

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE

DEPARTMENT OF ECONOMICS

E U I W O R K I N G P A P E R No. 25

MODELLING, MANAGING AND MONITORING

FUTURES TRADING - FRONTIERS OF

ANALYTICAL INQUIRY

by

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OCTOBER 1982



The author is greatly indebted to Basil S. Yamey for advice and help, but retains responsibility for any remaining errors and omissions.

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Printed in Italy in October 1982.
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The present Working Paper is the pre-ultimate draft of the introductory chapter of a volume of proceedings of a colloquium on recent developments in futures trading to be edited by the author. The title of the volume will be FUTURES MARKETS - MODELLING MANAGING and MONITORING FUTURES TRADING to be published with Basil Blackwell, Oxford, Spring 1983. Since some references to chapters of this volume are made in the working paper, a table of contents of the volume can be found in an annex.

MODELLING, MANAGING, AND MONITORING FUTURES TRADING -
FRONTIERS OF ANALYTICAL INQUIRY

MANFRED E. STREIT

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The more we learn about the world
 and the deeper our learning, the
 more conscious, specific, and
 articulate will be our knowledge
 of what we do not know, our know-
 ledge of our ignorance.

(K.R. Popper, 1960)

1. Introduction

1.1. The key questions

The last one and a half decades have witnessed an acceleration of the growth of trading in most conventional futures and the spectacular success of some new ventures, particularly financial futures. The expansion of futures trading is also reflected in the successful launching of new markets away from the traditional centres in the United States and England. However, so far initiatives in this field cannot be recorded for

continental Europe. Possible explanations are : (i) a reduction of potentially tradeable commodities as a consequence of the price controls executed via the Common Agricultural Policy, (ii) limitations of potential market participation of the banking sector due to public regulation, (iii) barriers to entry of speculators because of adverse legislation as in the case of the German Exchange Act which largely inhibits speculative trading in commodities, and (iv), perhaps even more deep-rooted than elsewhere, a widespread contempt for and misinterpretation of speculation, one of the vital elements in any futures market.

But the forementioned obstacles to futures trading in continental Europe have not completely prevented the business community from using the markets in London and the United States.¹ Whether the new markets in financial futures in London (London International Futures Exchange, LIFE) will attract sufficient European users and market makers for it to become more than a satellite market to Chicago is still uncertain. This uncertainty is rather underlined by the poor performance of trading of financial futures at the New York Futures Exchange (NYFE), which itself also points to the difficulty of predicting the success or failure of new markets and new contracts.

As far as the scientific analysis of futures markets is concerned, the growth of futures trading has been well matched by corresponding research. Particularly in the United States, major advances in both empirical as well as purely theoretical research have been recorded. And both types of research have converged, especially in the analysis of information processing via markets. European contributions, although quite important in content right from the beginning, so far have been comparatively few and largely restricted to English scholars. From this point of view, a volume like the present one may perhaps stimulate research in futures trading, not least as a market approach to imperfect information and uncertainty. And it is

the major purpose of this introductory essay to point to frontiers of analytical inquiry which partly are revealed by the contributions to this volume and partly became apparent during the proceedings of the colloquium at which the contributions were initially presented.

The studies of the present volume basically deal with three interrelated issues which can be summarized with the following questions:

- (1) Modelling: To what extent do economic models of futures trading cover those aspects of these markets which are considered salient in the light of what is known empirically about these markets?
- (2) Managing: Taking into account the answer to the first question, what advice can be given to private economic agents using futures markets, and to governments trying to assess such markets as an allocation device which may be a substitute for, or a complement of, some instruments of public policy?
- (3) Monitoring: To what extent does the performance of futures markets depend on their institutional framework, properties of the underlying commodities, the design of the traded contracts and on the monitoring of trading via private and public regulation?

1.2. The contributions in perspective

Although most contributors to this volume go beyond addressing themselves to a single one of the forementioned questions, from their main focus the following assignments to the three issues suggest themselves:

Dealing with the first issue, B.S. YAMEY (chapter 2) confronts some major post-war contributions to the theory of futures trading with earlier views. He traces the process of trial and error in the development of basic concepts which so far have not even led to definite answers to a number of basic questions like the relevance of the various forms of hedging, the need for and the existence of a risk premium, the interpretation of convenience yield, and the analytical value of futures markets statistics. J.M. BURNS (chapter 3) demonstrates the necessity to reduce the degree to which institutional aspects of futures markets are abstracted from in theoretical studies. As one important consequence, the presently dominant concept of informational efficiency turns out to be only a part, although an important part, of a wider concept of market efficiency. Within the context of informational efficiency, J.E. STIGLITZ (chapter 4) shows that the conditions for a revealing full communication equilibrium are even more stringent than has been believed. However, his major results concern the evaluation of an equilibrium model of futures trading with which he analyses the possibilities of producers and users of a non-storable commodity to adjust both to price and to quantity risk. The contribution by D. LEVHARI and M. ROTHCHILD (chapter 5) basically consists of an attempt to discuss futures trading in a wider macroeconomic context. Hedging via futures as a market response to the observable increase in the variability of interest rates is linked with investment behaviour. This allows speculation on possible reactions in terms of changes in the interest rate elasticity and the structural properties of investment. As far as tests of the validity of theoretical propositions are concerned, D. FRIEDMAN, G.W. HARRISON and J.W. SALMON (chapter 6) belong to the comparatively small number of economists who try to employ the experimental method. The results obtained for a still narrowly defined experimental situation demonstrate sufficiently the potential of this method to single out the relative importance of the various determinants of futures prices which can hardly be disentangled by using conventional econometrics.

Related to both the first and the second question is the contribution by S.J. TAYLOR (chapter 7). The trading rules with which he analyses price series of some London commodity futures and of currencies traded in Chicago produce new empirical evidence concerning the informational efficiency of futures markets. But they can also be considered as more sophisticated methods which may help operators to explore profitable trading opportunities. J. ROLFO and H.B. SOSIN (chapter 8) go beyond the analysis of the riskiness of simple hedges by considering a trader who wants to lock in both the cost of inputs and the value of outputs. The analysis of five strategies which they discuss is designed to take into account, in addition, potential margin calls and interest rate risk. Price volatility as a problem of public policy is taken up by D.M. NEWBERY (chapter 9). He offers a model which ultimately allows one to deal with the question whether futures markets promise to perform better than a marketing board in protecting producers against price variations. The answer is shown to depend last but not least on whether it is also possible to take into account quantity risks. B. BROWN (chapter 10) looks at forward and futures trading in currencies in order to establish which arbitrage constraints a domestically-oriented policy may have to face depending upon the convertibility of the currencies. It is shown that there are more arbitrage opportunities than are usually accounted for in the theory of foreign exchange.

Primarily related to the third question are the contributions by R.L. SANDOR and H.B. SOSIN (chapter 11) and by D.J.S. RUTLEDGE (chapter 12), which analyse the experience of the introduction of interest rate futures at two different exchanges. They provide first-hand information on the art of contract design and on the criteria which may be useful in evaluating proposals for the introduction of new futures. Attention is also paid to the structure of membership and to the prudential control of brokers as possible factors determining success or failure of a new futures market. Finally, G.T. GEMMILL (chapter 13) looks into

differences between public surveillance and regulation of futures markets in the U.S. and England, and assesses the validity of arguments in favour of public regulation in general. This also leads to an investigation of the effectiveness of both the existing regulation by public authorities and by the exchanges themselves.

2. Modelling Futures Markets: Positive Knowledge and Adequate Abstraction

Among those aspects of futures trading which represent a challenge when trying to model those markets, at least three still seem to require further attention: (i) trading motives and the corresponding variety of transactions, (ii) price formation and the extent to which it is governed by expectations, and (iii) the importance of information for trading and as an element in the efficiency of futures markets.

2.1. Trading motives and transaction variety

Right from the beginning of the analysis of futures markets and quite inline with the views of the users of these markets, attitudes towards risk were considered to be central. Futures trading was essentially a risk-shifting operation. At least in as much as it was not possible in practice to pool risks within the group of hedgers, those who wanted to shed risks had to pay a premium to speculators who were prepared to take them but were also risk averse on average. When modelling futures markets, this view allowed to dichotomize market participants accordingly into hedgers and speculators. As discussed by B.S. YAMEY (chapter 2), in the post-war period the view gained ground that the pursuit of profit, rather than the shifting of risk, was the governing motive. The dialectics of the propagation

of new ideas by now seem to have converged to a synthesis in the sense that the theory of hedging has become more sophisticated and accommodates both risk and return.

The recognition of the profit motive in hedging at the same time required to lay stress on the information aspect of futures trading. Given the standardization of contracts and the organized, highly competitive trading, only an informational advantage could serve as a second potential source of systematic returns, besides the scarcity rent possibly obtainable by risk bearers. Even if they were on average risk neutral and no scarcity rent was distributable, speculators would still have an opportunity to gain from the acquisition and use of informational advantages. The implication for hedging is that the price to be paid for unloading risk on to the futures market can, in principle, be reduced by information activities. The least a potential hedger can do in this respect is to use the information he acquires in the course of his business in actuals as a basis for forming his own expectations. They in turn allow him to assess the hedging situation, i.e. the current futures price. This approach contrasts with a notion of hedging which for a long time dominated the theoretical interpretation of futures markets. It implied that hedgers always content themselves with locking in a futures price.² What remains unsettled, however, is essentially an empirical problem: the relative importance of discretionary forms of hedging as opposed to routine hedging still has to be established.

In terms of modelling, a further departure from the comparatively simple concept of routine hedging should be mentioned. It refers to the recognition that the quantity to be hedged is a decision variable, instead of always assuming completely hedged positions. Particularly in the case of agricultural commodities it is evident that a producer has to face not only a price risk but also a quantity risk. And, as demonstrated by J.E. STIGLITZ (chapter 4), deviations from a completely hedged position are

rational and depend on the kind of relationship between output and price variability. Although the practice of incomplete hedging was well known, its recognition as a theoretical issue was mainly related to attempts to apply portfolio theory to hedging behaviour (e.g. JOHNSON, 1960; RUTLEDGE, 1972).

The easy conceptualisation of a futures market in terms of the simple dichotomy between hedging and speculation probably also encouraged abstraction from all other types of transactions observable on futures markets. And again, these differ in a characteristic way from routine hedging and straightforward speculation when considering the risks involved and the related information activities. There are, first, the possibilities of profiting from differences between (i) prices of the same contract at different exchanges and (ii) prices of a futures contract and the corresponding spot prices, i.e. pure inter-market arbitrage and, in the case of storable commodities, inter-temporal arbitrage. These transactions are practically riskless if the arbitrageur manages to lock in the relevant costs of inter-locational and inter-temporal substitution (i.e. transport and storage costs). Second, effective arbitrage in turn opens up possibilities for speculating in futures but limiting the risk, i.e. intra-commodity, inter-commodity and inter-market spreads in futures as opposed to straightforward speculation by holding a completely open futures position. The reduction of potential losses results from the price link between the two positions of a spread which is stabilized via arbitrage based on the corresponding costs of substitution (i.e. again transport and storage costs and, in the case of inter-commodity spreads, for example the processing or transformation costs).

The difficulties in extending the analysis of futures markets to such transactions are reflected in at least two shortcomings of most available models of futures markets: (i) they are one-market models, abstracting from the interrelations between those actuals and futures markets which are firmly linked

via substitution possibilities, (ii) they are comparative static models, abstracting from inter-temporal relations and from the actual trading process. Tentative efforts to overcome this limitation (e.g. PESTON and YAMEY, 1960) clearly demonstrate the price which most probably would have to be paid in terms of highly complex or even indeterminate solutions if the analysis were to be extended. But as will be argued here, unless such extensions or elaborations were attempted, the speculative element in all futures transactions as well as the processing and conveying of information would probably have to remain inaccessible or elusive.

A discussion of the motives for futures trading would be incomplete without reference to tax considerations.³ Although taxation-induced market participation does not lead to new forms of transactions worthy of exploration, it does affect the volume and structure of trade. The tax implications of futures trading may differ for nonspeculative and speculative transactions. Tax implications of futures trading can be taken into account by traders in basically a passive way in their decisions to enter the market. However, they may also be used actively to try to manipulate the tax burden resulting from other activities. Particularly spreading can offer an opportunity to manipulate the time structure of taxable revenues to the advantage of the taxpayer. Depending on the relevant rules of taxation and particularly changes in the rules, incentives and disincentives to use futures markets for tax purposes may produce additional difficulties for the empirical analysis of these markets.

2.2. Expectations and price formation

The modelling of futures trading predominantly within a comparative static framework definitely facilitates the analysis, but it also fails to capture a characteristic feature of trading

on these and other speculative markets: the specific time-structure which futures transactions normally have. As emphasized more recently again by HIRSHLEIFER (1975,1977), trading usually consist out of two stages. In a first round a trader establishes a position which he hopes to revise at a profit in a later round. The obvious but basic conclusion then is that traders tend to be induced to take an open position in futures in a discretionary way if they anticipate that the current futures price or, in the case of hedgers, the difference between two prices (the basis), will change, i.e. if they in fact consider the current price to be a wrong forecast of the price at maturity of a contract and hence of the future spot price (or the futures price at any earlier date at which they intend to close out).

If some traders are able to establish, say, a positive position at a futures price they consider to be a wrong forecast, the above reasoning equally suggests that those who are prepared to hold the opposite position, must have expectations which diverge both from those implicit in the traded price and those held by the other side of the market. In this case it can be demonstrated (c.f. STREIT, 1983) that during the period before the maturity of a contract trading at "false" prices determined by divergent beliefs or expectations is the rule. Only at the maturity of a contract is a transient consensus imposed upon traders by the facts of the spot market.

This view has interesting implications both for the interpretation of futures prices and also for the modelling of their formation. According to this view, prices at which transactions have taken place before the maturity of a contract represent wrong forecasts of future market conditions to those who have made transactions at those prices. The implicit forecasts have been acceptable only to those who refrained from trading at those prices. As far as price changes indicate changes in information situations, those who trade tend to disagree that the observable price changes

reflect accurately the changes in information. This has the following implication. Suppose it turns out, empirically, that the futures prices in a particular market over a particular period prove to have been good forecasts and that the market has to be judged efficient in the informational sense. This observed result would have been brought about by the actions of market participants who in fact disputed the forecasts implicit in the various futures prices. Thus the favourable "performance" of the market would be the unintended outcome of numerous decisions of the many participants who traded precisely because they considered various prices to be inappropriate and unjustified last not least in the light of the information available to them and who intended to profit from the mistakes. The rationale for active market participation differs completely from the observable market result. The modelling problem which has to be solved conforms to POPPER's general description of the task of theoretical social sciences: "to trace the unintended social repercussions of intentional human actions" (POPPER, 1948, p. 342).

To fulfill this task seems to be particularly difficult in the case of futures trading or, more generally, speculative trading. If divergent beliefs are essential for such trading, HAWTREY's early verdict on the conventional method of bridging the gap between individual decisions and market results still holds, namely that divergent beliefs represent "a fatal objection to the introduction of any aggregates or averages of expectations into economic reasoning" (HAWTREY, 1939/40, p. 203). This also means that the usual econometric approach of inferring from the aggregate performance of such markets how expectations are actually formed is basically invalidated. It remains to be explored whether it is an adequate approximation to segment a futures market according to types of transactions and positions taken and to

analyze the consequences of correspondingly segmented expectations (as done e.g. by GOSS and GILES, 1981).

2.3. Information processing and market efficiency

The difficulties of comparative static equilibrium analysis in capturing salient features of speculative markets also apply to the information activities on these markets. They are particularly well demonstrated by the link between the conveying of information and the informational efficiency of markets which has been established by an impossibility theorem (e.g. GROSSMAN and STIGLITZ, 1980). The theorem is basically the result of a free-rider problem which leads to an erosion of futures markets as a means for processing and disseminating information.⁴ If the conditions are such that prices convey all information which informed traders collect, other traders can get the information free by just observing market prices. Hence speculative markets can only exist if they are not informationally efficient. This can be modelled by adding sufficient noise to the price signals.

In the meantime, and as demonstrated by J.E. STIGLITZ (chapter 4), it has become clear that the assumptions necessary to establish the theorem are even more stringent than originally thought. However, it can be argued that modelling information activities in the conventional (neoclassical) way raises a more fundamental problem. The problem results from the abstraction from time. Given the time structure of transactions, the informational externality created via trading can only endanger the existence of a speculative market if an informed trader has no opportunity of trading before his new informational situation has become general. This opportunity to trade at a price which is false in the light of his information-based beliefs and to re-trade at a profit if his beliefs turn out to be correct, is the greater the smaller is the market weight of his transaction and the less

he initially has to share his informational advantage with others.

The dynamic view also leads to the conclusion that speculative markets cannot be completely efficient at every point in time. But whereas in the case of the theorem informational inefficiency is a necessary condition for the existence of such markets, inefficiency in this view is part of the process of discovery and communication of information when considering market dynamics. Furthermore the incentive problem is seen differently. In the static analysis, it is noise that guarantees a rent distributable to informed traders. It must be high enough to cover their information costs. In a dynamic context, however, inefficiency is the result of some traders being able to trade at a temporary informational advantage. The derivable profit is a premium for being faster in the acquisition and correct reading of new information, and also for re-interpreting already available information more quickly. The premium is highly uncertain, and is exposed to the competitive information activities of other traders. It is the competition for a temporary informational monopoly which not only determines the informational quality of prices but also the speed at which changes in beliefs and underlying information are disseminated.

If the above interpretation of the market process from an informational point of view comes closer to reality, a further modelling problem results. It concerns the relationship between informational efficiency and competition. Inefficiency from a static point of view reflects in a competitive market the generated incentives which are the source of its dynamic efficiency. What in the static approach is interpreted as a deviation from Pareto-optimality (e.g. GROSSMAN, 1976, p. 584; FIGLEWSKI, 1978, p. 581) is in the dynamic approach a source of virtue.

Permanent efficiency in a Paretian sense is not only "at best

an irrelevant fiction" (LACHMANN, 1977, p. 37) but would also be undesirable if it could be achieved. If the state of permanent Pareto efficiency were to be used as a (fictitious) reference point, it would be necessary to establish a kind of optimum degree of inefficiency. For the market to fulfill its function of collecting and disseminating information, the optimum would refer to a balance which had to be struck between the access to information premia and their erosion through competition. The same applies to the function of facilitating transactions. In order to recruit sufficient support from potential market makers, they have to be offered an incentive. But at the same time they have to be threatened by competition. Two points emerge out of these considerations which are raised by J.M. BURNS (chapter 3): (i) in view of the functions a market has to fulfill, informational efficiency is only one, although important, element of a wider concept of market efficiency and (ii) the institutional framework of trading and the design of the tradeable contracts can be considered as controlling variables with respect to the effectiveness of competition.

To assess competing theoretical propositions empirically has proved to be difficult. First, the available statistical information is partly inadequate, as explained by B.S. YAMEY (chapter 2). Second, the inference from the observable price, volume and participation data to the unobservable expectations and information of traders has to overcome analytical obstacles (section 2.2.). Third, the application of econometric methods has problems of its own, as demonstrated by S.J. TAYLOR (chapter 7). Given these difficulties, the experimental method presented by D. FRIEDMAN, G.W. HARRISON and J.W. SALMON (chapter 6) could help to improve the empirical assessment of rival theories. The improvement would result primarily from the characteristic property of the experimental method of allowing individual influences to be isolated. This is already demonstrated by the forementioned contribution, in as much as it shows that within a stationary

environment results can be observed which come quite close to those of the conventional equilibrium analyses. It would now be particularly interesting to trace the consequences of a change in the experimental design by allowing for event uncertainty and a stochastic inflow of information.

3. Managing futures trading: the perspectives of business and government

3.1. Investment strategies and risk management

Futures markets can be approached from two basic business perspectives which, however, can be and are frequently merged as emphasized in the discussion of trading motives (section 2.1.):

- . the search for unexploited profit opportunities including tax considerations and
- . the attempt to manage risks which are predominantly multi-dimensional.

The first perspective can be described by asking whether it is possible and necessary to forecast prices in order to profit from an investment in futures. If the first part of the question is reduced to the possibility of forecasting short-term price movements from past futures prices, the link between investment opportunities and informational efficiency of the weak variety becomes visible. The second part of the question concerns the skills of market participants to forecast medium-term price developments by considering "fundamentals", and the existence of a risk premium which would reduce the value of such skills.

As far as short-term price-forecasting is concerned, the random walk, introduced into futures markets analysis more than forty years ago (WORKING 1934, 1942, 1949), still serves as the

basic, negative proposition. The statistical models and methods which have been developed in the meantime, and to which S.J. TAYLOR (chapter 7) has something to add, primarily helped to reveal the structure of the on average small and unexploitable deviations from the proposition that consecutive price changes are basically unpredictable.

Even if short-term price movements do not deviate in an exploitable way from the random-walk, investors may still be able to profit from longer-term price changes. The simplest possibility would be to exploit price trends with a buy and hold strategy. But if such trends exist, do investors or, for that matter, speculators, profit merely for bearing the price risks that hedgers may want to unload on to the futures markets, or do speculators earn profits because they successfully forecast prices? The attempts to settle the question of the relevance of a risk premium have been numerous and made with persistently improved statistical methods. But the results have to be qualified, at least, on the following grounds:

- . first, there is the forementioned identification problem;
- . second, even if one accepts the test's performance so far, the available evidence is inconclusive because it varies between commodities, contracts, trading periods and exchanges;
- . third, in the case of (temporarily) thin and hence imperfect, markets, speculators may equally well be risk neutral but earn a scarcity rent;
- . fourth, even sizeable premia are not necessarily a sufficient indicator of a risk premium because if speculators were to be averse to risk, they would, on average, probably also consider the risk related to a risk premium, i.e. its variability.

The last point leads to a more general qualification, also made

by S.J. TAYLOR (chapter 7), so far as the results presented in his contribution are concerned. The risk premium is necessarily a highly subjective concept. As such and from a modelling point of view it must also refer to expectations on the variability of the premium. Hence efforts to model price formation on futures markets in the tradition of KALDOR (1939/40) tend to obscure the issue because they rely upon the notions of quasi-objective "representative" price expectations and a (constant) risk premium to accommodate speculators.

Turning to the second business perspective, risk management, the gap between its oversimplified theoretical conceptualization and sophisticated business practice has been narrowed somewhat in recent years. This concerns particularly the move away from the one-dimensional price risk and the inclusion of quantity risk as also exemplified by J.E. STIGLITZ (chapter 4) and D.M. NEWBERY (chapter 9). And that there are even more dimensions of risk worth being considered and dependent upon the specific situation of a potential hedger is clearly demonstrated by J. ROLFO and H. SOSIN (chapter 8). The hedging strategies which they discuss also partly serve as a reminder that, via cross-commodity hedges, developments on various futures markets and the underlying spot markets can be directly linked, thus increasing the complexity of their price determination. But a look at the conditions underlying the various strategies equally supports the verdict that "the differences of opinion and practices as well as the intricacies of the variables involved make it all but impossible to reduce the outcomes to general rules for the improvement of trading effectiveness" (TEWELES et al, 1977, p. 43).

3.2. Futures trading and public policy

At least four public policy issues can be identified besides the issues of the need for and the effectiveness of the regulation

of futures markets (section 4.2.):

- . trading in financial futures as a feedback mechanism relevant to monetary policy and debt management;
- . trading in futures as a substitute for interventions in the underlying commodity markets;
- . interventions in futures markets as a substitute for interventions in the underlying commodity markets;
- . interventions in futures markets in order to improve some of the functions of these markets.

Regarding the first issue, hardly any empirical conclusions have been established so far. If, for example, futures markets were to add to the variability of interest rates, they could create a problem for monetary policy to the extent that such signals from the financial markets are used for the scaling and timing of policy. Similarly, if the monetary theory of exchange rate determination contained realistic propositions and if again currency futures tended to increase the variability of spot exchange rates, an undesirable side-effect of futures trading would have to be taken into account. But as far as the latter point is concerned, there is also the argument put forward by B. BROWN (chapter 10) that currency futures are not likely to add very much to the responsiveness of currency markets given the dominant and comparatively efficient interbank forward market.

In any case, the possible undersirable feedbacks on monetary policy depend on the relationship between the presence of futures trading and the volatility or variability of spot prices. The question has received considerable attention with respect to both commodity and financial futures. There are good a priori grounds for supposing that futures trading does not increase price volatility; and the empirical evidence seems to bear this out.⁵ But the question cannot be definitely settled with the help of conventional (non-experimental) econometric methods. However, the policy

problem also has to be assessed from a wider cost-benefit point of view. Against possible but hardly substantiated negative feedbacks on monetary policy have to be set the private and public benefits provided by futures markets, emphasized, for example, by J.M. BURNS (chapter 3). And last but not least it seems reasonable to ask whether the problem would not become negligible in any case if there were to be a changeover from the observable, partly erratic monetary policy and the monetary shocks resulting from fiscal activism to a more steady conduct of macroeconomic policy.

The second issue, futures trading as a substitute for interventions in commodity markets, is of particular importance as regards various price stabilization schemes put forward in the discussion of a new international economic order. In this context the results obtained by D.M. NEWBERY (chapter 9) have to be emphasized. He shows that, in general, futures markets are likely to offer better insurance to producers than price stabilization schemes, as long as, and to the extent that, futures markets can be made and kept highly competitive. And this condition, quite contrary to widespread prejudice, requires sufficient speculation. The comparative advantage futures trading has over price stabilization schemes largely results from (i) the discretion it gives to the potential hedger, also allowing him to take into account a possible quantity risk, and (ii) the production incentives which may become distorted with the operation of price stabilization schemes. A normative implication of using futures markets instead of price stabilization schemes may also be worth pointing out, namely that producers of the commodities in question should handle the marketing side of their business like any other producer, trader or manufacturer.

The remaining two policy issues, intervening in futures markets either as a substitute for interventions in the underlying commodity markets or in order to improve the functioning

of futures markets, are particularly well exemplified by two proposals made by HOUTHAKKER (1967, p. 51) and MCKINNON (1967, p. 851). The proposals serve well to demonstrate that even well-intended interventions in futures markets are likely to be counterproductive.

According to HOUTHAKKER, a Commodity Stabilization Agency would be established to operate in futures markets under the following rules:

- . Interventions would be guided by a so-called Indicator Price representing a three year moving average of commodity spot prices.
- . Interventions via buying or selling of futures contracts are supposed to induce private storage to the extent that spot prices are kept within a range to be established around the Indicator Price.
- . Interventions would be restricted to contracts six to nine months from maturity.

The scheme would operate as follows. If the spot price tended to fall below the floor of the price range, the Agency would have to buy futures contracts. Such purchases would have to produce a positive difference between futures and spot price (contango) large enough to induce a withdrawal of supplies via short carrying-charge hedging and also to attract additional demand via arbitrage. Hence the spot price would be supported through induced private decisions to increase stocks. Conversely, if spot prices tended to rise above the ceiling, a negative difference between futures and spot price (backwardation) would have to be produced. By selling contracts, demand for stockholding purposes would be discouraged whereas additional supplies would be attracted, leading to a reduction of private stocks. The price incentives given through a manipulation of some more distant futures prices are supposed to produce private storage

decisions similar to those a buffer stock authority would have to make in order to stabilize spot prices; consequently, the financial burden of the stockholding operations would be shifted to private market participants.

A first limitation of this proposal is rather obvious. Like buffer stock arrangements, it is only applicable to continuous inventory markets and inapplicable to non-inventory markets. With respect to discontinuous inventory markets, qualifications would be necessary in respect of the period during which practically no stocks are held. Furthermore, the possibility of attracting, if necessary, additional supplies is rather limited towards the end of the storage season. The latter point leads to a more general argument. The possibility of putting pressure on spot prices is limited by the size of private stocks held. In terms of the proposal, this means that, against its original intentions, the Agency might be drawn into holding stocks in order for it to be able to step in with spot sales should insufficient private supplies not be coming forward when needed (RICHARDSON and FARRIS 1973, p. 229).

A further problem results from the declared intention to restrict interventions to contracts six to nine months from maturity. There are side-effects to be taken into account. These result from the interdependence among the prices of all the contract maturities traded. Those prices which are directly manipulated may easily induce hedging, arbitrage and spreading operations affecting contracts of other maturities as well. Basically, such transactions would be profitable as long as intertemporal price spreads prevail which differ from the corresponding costs of storage. But such transactions would also affect the spot price. This could mean that consecutive interventions in the selected contracts would be required; however, these might not be sufficient to control spot prices (TOMEK and GRAY, 1970, p. 379). As a consequence, interventions would have to be spread

to other contracts as well, making the job of the Agency difficult if not impossible.

Doubts can also be raised as to the predictive quality of the Indicator Price. If the likely price trend could be detected so easily by using the suggested or any similar method of extrapolation, it is very likely that private market participants would already be using it successfully. In this case interventions along the same lines would hardly pay. But there are also some technical problems involved. The smoothing effect of the moving average depends upon how well deviations from the trend even out over the period considered. And from this point of view the length of the period required is very likely to differ among commodities. Furthermore, it is uncertain whether the pattern of fluctuation would remain the same in the future. As to the trend which has to be isolated by this method, the results are different for a linear trend and a non-linear trend. In the latter case, the method can only provide a linear approximation. The quality of the approximation tends to vary according to the polynomial applicable to the trend. Finally, the predictive quality also depends upon how speedily changes in the trend are indicated. A lagged response is practically unavoidable, and it will be greater the more observations of past spot prices are included. Hence the requirements as to smoothing can conflict with those conducive to signalling a change in the trend.

It is also uncertain how private market participants will behave, given the Agency's planned interventions. They could continue to adjust to the now manipulated market conditions. Alternatively, speculators could find it profitable to anticipate likely future interventions to the Agency according to the market information available to them. In this case, one possibility is that the amount of intervention would be reduced, although it would hardly be in a foreseeable way (RICHARDSON and FARRIS,

1973, p. 229). But a priori, it is also possible that the amount of intervention registered would increase. If, for example, the Indicator Price follows trend changes with a noticeable lag, informed speculators would have almost riskless opportunities to take advantage of the lagged response of the Agency which would have to defend its Indicator Price⁶. Furthermore, it can be argued that traders in the actual commodity would be inclined to economize their stocks and reduce or even stop hedging, given the announced stabilization of spot prices (and confidence that it would be achieved). Consequently, commercial transactions in futures i.e. hedging, might decline. However, according to the available evidence, they appear to be the basis for financial transactions, i.e. speculation⁷. Hence the market volume attributable to private participants might shrink even further. This tendency could be aggravated if KEYNES (1930, Vol. 2, p. 141) was to be proven correct in expecting that only relatively large variations of spot prices attract a sufficient amount of speculation. All this could mean that, if the Agency proved to be successful in stabilizing spot prices, it would serve eventually to destroy, or at least debilitate, the basis for its own interventions, viz the futures market.

Whether HOUTHAKKER's stabilization scheme would at least have a successful start can also be questioned. Ex post simulations of the market for soybeans over a period of 14 years led to the conclusion that the volatility of spot prices would tend to be increased under a HOUTHAKKER regime,⁸ changes in private market participants' behaviour being excluded. According to this study, the main reason for the failure of the scheme seemed to be that the three years moving average imposed "backward looking trends" of futures prices and quantities.

Turning to McKINNON's proposal, it would be the task of the Commodity Authority to ensure that "distant futures prices are stable and do reflect the long-term trend in spot prices" (McKINNON, 1967, p. 857) leaving spot prices and nearterm futures

prices free to vary. Any stabilizing effect on spot prices is considered to be only a welcome side-effect, and not the major objective of interventions in futures trading. Hence one of the criticisms raised against HOUTHAKKER's proposal does not apply here. The Authority is not likely to be drawn into any storage operations against its original intentions. However, again reservations have to be made according to the storability of the commodities in question. In the case of continuous inventory markets the interdependence of futures and spot prices has to be taken into account. If the Authority simply controlled distant futures prices, probably mainly by taking long positions, this would block any feedback of spot-price developments on those futures prices. Only near-term futures contracts would be affected, with the risk of causing distortions in the intertemporal price-spreads. And this would add to the volatility of spot prices via induced private transactions. Under these circumstances the proposal is more applicable to discontinuous and non-inventory markets where the relationship between spot and futures prices is less stringent.

As in HOUTHAKKER's proposal, it is uncertain how private market participants will react to the activities of the Authority. But an even more important problem appears to be how the Authority would make sure that it inserted the "right" long-term trend. MCKINNON assumes that the Authority could solve this information problem. With growing experience, it is supposed "to learn to discern a secular trend in distant futures prices by the size of the net long position it had to take in order to support a target price". And "secular changes in prices will be modest in size to which the Authority should accommodate itself to avoid supporting any longterm disequilibrium price". (MCKINNON, 1967, p. 859). The first expectation is hardly justified in the case of continuous inventory markets. Because of the interrelatedness of spot and futures prices, the Authority could easily be misled by developments in the spot market spilling over into the

futures market; admittedly this can be assumed away by attributing sufficient experience to the Authority. The second expectation cuts both ways. Even if secular price changes were modest, it could prove difficult to isolate them because of this very property. Hence the Authority could hold on too long to a wrongly estimated price trend.

The last point leads to the question of the kind of information the price trend should be based on, apart from the size of the net long position. It can at least be doubted whether a public agency would be able to achieve more than is done by numerous private market participants in collecting and using information relevant to the future. Or to put it in more general terms: "the real issue which is thereby posed is whether speculation should be done by private traders or official agencies, or by some combination of the two". (GRAY and RUTLEDGE, 1971, p. 81).

Finally, a policy which involves the establishment of more distant futures contracts have most currently available can be questioned altogether. First, it may be doubted whether there really is a strong demand for longer term contracts. To be able to lock in one single price over a long period may be counter-productive in view of the fact that market participants are unable to control in a similar way all, or at least many, of the other input and output prices which help to determine the profitability of their economic activities. Second, even if it could ever be shown that private risk aversion is greater than desired by society, with the likely effect of shortening the average time span covered by futures contracts, the priorities for economic policy can be considered to be different. Instead of trying to intervene in futures markets with highly dubious success it may be worthwhile to explore possibilities which could lower the risk burden. And a considerable part of this burden is imposed by the multitude and unpredictability of changes of government interventions at large⁹.

4. Monitoring futures trading: issues of promotion and regulation

4.1. Promoting futures trading

The successes and the failures in launching new and sustaining old futures contracts and in opening new and expanding traditional exchanges with diverging institutional infrastructures during the past fifteen years invite us to ask again what are the pre-conditions for successful futures trading. Besides adding to positive economic knowledge, the answers to the question are important from two points of view:

- . Futures trading has definitely passed the stage of predominantly spontaneous development and has become an industry with "products" introduced, managed, and diversified by the exchanges. Hence the answers are of instrumental value to the competitors, actual and potential, in this comparatively new industry.
- . Futures markets have grown to a size which in many cases is of considerable importance to the underlying spot markets and which involves a wide-ranging market participation. As a consequence governments have been induced to consider and reconsider the regulation of such markets, an activity which requires sufficient knowledge if the markets are not to be inadvertently and unnecessarily crippled by public policy.

The answers relevant to the two points of view basically refer to the two sides of the same coin, liquidity of the market and effective competition. The need for public regulation is largely a question of how to induce and to safeguard effective competition in futures trading (cf. section 4.2.); and it becomes redundant when this has come about. For the futures industry, the success of a contract depends on whether it is possible

to attract and sustain sufficient liquidity. And as already indicated (section 2.3.), the system of incentives to trade can be considered as a controlling variable.

The incentive system can be split into two components, (i) the underlying commodity or financial instrument and its properties, and (ii) the institutional infrastructure provided by the futures contract and the trading arrangements. As pointed out by D.J.S. RUTLEDGE (chapter 12), both components have received different analytical attention in the past, with the emphasis moving towards the institutional characteristics of futures markets. He also demonstrates that, on an international scale, the characteristics show a remarkable diversity. Furthermore, and as reported by R.L. SANDOR and H.B. SOSIN (chapter 11), the method of trial and error still ranks high when it comes to determining the provisions of a contract such as contract size, "tick" size, daily price limit, position limit size and deliverable grades. It may well be that the choice of the most attractive provisions is one of the areas where technical and hence systematic knowledge has to be combined with ingenuity and possibly flair.

A further unsettled question concerning the incentive system is the assessment of floor trading. There seems to be a consensus that floor brokers add liquidity to a market. Their presence or absence serves, for example, at least as a partial explanation of differences in liquidity and - possibly - informational efficiency between American and English markets for the same commodity. But this additional liquidity comes at a price. As argued by J.M. BURNS (chapter 3), floor brokers find themselves in a privileged position compared with other market participants when it comes to the speed at which orders can be executed. Hence they enjoy an institutionally determined competitive advantage in the exploitation of trading opportunities arising out of new information. Furthermore, a minimum return is provided to them depending, as shown by R.L. SANDOR and H.B. SOSIN (chapter 11), on the "tick" size.

It may well be that these selective incentives on balance still create net benefits by attracting additional trade and trading skills, given the present organisation of exchanges. But it remains to be explored whether an organisational innovation like electronic trading may not allow the striking of an even more favourable balance between incentives to trading and the strength of competition.

4.2. Regulation and market performance

As with all other economic activities, the performance of futures markets can be assessed on allocative and distributive criteria. Even if the result of such an assessment were to support government regulation in principle, rationality would require us to weigh carefully the likely benefits of regulation against the cost to be incurred. Assessment requires the following:

- . an operational reference system which allows a comparison between actual performance and possible performance,
- . solid empirical evidence to establish deviations between actual and possible performance,
- . courses of regulatory action which, according to a priori reasoning and relevant experience, are likely to be effective in terms of reducing or removing such deviations,
- . estimates of the direct costs of regulation in terms of resources required as well as an evaluation of possible side-effects of regulatory action.

Only too frequently one or even several of these requirements for a rational policy conduct are violated.

To date, public opinion on the functions and the performance of futures markets seems to reveal even more contempt for these

markets than for stock exchanges. Hence arguments for their regulation, or even prohibition receive wide spread support only too easily. Among arguments put forward in favour of regulation three are particularly popular: (i) dangers of price manipulation, (ii) additional price volatility due to speculation, and (iii) losses imposed upon inexperienced traders. Whilst the last argument is purely distributive, the first two suggest market failure with allocative and distributive consequences.

As far as manipulation and price volatility are concerned, it is important to note at the outset that it proved to be extremely difficult to muster unambiguous empirical evidence. As regards manipulation, the results presented by G.T. GEMMILL (chapter 13) reaffirm previous findings. They can be summarized in terms of the verdict of CAGAN (1981, pp. 173, 174) referring to interest rate futures markets: (i) "...the bugaboo of corners should be laid to rest. Although their possibility always seems to cast an ominous shadow over futures markets, corners are almost never achieved". (ii) "Most squeezes probably reflect fortuitous developments rather than intended manipulation".

Turning to the alleged additional volatility of futures and spot prices due to speculation on organized futures markets, the proposition had already been questioned when dealing with the more general issue whether futures trading has a destabilizing impact on prices (section 3.2.). Furthermore, destabilizing speculation is difficult to reconcile with the predominant finding that prices on liquid futures markets can be reasonably closely described in terms of the random walk model. If price changes turn out to be basically unpredictable, they indicate that the market participants have not missed significant opportunities to profit from informational advantages. As an unintended (external) effect of their competitive trading, prices tend to become informationally efficient. Any trading effort to

drive prices off this efficiency "walk" would simply invite losses, except when such efforts turn out to be consistent with future developments so far unknown to anybody. This does not exclude the possibility that the efforts themselves may be undertaken at random (CAGAN, 1981, p. 178). But it is difficult to see them as a major but still random component in price determination. Even the proposition of overshooting, which refers to a sequence of price changes as a whole and not to individual consecutive changes, has less empirical force than a simple inspection of futures prices may frequently suggest. As shown as early as 1934 by WORKING, a random walk can be quite consistent with a price series which seems to suggest a systematic cyclical component.

As far as inexperienced but nevertheless avaricious market participants are concerned, they may well be responsible for some of the random changes in prices and may have to take losses which necessarily must be profits to others. But it is difficult to see that such redistribution should require any regulation going beyond protection against criminal acts like fraud. First of all, the possible implication that experience is a sufficient safeguard against losses cannot be reconciled with imperfect information and uncertainty. Second, nobody has forced inexperienced market participants to engage in trading. Hence they may well be left to bear the full responsibility of that freedom of action as is done in other cases of economic activity. Third, losses resulting from poor decisions can be a better teacher than paternalistic regulation.

But even if it be accepted that market participants should be protected from their own imprudence, what form should such protection take? In order to be effective, more than public warnings and the provision of information would be required. Most likely, such regulation would have to assign to brokers the task of protecting customers. But how should the requisite rules

be defined? Where is the borderline to be drawn between prudent and imprudent trading decisions? Who is to supervise the performance of brokers and who is to audit the supervisors? The likely outcome would be a regulatory chain of little effectiveness in terms of protection but with stifling consequences for futures trading. If there is to be any protection of inexperienced traders, it has to come from the brokers themselves acting in their own interest. And it can well be argued that they have an interest in advising their customers well, particularly as they have to offer their services, including their advice, under competitive conditions. Furthermore, the exchanges have an interest in orderly relationships between their members and the members' clients. Hence feasible safeguards have been introduced over time into the self-regulation of the exchanges.

Self-regulation and public regulation also are substitutes when it comes to preventing manipulation. This is demonstrated by G.T. GEMMILL (chapter 13) who compares the British and American practice. And both substitutes seem to be equally ineffective in view of the practical difficulties of excluding completely (temporary) concentration as a precondition for manipulation. However, particularly in view of the competition between the various exchanges, which no longer stops at national borders, it can be argued that exchanges and their members have an interest in maintaining orderly trading conditions in general and protecting their clients in particular. This does not exclude, on the other hand, the possibility that they are inclined to tolerate monopolistic elements in the trading organization and in contract design as a source of revenues for their members - as is argued, for example, by J.M. BURNS (chapter 3). But it is difficult to see that frequent and substantiated complaints of monopolistic trading practices on an exchange would leave its volume of transactions unaffected.

If, however, there exists an incentive for self-regulation,

the exchanges are unlikely to extend regulation beyond codifying and generalizing common practice, because such extension would merely increase the costs of using these markets. Such restraint cannot be expected from government regulation, where an extension of regulation is more compatible with the production incentives of bureaucracies weakly checked by budget constraints. And given the limited effectiveness of both private and public regulation, the harsh verdict of STIGLER (1975, p. 177) may serve as a useful reminder whenever one is tempted to strive for perfection through regulation: "Public regulation, for all its enormous momentum, lives by its goals and not by its achievements, and surely we ought eventually to tire of promising preambles and unpromising achievements".

FOOTNOTES

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1. Corresponding evidence has been provided, for example, for the International Monetary Market (IMM) in Chicago by the 1977 survey of the Commodity Futures Trading Commission (CFTC). (cf. International Commodities Clearing House, 1979, Appendix V).
2. Notable exceptions are quite early contributions like the one by HOFFMAN (1932), who emphasizes (p. 407): "that hedging is something more than simply setting up counter future transactions and hoping for the best". And his definition of hedging (pp. 405 ff.) correspondingly includes expectations as to basis changes as a constitutive element.
3. For a discussion of the taxation aspects of futures trading with reference to U.S. Laws and regulations cf. POWERS and VOGEL (1981, chapter 19).
4. For a more detailed discussion see STREIT, 1982.
5. For a summary cf. STREIT (1981, pp. 495 ff).
6. To skilled chartists, such technical shortcomings of the intervention scheme would be quickly revealed. If the Agency tried to frustrate speculative trading by frequently changing the scheme, this would presumably be counterproductive to the stabilization objective.
7. Studies relating hedging and speculation suggest that, when measured in terms of open contracts, the total amount of business done on a futures market tends to vary fairly closely with the amount of hedging contracts outstanding and not so much according to those open contracts attributable to speculation (e.g. WORKING, 1970, pp. 14). In addition, according to the history of individual futures markets, no cases are known where speculative motives rather than the desire to shift commercial risks were the driving force to open such a market.
8. According to RICHARDSON and FARRIS (op. cit.) who claim to have used as indicators for the total market values for the elasticity of demand and supply which are even rather favourable when taking into account the operation of the scheme.
9. For a wider discussion of the time horizon in futures markets and of government interventions cf. STREIT (1981, pp. 500).

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FUTURES MARKETS -

MODELLING, MANAGING, AND MONITORING FUTURES TRADING

Manfred E. Streit, editor

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IN TWO VOLUMES.
VOL. I.
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PRINTED BY
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1842.

