, the use of FFs for hedging purposes is cheaper and more convenient than most other strategies.

4 It is not the case that risk can only be transferred from hedgers to speculators. It could be that one hedger wishes to hedge against a price movement in one direction, whereas another wishes to hedge against price movements in the opposite direction. If they use the same instrument to hedge, then effectively they transfer risk between themselves. In general, if two speculators are on the same side of a given contract, they increase total risk. Conversely, if two hedgers are on either side, they reduce total risk. If a hedger and a speculator share the contract, then net risk is constant.

Other important aspects of financial futures

Pricing financial futures

The pricing mechanism in FF markets differs from that of the spot market (Fitzgerald, 1986). Consider Interest Rate futures (such as Sterling Time Deposits on LIFFE, or DIBOR futures on IFOX [see appendix]). These are priced on a "discount" basis: i.e., the price of the contract is given by (100 - r), where r is the (locked in) interest rate. This preserves the inverse relationship between the contract price and the interest rate. For example you could lock in a 9.75% rate by buying DIBOR futures at a price of 90.25. If the price falls, this implies an increase in the interest rate.

Minimum losses/gains on contracts are known as "Ticks", which have a fixed value. That value is given by the size of the tick (usually 1/100 of 1%) times the face value of the contract. So, for example, a trader might purchase 20 DIBOR futures at 90.25 (tick value = 0.01% of IR£100,000 face value, for 1/4 of a year = £2.50) and sell at a later date for 90.10. The loss on this transaction is given by:

20 x 15 ticks (90.25 - 90.10) x £2.50 = £750.

Other FFs, such as Foreign exchange Futures, are simply priced in terms of the underlying security, parallel to the forward market. The exception with foreign exchange futures is that they are always priced in terms of Dollars per unit of foreign currency.

Program Trading

Quite often, traders will use index-futures as dummies for the underlying stocks themselves. Program Trading involves

using computer programs to do all the work. For example, an investor may wish to buy stock-index futures when they're cheap relative to the actual stocks, and sell when they're relatively more expensive (i.e., exploit any differentials between the value of stock in an index and the value of the index-future). Computer programs can be used to tell when the time is ripe for such a strategy. These programs can be adjusted to take account of borrowing costs, transaction costs and dividends forgone by moving out of stocks and into futures. If the investor expects a return greater than the return she could get on, say, Treasury Bills, she could take this strategy (known as "index-arbitrage") and know her profit prior to trading. This is because she could close out her position by taking an equal and opposite position in the same contract.

This type of program-trading has been at least partly blamed for the October 1987 crash. During the precipitous decline in stock prices, computer programs detected very large arbitrage opportunities from big discounts between futures and spot prices (for example, on October 19, Standard & Poors futures were trading at a 23 point discount). These discounts led to the market being inundated with huge sell orders, so much so that the New York Stock Exchange could not match the massive amount of sellers with scarce buyers and on October 20, it had to close, since the index couldn't be calculated (The *Economist*,1987:88).

The Irish futures and options exchange

On May 29, 1989, IFOX opened for trading. The exchange was set up as a result of an NCB private sector initiative. It has 24 members including banks, brokers, portfolio managers and own account traders. The trading is "screen-based", so the deal signals are sent from individual computers in the workplace and confirmed/co-ordinated by a central computer. There are several contracts traded (DIBOR 3-month interbank-rate futures exhibiting the greatest volume).

There is no overall clearing house. Rather, each member acts as its own clearing house, undertaking to meet daily margin calls (O' Dea,1990:42). At October, 1990, the 'net worth' requirement for membership was £1.5m tangible net assets. Each member also lodged £264,000 in cash or gilts into a "guarantee fund" which gave the exchange £6.4m to deal with defaults (where members don't satisfy their margin requirements by a specified time). In the case of same, the exchange undertakes to close out the defaulting member's position, precluding any further losses.

The exchange also operates a "price-limit" system (i.e., prices are not allowed to move beyond a specific point in order to prevent having to make intra-day margin calls which are administratively inefficient). This implies that the initial margin will cover the maximum losses from trading in any one day (O' Dea,1990:44).

All of these risk-minimization devices the "net-worth" requirement, the margining system, the "guarantee-fund" and the "price-limit" system - are essential elements of the risk management structure of any efficient, organized FF exchange.

Conclusion

This essay has provided a cursory overview of the FF instrument. It was seen that the extraordinarily rapid growth in the use of the instrument derives from the ease with which it can be traded, the low transactions costs which this involves, and its utility in the hedging and purchasing of risk.It can be concluded that, despite the problems caused by program trading, FF markets offer a highly efficient and useful investment medium.

Appendix

An example of a financial futures contract: the DIBOR 3-month contract on IFOX

Size:	£100,000 3-month deposit
Settlement months:	March, June, September, December
Quotation:	On discount basis (100-r)
Tick Size:	0.01
Tick Value:	0.01 x 100,000 x 1/4 = £2.50
Price Limit:	60 basis points
Initial Margin:	£300 *

* For a straddle strategy, where the trader takes simultaneous long and short positions in the same contract with different delivery months, the initial margin is only £90 since the trade involves exposure to less risk than an open position.

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