



The Brent Market
An Analysis of Recent Developments

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EXECUTIVE SUMMARY

The Brent market is an informal forward market for physical oil. It has gained considerable importance during the past three or four years playing an important role in the pricing of internationally traded oil. But the growth of the Brent market and its informal character have caused problems: recent bankruptcies and performance failures have affected confidence and, on occasions, brought trading to a standstill.

This paper addresses both the issue of growth (what causes the increase in the volume of trading?) and that of failure (are there any problems associated with either growth or the informal character of operations?). It begins with a succinct description of the market and provides data on growth on trading, changes in the time-characteristics of transactions and prices.

The motives of agents trading in the Brent market, motives which include hedging, speculating and tax-spinning, are analysed. The increasing importance of speculative activity is noted. The determinants of growth are discussed. An important factor is the dispersion of expectations held by traders: if expectations about price movements are widely spread then the number of deals can be high. Another factor is the perception by integrated oil companies that they could lower their tax liability e.g. trading arm's length at prices lower than the key-reference.

The paper identifies the problems which may cause significant strains in the market, such as faster movements in spot prices than allowed for in the previous backwardation, large numbers of transactions in relation to the wet cargoes available and high backwardness of maturing deals causing large forecasting errors.

The future of the Brent market depends on the state of perceptions about risks of failures, the size of potential gains to be made from using the market and implementation of new arrangements which lessen concern about possible defaults.

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FOOTNOTES

1. This is a summary of material given in The Market for North Sea Crude Oil (1986) and concentrates on the central features of trading.
2. Deals in which neither party owns or plans to own the oil are known as "paper" deals as opposed to "wet" deals.
3. See The Market for North Sea Crude Oil for details of the arrangement.
4. If there were a collection of firms who were risk-takers, then it is possible that the market could be sustained by the long run losses willingly borne as the price of playing in this risky environment.

REFERENCES

- [1] Petroleum Argus, formerly Europ Oil Prices, weekly, published by Petroleum Argus Limited, 104-108 Grafton Road, London NW5 4BD.
- [2] The Market for North Sea Crude Oil by Robert Mabro, Robert Bacon, Margaret Chadwick, Mark Halliwell, David Long. Oxford University Press, July 1986.

INTRODUCTION

The recent history of the informal market for North Sea Brent blend has been of great interest to those studying commodity markets in general and the oil market in particular.

Two aspects of this market gives it this important position. First, the very rapid growth in activity in the Brent market means that for much of 1985 an average of at least 400 deals a month were being made. With each deal being for a lot size of 600,000 barrels of oil at around \$25 a barrel the total turnover in 1985 was at least \$72 billion. The second feature of the market is that it operates as an informal forward market. There is no central clearing agency, as in a futures market, and so each deal is done directly between agents. These facts raise a number of questions:

- (i) What causes the increase in the volume of trading in the Brent market, and are there any limits to this growth?
- (ii) How can an informal market of such a size operate, and are there any problems associated with the informality of operation?

Before we can sketch answers to these questions, it is necessary and indeed highly illuminating to describe, first, the actual institutional aspects of the market and to analyse in some detail the pattern of growth in the market. The paper is

thus arranged in five sections. Section 1 describes the method of buying and selling Brent cargoes and the nature of the buyers and sellers. Section 2 provides data on the amount of trade in Brent, the time pattern of deals and of prices, and on the relationship between trade and physical production of Brent blend. Section 3 discusses agents operating in the Brent market and their trading motives; and Section 4 analyses the determinants of the equilibrium size of the market, both in the short and long run. Finally, Section 5 attempts an interpretation of Brent market behaviour in the light of the earlier discussion. It also includes reflections on the general difficulties of such a market operating smoothly.

1. BUYING AND SELLING BRENT BLEND

There are two distinct types of contract in the buying and selling of Brent Blend and three distinct types of agent. We start with the contracts.¹

A contract to buy or sell Brent can be either "dated" i.e. for a specific date, or it can be for a specific month that is "open" as regards the day of delivery but with the delivery month agreed. Given that schedules of loading for a particular month are not agreed until the beginning of that month, "dated" cargoes can only refer to the current month. The open contract has two special features:

(i) The seller nominates when oil will be delivered in the month in question but must give at least 15 days' notice of the intention to deliver. The buyer has a 3 day margin around the delivery date suggested by the seller in which he can agree to take delivery. Thus the seller has a far greater flexibility than the buyer in scheduling the actual consummation of a deal. The effect of the 15-day rule is that after the middle of a month (say March) it is not possible to deal in an open March contract since 15 days' notice of delivery could not be given. April delivery would be the nearest time possible.

In practice, open deals started in 1983 with virtually all deals being for the current month or one month ahead; by late

1983 two month deals were regular, soon followed by three month deals in early 1984. Four month deals emerged as a common feature in mid 1985.

Before the beginning of 1985 all deals were for lot sizes (tankers) of 500,000 barrels of Brent Blend crude while from 1985 on the lot size increased to 600,000 barrels.

(ii) The deal is made by telephone and confirmed by telex directly between the two parties involved but it is not paid for at this stage. Payment is made 30 days after delivery. Given the very large size of the deal, it is not surprising that security is sometimes sought in letters of credit or similar financial guarantees.

There are three distinct types of agent active in this market, although in practice certain companies contain some or all characteristics:

- (i) there are companies which produce crude oil (or have a participation entitlement) who for various reasons wish to sell some or all of their production;
- (ii) there are refiners of oil who need to buy some or all of their inputs;
- (iii) there are traders who own neither oil nor refineries and so if they buy oil must sell it to someone else (or if they sell must buy) in order to meet their obligations or not to receive a large amount of a commodity for which there are virtually no storage facilities.

The existence of these pure "traders" or middlemen, combined with the lack of a clearing agency has given rise to a phenomenon known as a "daisy-chain". At the point of nomination the

producer informs somebody who has purchased from him that there will be a delivery in that month. This person may well be a trader who does not want the oil². He therefore must immediately inform someone that he has sold to that a cargo is nominated for the latter to receive. This person in turn, if not a refiner, must "pass the parcel" on. This continues until either a refiner is nominated (who is willing and anxious to receive the physical cargo) or until there is no time left (i.e. the 15 day rule is binding). In such a case the middleman must expect to take delivery but may try to sell, perhaps as a dated cargo, sometimes at a discount. The actual linking from first buyer to last seller is the "daisy chain" and the exact membership of the chain is not determined until the nomination procedure starts.

This account makes it clear that the motives for the middlemen are purely speculative. They go from a closed position to an open one and then back to a closed position, hoping to make a margin between the prices at which they bought and sold. However, in this market nobody can be sure that his position is closed until the daisy chains have been established. As we shall show later, this market has been de facto dominated by speculative deals.

Although there is some trading in all the North Sea crudes the existence of a substantial forward paper market is confined at present to Brent blend (which is of course a substantial fraction - around 40% of total production). Accordingly, the rest of this study is addressed to this specific market.

2. THE SIZE AND TERM STRUCTURE OF THE MARKET

The introduction of the speculative motive into the Brent market has affected behaviour in several ways. First, the number of deals has increased very greatly. Secondly, there has been a marked increase in the willingness to buy and sell further forward. Thirdly, there has been an effect on the volatility of the market, both in terms of numbers of deals and also possibly in price behaviour.

In order to trace the development of the market, it is necessary to have some data, and for this the publication by Petroleum Argus [1] of the results of their survey of the market is invaluable. Petroleum Argus monitors market activity by contacting all known traders each day and asking for details of deals done. These are then checked with the other party named. The published data give the day on which the deal was done, the month for which it was done and the price at which it was done. These data were available on a daily basis from the middle of August 1983. Since the Brent market is not recognised as a formal Exchange with trading Plan there can be no official records of activity so that Petroleum Argus is probably the most complete source of information available. Of course there may well have been a degree of under-recording, particularly at the beginning of the period, but we shall assume that recording has

improved and that there is no pattern to the missing data.

The weekly data are reported in The Market for North Sea Crude Oil [2] but for our purposes it is necessary to aggregate the data. The key to aggregation is the contract period, which is specified by the calendar month. If we are interested in the extent to which deals are made further forward than the minimum, then the 15-day rule prevents us from aggregating by calendar month. For example, in the first half of March deals for March are still possible so that deals for April are deliberately not "current", while after mid-March deals for April are the nearest date that can be made. Accordingly we define a "trading" month as running from the middle of one month to the middle of the next and we call it by the name of the later of the two. Thus in "March" (mid-February to mid-March) we can identify deals for March (calendar month) which we denote "current" deals; deals for April (calendar) which we denote 1 month deals etc. On this basis we present first in Table 1 the number of deals recorded in each "trading" month for each calendar month.

TABLE 1: Deals Done in Trading Months By Number of Months Forward

TRADING MONTH	CURRENT	ONE MONTH	TWO MONTHS	THREE MONTHS*
Sept. '83	13	20	1	0
Oct. '83	41	60	0	0
Nov. '83	37	41	3	0
Dec. '83	29	40	14	0
Jan. '84	31	44	28	0
Feb. '84	54	68	20	0
March '84	44	87	35	11
April '84	28	53	38	14
May '84	22	95	43	7
June '84	30	87	47	20
July '84	45	83	83	45
Aug. '84	39	103	120	77
Sept. '84	55	84	100	53
Oct. '84	54	74	64	17
Nov. '84	47	236	42	11
Dec. '84	63	75	77	35
Jan. '85	45	98	66	8
Feb. '85	96	263	106	15
March '85	66	161	117	22
April '85	50	124	97	25
May '85	62	182	74	55
June '85	60	140	105	69
July '85	54	103	55	29
Aug. '85	71	135	108	135
Sept. '85	63	141	86	87
Oct. '85	110	197	208	91
Nov. '85	85	230	188	62
Dec. '85	47	212	195	27
Jan. '86	52	126	78	29
Feb. '86	82	273	154	23

Note: * 3 or more months ahead.

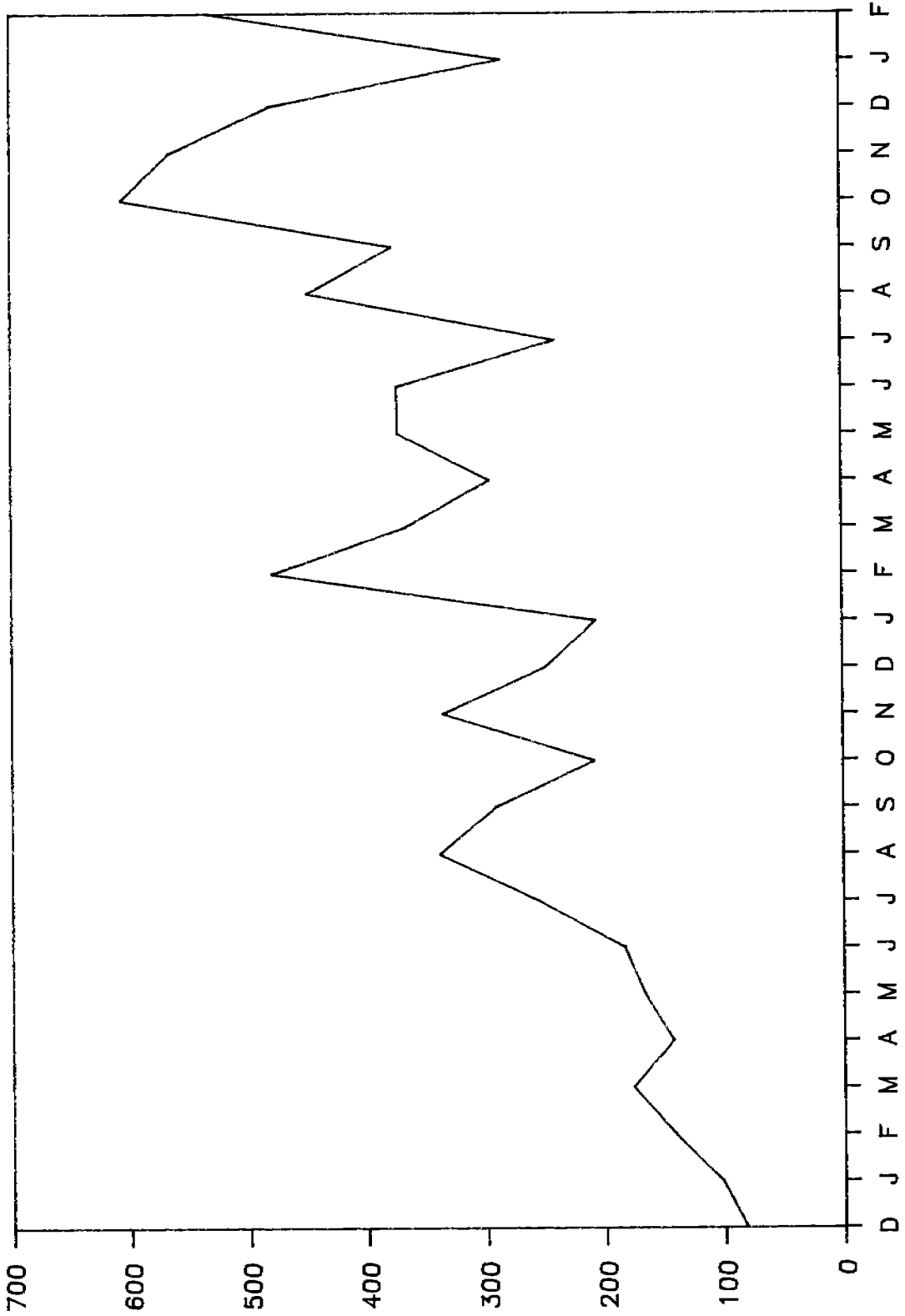
Given this data we can combine them in various ways to form pictures of overall market activity.

(a) **Total New Deals in a "Month"** The number of new deals made each trading month is the easiest statistic to collect and is the horizontal sum of entries from Table 1. For example, in 'June' 1985 there were 374 deals. The data is plotted in Figure 1.

(b) **Total Number of Deals for a Month** This is the total number of all deals made which fall due in a calendar month. For example, in "June" 1985 60 deals were made to fall due in June, in "May" 182 deals were made for June, in "April" there were 97 deals for June and in "March" 22 deals - a total of 361. The diagonal sums of Table 1 give the total number of deals for a month. The results are plotted in Figure 2.

(c) **The Total Number of Deals Outstanding** The easiest way to construct a measure of the "size" of the market is to calculate at the end of a trading month how many deals are still outstanding. At the last day of "June" there could be deals for July, August, September. There could also be deals for June to be delivered (but no new ones to be made). Thus the triangular summation will underestimate the size of the market. If we assumed that half the current month deals at end of "June" will in fact be delivered in the second half of the calendar month, we will not be too far out for a measure of total market size. Hence at end of "June" 1985 we have 239 deals for July, 160 for August, 69 for September and 180 for the rest of calendar June - a total of 648. The results are plotted in Figure 3. These various totals are given in Table 2.

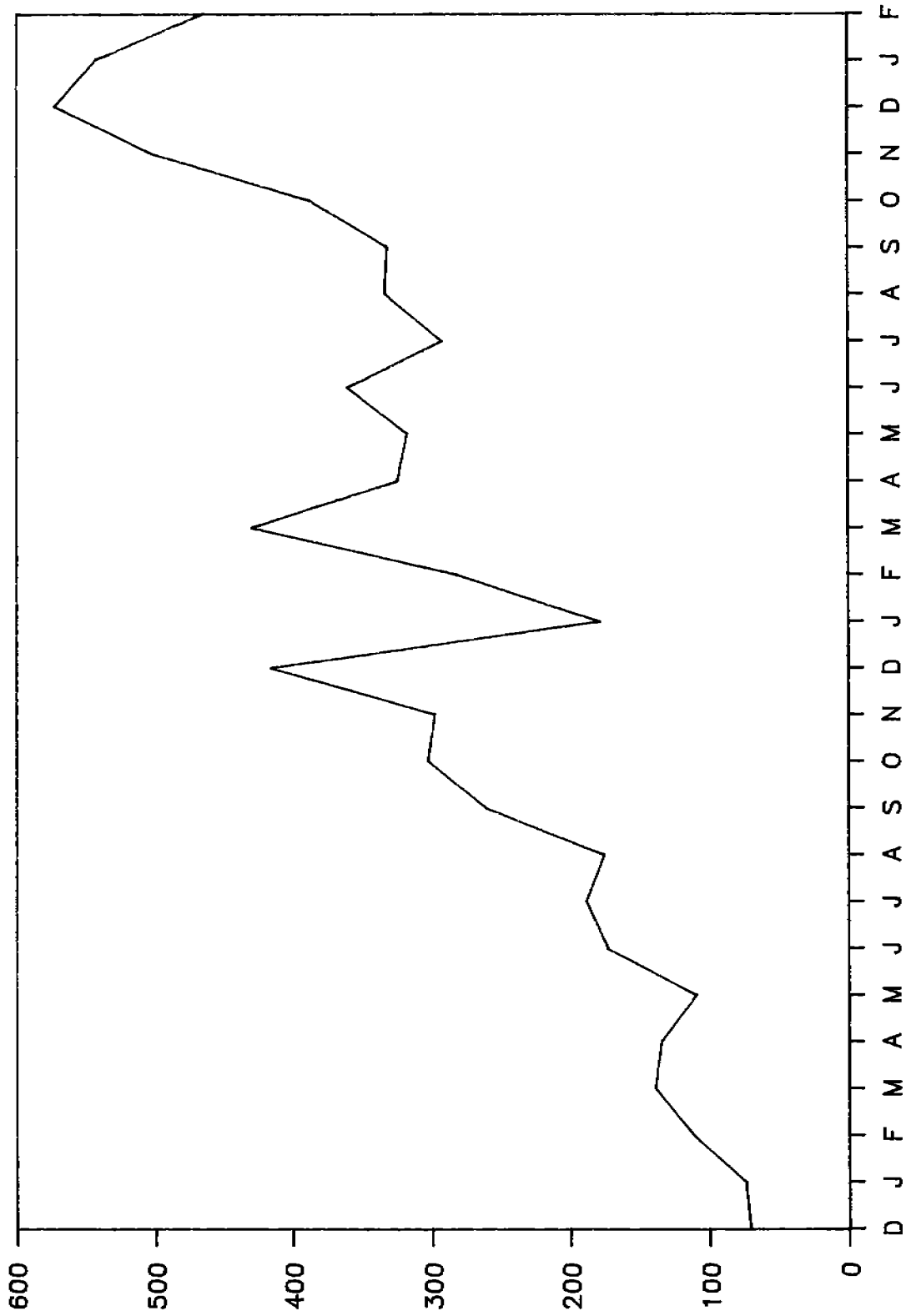
DEALS IN THE MONTH



1984 1985

FIGURE 1

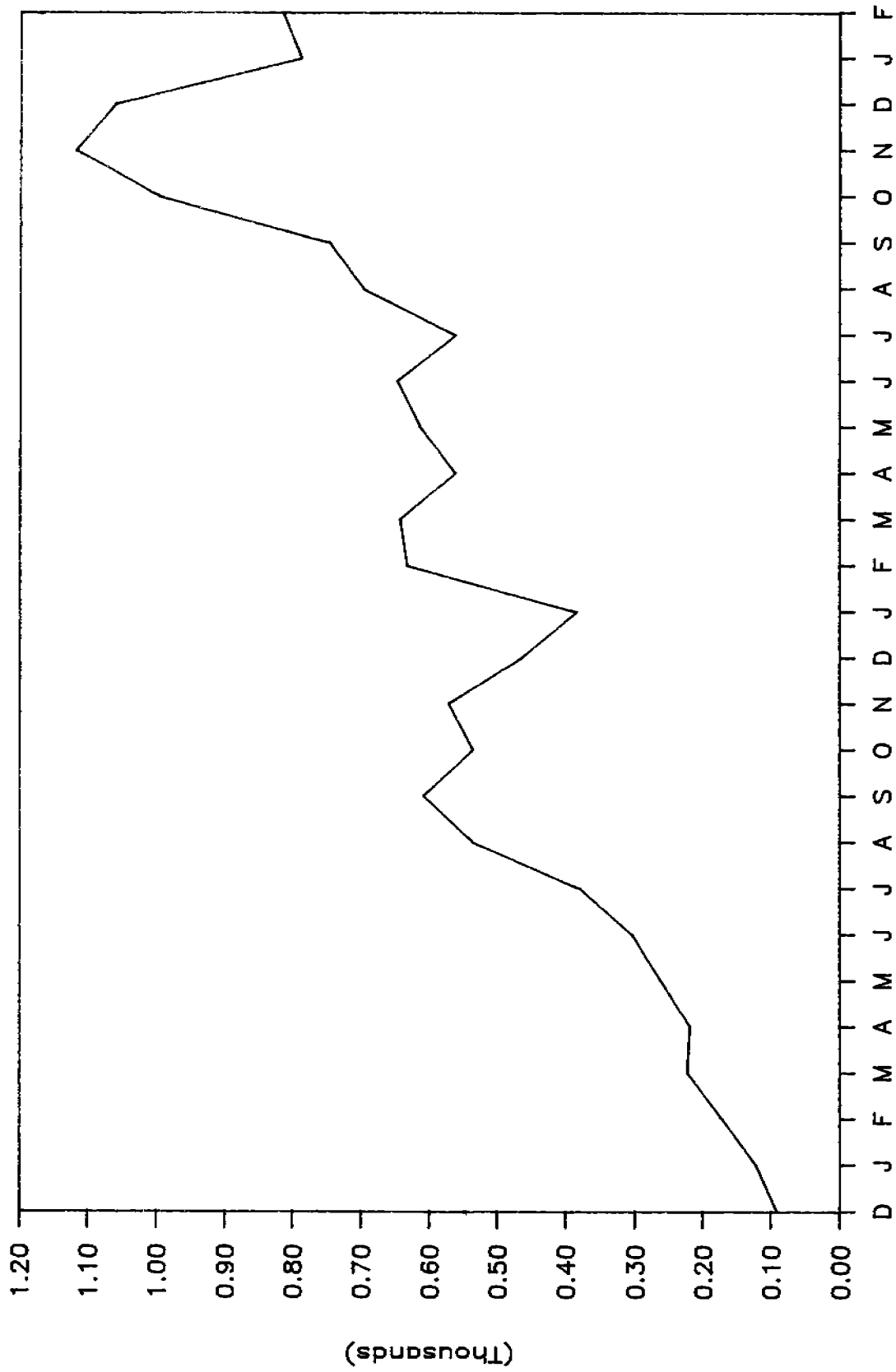
DEALS FOR THE MONTH



1984 1985

FIGURE 2

DEALS AT MONTH END



1984 1985

FIGURE 3

 TABLE 2: Deals In The Month, For The Month And At Month End *

MONTH -----	IN THE 'MONTH' -----	FOR THE MONTH -----	AT MONTH END -----
Dec. '83	83	70	92
Jan. '84	103	74	123
Feb. '84	142	112	172
March '84	177	140	223
April '84	143	135	219
May '84	167	110	263
June '84	184	174	305
July '84	256	189	380
Aug. '84	339	176	536
Sept. '84	292	261	609
Oct. '84	209	303	536
Nov. '84	336	298	572
Dec. '84	250	416	465
Jan. '85	207	179	385
Feb. '85	480	282	634
March '85	366	430	644
April '85	296	325	562
May '85	373	318	614
June '85	374	361	648
July '85	241	293	562
Aug. '85	449	334	698
Sept. '85	377	332	747
Oct. '85	606	388	998
Nov. '85	565	503	1,118
Dec. '85	481	572	1,061
Jan. '86	285	543	789
Feb. '86	532	465	816

Note: * December 1983 is the earliest date for complete data since data for the month starts from deals in September made three months forward.

Table 2 immediately reveals two important characteristics: the market has grown rapidly, and there has also been great fluctuation on a month by month basis. The different columns of the table have to be interpreted in slightly different ways. The number of deals in a "month" reflects the new activity in that month, and this is likely, as we shall show below, to reflect the range of views about likely future development. The wider the

spread of views the larger the number of deals. At the same time, if new agents learn about the market, or existing agents are willing to assign more resources to the market there will also be growth. There seems to be a three-month cycle in the latter half of the period (with peaks in August, November, February and May) but the reason for this is unclear and it may be a statistical quirk of the short data series. There appears to have been some growth during 1985 particularly in the last quarter (see Figure 1).

The number of deals **for** a month reflects the number of agents who were willing to be involved in a "daisy chain" (i.e. to be settling accounts) at any particular time. It is on the basis of the profits and losses incurred from the settlement of such chains that agents will assess their performance. This is the measure that is most closely related to the amount of physical oil being delivered in the month. The actual number of wet deals is unknown without direct information on the amounts the integrated producers are keeping for their own purposes and not selling on the market. However, the actual production of Brent blend, which gives the upper limit to the number of wet deals, is shown in Table 3.

TABLE 3: Production Of Brent Blend * Thousand Barrels/Day
1983-86

December 1983	869
January 1984	932
February 1984	962
March 1984	945
April 1984	908
May 1984	739
June 1984	725
July 1984	794
August 1984	870
September 1984	892
October 1984	967
November 1984	955
December 1984	1,012
January 1985	1,025
February 1985	981
March 1985	951
April 1985	891
May 1985	873
June 1985	764
July 1985	850
August 1985	844
September 1985	826
October 1985	949
November 1985	940
December 1985	969
January 1986	969
February 1986	951

Source: Wood McKenzie

Note: * Brent blend is the output of the following fields: Brent, Cormorant, North Cormorant, Devron, Dunlin, Hutton, N.W. Hutton, Murchison (U.K.), Thistle, Murchison (Norway).

Comparison of Table 3 and column 2 of Table 2, as shown in Figure 4, shows that even looking at 1985 (by which time the most rapid growth in the market had already occurred) there is little correlation between the series. The number of deals for a month does not reflect the amount of crude that is available (unless the integrated producers are varying the amounts they sell by

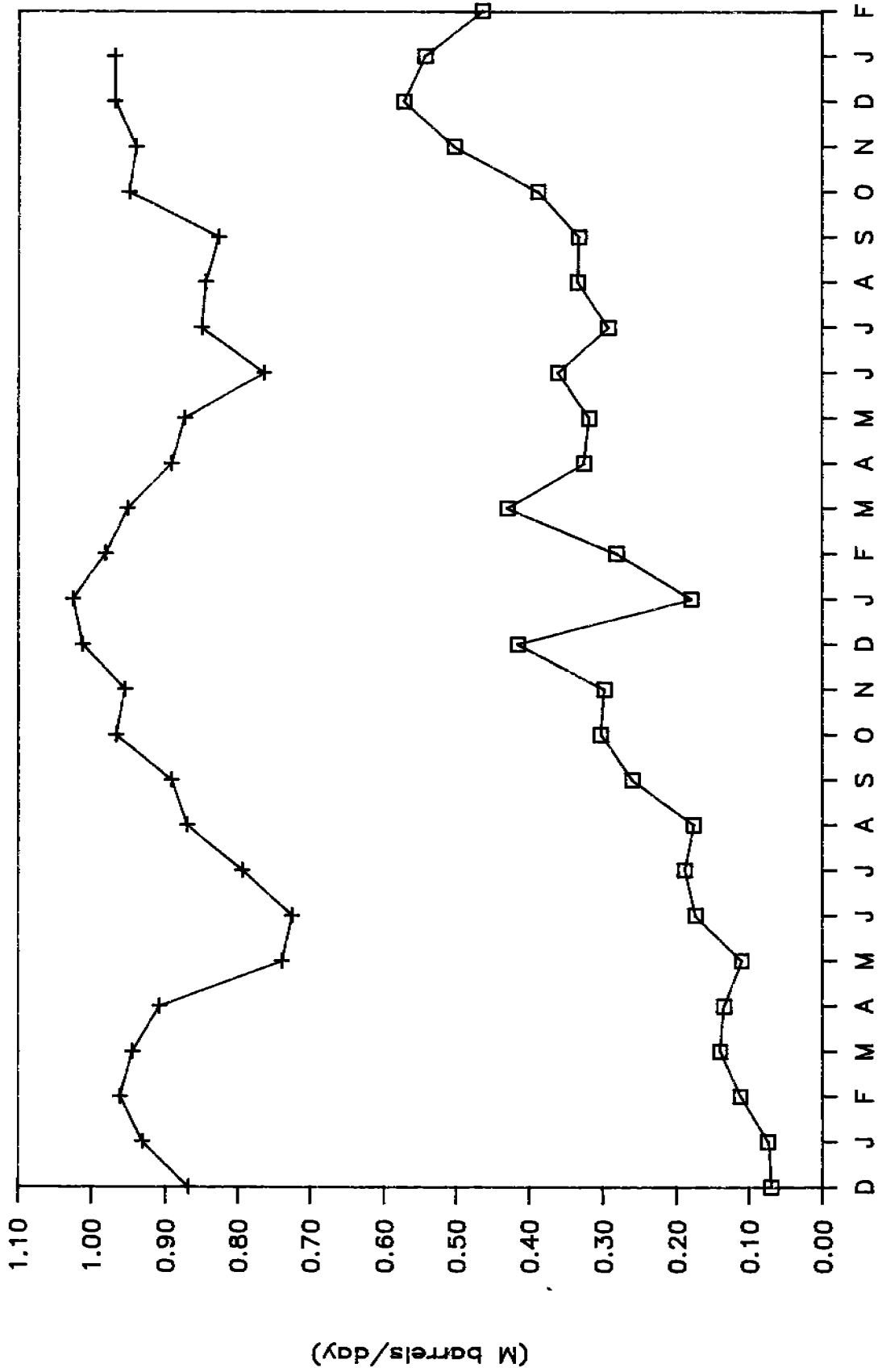
very great amounts). In the absence of information on the number of wet cargoes on the market the number of deals **for** the month is an index of the average length of the daisy chains. On this basis, there has been a very substantial increase (perhaps a tripling in average length) between early 1984 and late 1985 (see Figure 2).

If we take the maximum amount of Brent blend produced as being all sold on the market, which is about 1 mb/d we can see that this is about 50 cargoes a month. On a number of deals for a month of around 500 the minimum length of the average daisy chain (the ratio of paper or speculative deals to wet deals) is 10 to 1. In practice, not all Brent is sold on the market and not all market transactions will be recorded so that the ratio is definitely (and significantly) greater than 10 to 1.

The variation in the number of deals **for** the month, although substantial, is clearly less than that for deals **in** the month (with the exception of January 1985 which saw an exceptional drop from the previous month). There is no clear seasonality, and indeed there seems to be little growth in the first nine months of 1985, but there was a very large increase in the number of deals terminating in late 1985 and early 1986.

The number of deals outstanding at the end of a month is a measure of the total overhang on the market - a measure of the amount of money committed to it. This in fact does show very substantial growth during 1985, and is because the number of new deals being made **in** the Autumn of 1985 is greater than the number of retirements (deals **for** the month). The peak reached in November 1985 is very striking.

BRENT PRODUCTION AND DEALS FOR MONTH



1984 1985
 + Brent production

□ Deals for month

FIGURE 4

A different way of presenting the same data is to look at the age structure of the deals. The measures of numbers of deals each have a corresponding "average age of deal" measure.

(1) Average Life of New Deals (Forwardness of New Deals)

In order to analyse how far ahead on average new deals are being made we define the **incremental forwardness** under $F_1(t)$:

$$F_1(t) = \frac{\sum_{i=0}^3 i D(i, t)}{\sum_{i=0}^3 D(i, t)} + \frac{1}{2} \quad (1)$$

where $D(it)$ is the number of deals done in period t for i periods ahead. In fact, since each deal will be delivered in a calendar month and the index is based on deals in a trading month, we must add half a month to obtain the average time for making the deal until doing it. In demographic terms this is the life expectancy of new deals. The series is plotted in Figure 5.

(2) Average Age of Concluding Deals (Backwardness of Deals for the Month) If we wish to find out in a given month the average age of those deals which are being settled then the analogous index is the **backwardness index** $F_2(t)$:

$$F_2(t) = \frac{\sum_{i=0}^3 i D(i, t-i)}{\sum_{i=0}^3 D(i, t-i)} + \frac{1}{2} \quad (2)$$

i.e. an average based on the sum of deals for t made three months, two months etc. ago. As before a factor of one half is added to line up the months. This, in demographic terms, is the average age of those deals dying at a given moment. The series is plotted in Figure 6.

FORWARDNESS IN THE MONTH

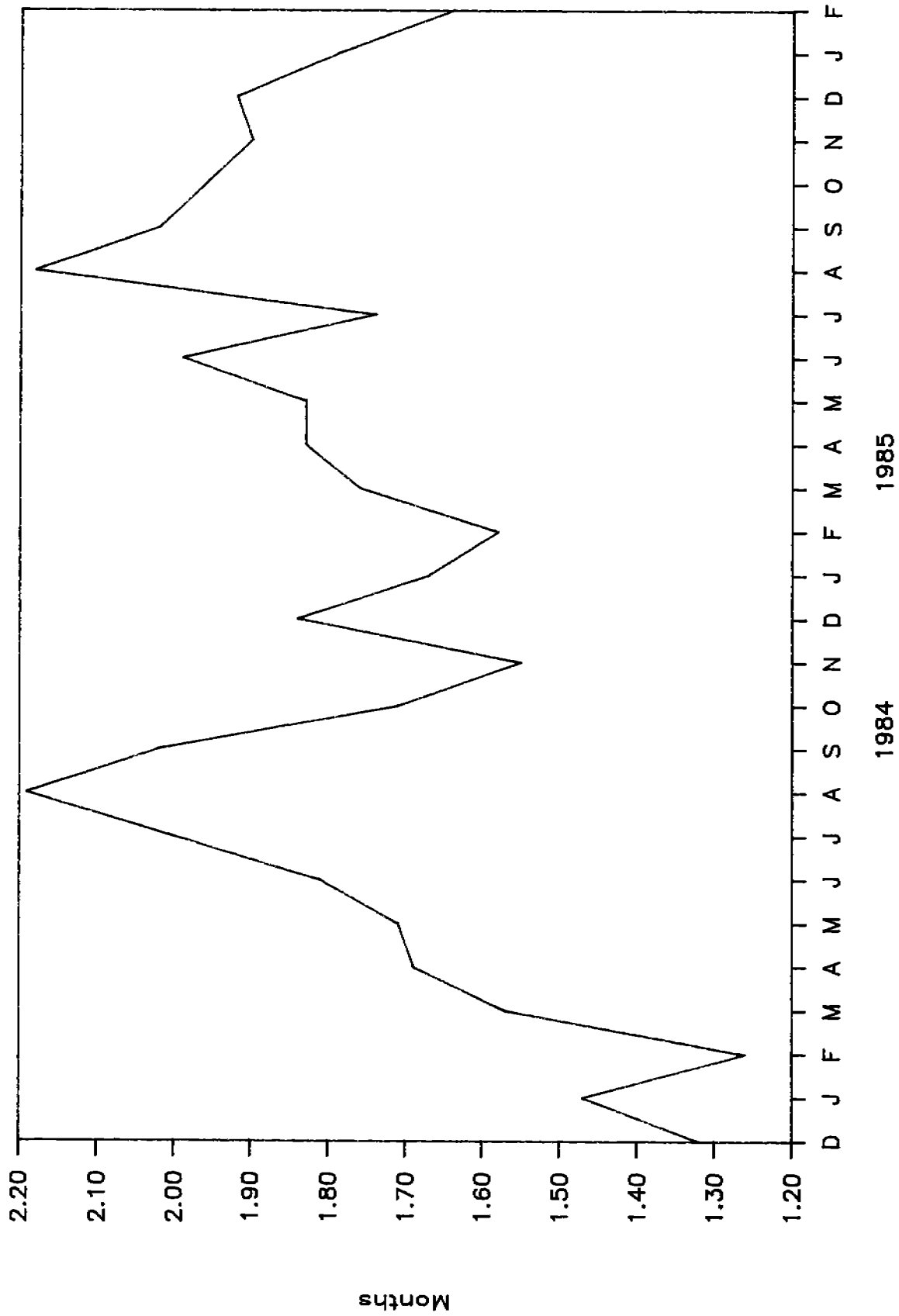
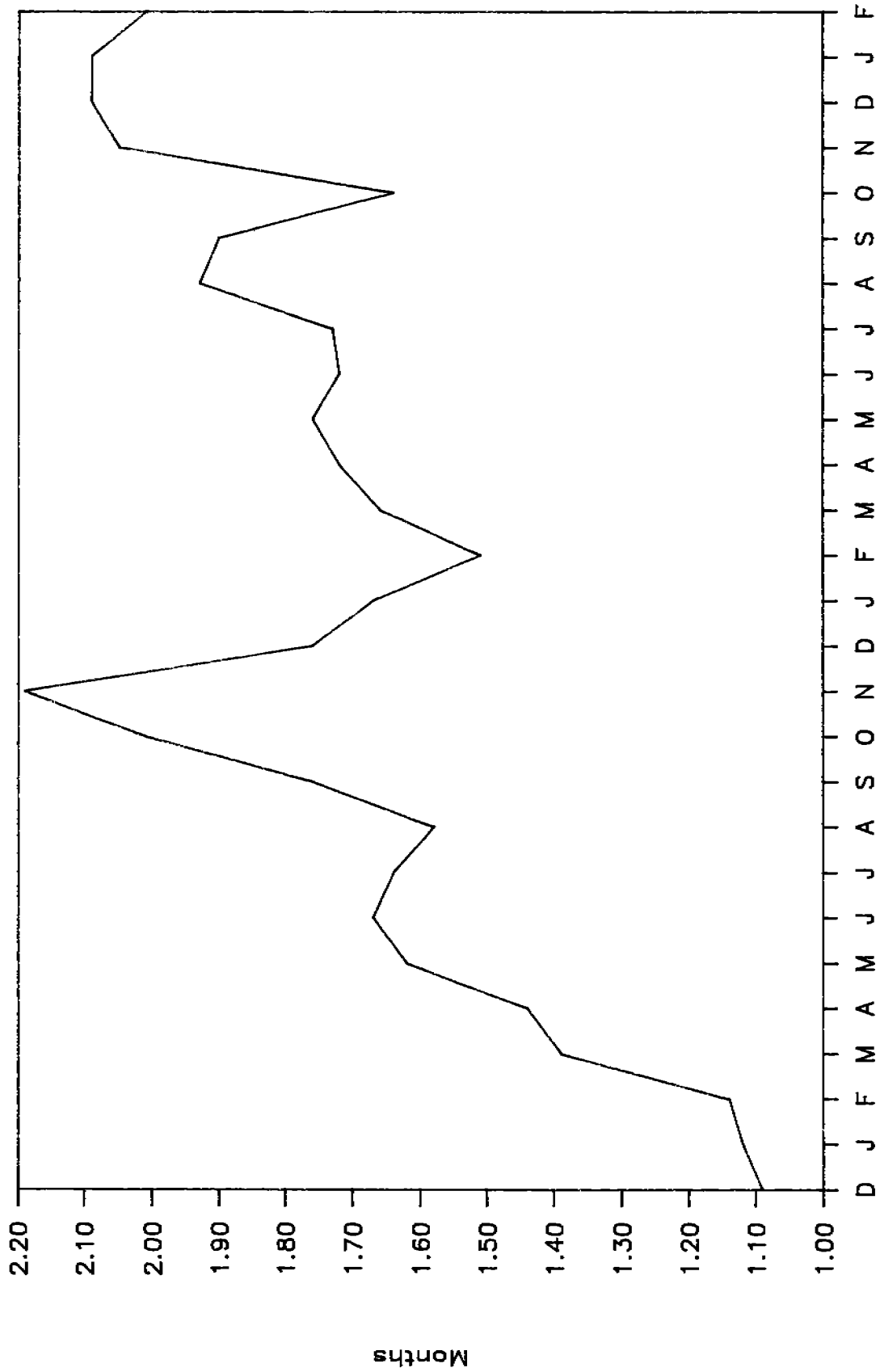


FIGURE 5

BACKWARDNESS FOR THE MONTH



1985

1984

FIGURE 6

(3) The Average Life Expectancy of Deals Outstanding If we wish to know not only how many deals are still outstanding but also the length of time they still have to run then we need the **total forwardness index** $F_3(t)$:

$$F_3(t) = \frac{\sum_{i \geq j} \sum_{j=1}^3 j D(t+j-i, t+i)}{\sum_0^3 \frac{1}{2} D(t-i, t+i) + \sum \sum D(t+j-i, t+i)} \quad (3)$$

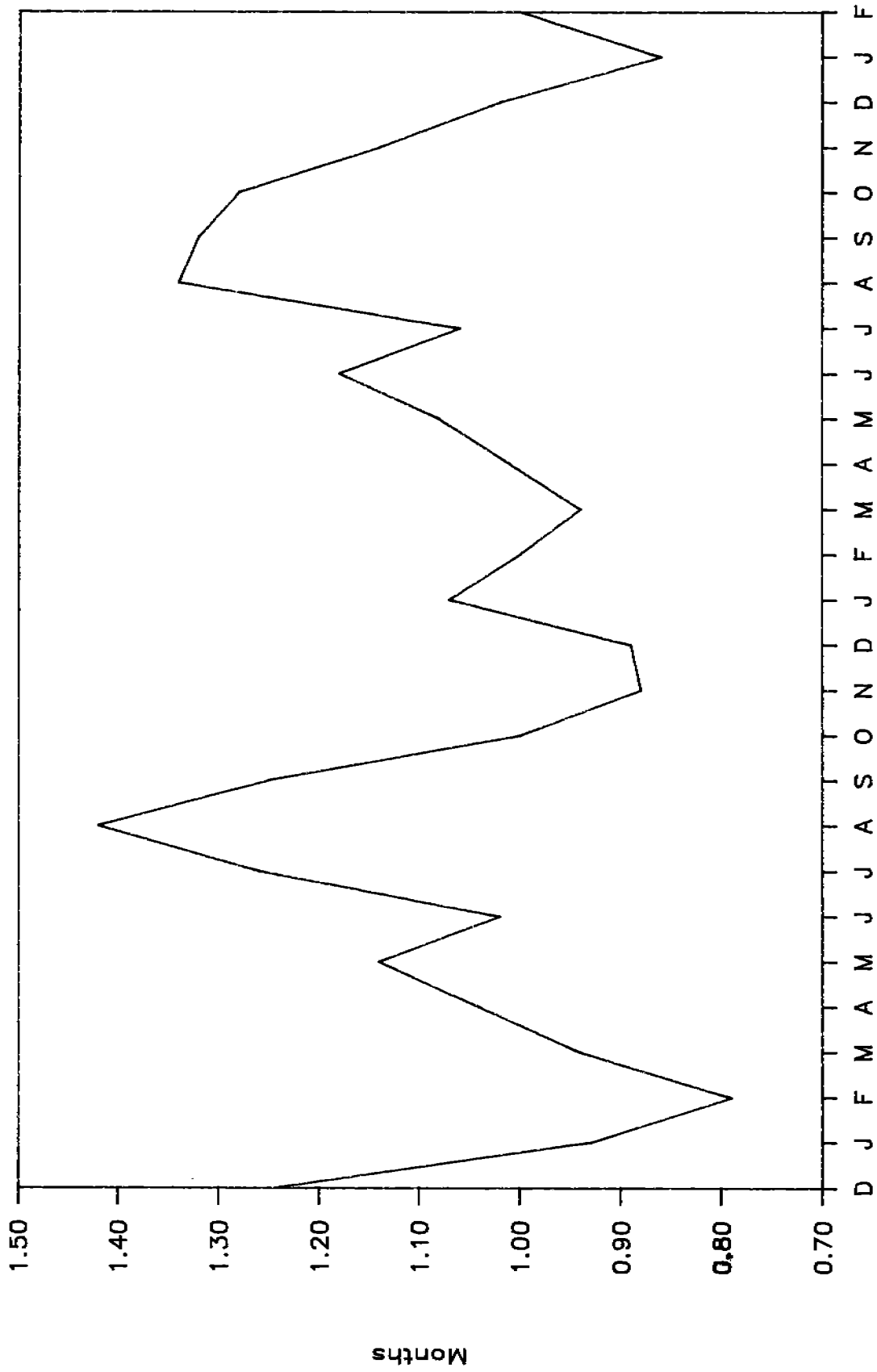
The deals at end "March" for April are counted as having one month to run while those in "March" for March are counted as having no months to run. Because the data is moved from the middle of the trading "month" to the end of it we do not need to add the extra half month as with the two other indices (both of which are in effect centred at the middle of the trading "month"). This index measures the "life expectancy" of those deals still alive. The series is plotted in Figure 7.

These three measures again reflect different aspects of the age structure of deals and it is useful to look at all of them. The values are presented in Table 4.

TABLE 4: The Average Age Structure of Deals

MONTH	FORWARDNESS IN THE 'MONTH'	BACKWARDNESS FOR THE MONTH	FORWARDNESS AT END 'MONTH'
Dec. '83	1.32	1.09	1.24
Jan. '84	1.47	1.12	0.93
Feb. '84	1.26	1.14	0.79
March '84	1.57	1.39	0.94
April '84	1.69	1.44	1.04
May '84	1.71	1.62	1.14
June '84	1.81	1.67	1.02
July '84	2.00	1.64	1.26
Aug. '84	2.19	1.58	1.42
Sept. '84	2.02	1.76	1.25
Oct. '84	1.71	2.01	1.00
Nov. '84	1.55	2.19	0.88
Dec. '84	1.84	1.76	0.89
Jan. '85	1.67	1.67	1.07
Feb. '85	1.58	1.51	1.00
March '85	1.76	1.66	0.94
April '85	1.83	1.72	1.01
May '85	1.83	1.76	1.08
June '85	1.99	1.72	1.18
July '85	1.74	1.73	1.06
Aug. '85	2.18	1.93	1.34
Sept. '85	2.02	1.90	1.32
Oct. '85	1.96	1.64	1.28
Nov. '85	1.90	2.05	1.14
Dec. '85	1.92	2.09	1.02
Jan. '86	1.79	2.09	0.86
Feb. '86	1.64	2.01	1.00

FORWARDNESS AT MONTH END



1984 1985

FIGURE 7

The index of forwardness for new deals shows little trend from after the first quarter of 1984 and at the same time does not have any pronounced cyclical pattern (except that August is at peak in both years and February is a low). There is no indication from this series alone why in certain months the new deals should tend to be further forward than in other months. The index of backwardness of deals for the month shows similar growth in early 1984 and some trend thereafter. The single notable feature of the data is the sharp peak around November in both years - the average age of the deals expiring then was more than two months. This may be due to increases in forward purchases by final users in August in anticipation of winter requirements. This interpretation also accounts for the increase in the number of three-month deals noted in August.

Finally, we look at the forwardness for the deals outstanding - this is of course much lower than the other two because many deals are just about to be completed and hence have low life expectancy despite the fact that they may have been initiated some time before. This measure shows very little trend but has very clear cyclical movements with lows in the Spring and highs in the Autumn.

The first question that these different measures raise is what, if any, is the relationship between the "volume" and the "forwardness"? Is it true, for instance, that the degree of forwardness of new deals is independent of the number of new deals, or is there a tendency for increasing amounts of dealing to be concentrated further forward? The squared correlations are shown in Table 5.

TABLE V: Squared Correlations Between Volume Measures and Forwardness/Backwardness Measures

Deals in the month.	0.29
Deals for the month.	0.61
Deals at month end.	0.04

The very strong correlation between the number of deals **for** a month and the backwardness for that month is striking. The results indicate that an increase in backwardness of one month is associated with an increase of 379 deals (each extra deal pushes the backwardness up by 0.1 days approximately).

The correlation between the measures **in** the 'month' is also significant while that at the end of the month is insignificant.

The next important piece of information that is available about the deals in the Brent market is the price of every single deal. These prices, which are the result of agents searching amongst other agents, change rapidly and can even be very different on the same day. This reflects both changing requirements and changing perceptions and information. The prices differ by the forwardness of the deal and accordingly on any one day there can be considerably different prices **for** current, one month, two month and three month deals. Because the price made on a day is for some point (at that time undetermined) in the month we cannot construct a daily series of forward prices in the normal sense - since although the price setting day moves forward the clearing day does not. For the simple descriptive purposes of this paper, we have therefore decided to construct monthly average prices. The current month price is the average

of all deals done in a trading "month" for that month (e.g. in "March" for March). The one month price is the average of all deals for the next month (e.g. in "March" for April) etc. The lack of three month deals until March 1984 means that the first month for which there is a three month price is June 1984 (and there is no figure for December 1983 for the two month forward price). There are two distinct ways to look at the term structure of these prices. The first, shown in Table 6, is to compare the prices set in a "month" for various months forward. The second, shown in Table 7, is to compare the prices for a month set in various months before.

TABLE 6: Prices Set In A "Month" (\$/BARREL)

MONTH	CURRENT	ONE MONTH FORWARD	TWO MONTHS FORWARD	THREE MONTHS FORWARD
Dec. '83	28.68	28.73	28.59	-
Jan. '84	29.12	29.05	28.86	-
Feb. '84	29.72	29.50	29.13	-
March '84	29.82	29.74	29.71	29.62
April '84	30.09	29.90	29.83	29.84
May '84	29.66	29.61	29.61	29.71
June '84	29.83	29.83	29.84	29.64
July '84	28.59	28.87	29.05	29.16
Aug. '84	27.41	27.81	28.26	28.30
Sept. '84	28.20	28.68	28.92	28.99
Oct. '84	28.50	28.83	28.90	28.89
Nov. '84	27.65	27.87	28.03	27.78
Dec. '84	27.46	27.28	27.14	26.98
Jan. '85	26.77	26.53	26.38	26.09
Feb. '85	27.29	27.04	26.65	26.48
March '85	28.27	27.19	26.67	26.58
April '85	28.29	27.61	27.33	27.36
May '85	27.48	26.71	26.55	26.49
June '85	26.79	26.37	25.99	25.89
July '85	26.50	26.12	25.81	25.46
Aug. '85	26.89	26.49	26.15	25.82
Sept. '85	27.73	27.19	26.86	26.57
Oct. '85	27.97	27.60	27.27	27.00
Nov. '85	28.69	28.61	28.10	27.56
Dec. '85	29.57	27.68	26.62	25.48
Jan. '86	25.71	24.03	22.84	21.82
Feb. '86	19.52	18.61	17.52	16.80

TABLE 7: Prices Set For a Month (\$/Barrel)

MONTH	CURRENT	ONE MONTH BEFORE	TWO MONTHS BEFORE	THREE MONTHS BEFORE
Dec. '83	28.68	29.50	-	-
Jan. '84	29.12	28.73	29.02	-
Feb. '84	29.72	29.05	28.59	-
March '84	29.82	29.50	28.86	-
April '84	30.09	29.74	29.13	-
May '84	29.66	29.90	29.71	-
June '84	29.83	29.61	29.83	29.62
July '84	28.59	29.93	29.61	29.84
Aug. '84	27.41	28.87	29.84	29.71
Sept. '84	28.20	27.81	29.05	29.64
Oct. '84	28.50	28.68	28.26	29.16
Nov. '84	27.65	28.83	28.92	28.30
Dec. '84	27.46	27.87	28.90	28.99
Jan. '85	26.77	27.28	28.03	28.89
Feb. '85	27.29	26.53	27.14	27.78
March '85	28.27	27.04	26.38	26.98
April '85	28.29	27.19	26.65	26.09
May '85	27.48	27.61	26.67	26.48
June '85	26.79	26.71	27.33	26.58
July '85	26.50	26.37	26.55	27.36
Aug. '85	26.89	26.12	25.99	26.49
Sept. '85	27.73	26.49	25.81	25.89
Oct. '85	27.97	27.19	26.15	25.46
Nov. '85	28.69	27.60	26.86	25.82
Dec. '85	29.57	28.61	27.27	26.57
Jan. '86	25.71	27.68	28.10	27.00
Feb. '86	19.52	24.03	26.62	27.56

We can see that for the greater part of the period there was only a very slow downward trend in prices (at around 15 to 20 cents a month on average) until the very rapid change at the end of the period. At the same time, the monthly average prices fluctuated a good deal (often by more than a dollar a month) so that there was considerable variation in the determinants of short-run prices.

If we begin by comparing prices in the same month we can

calculate the average difference between the price **for** the current month and the price **for** a given number of months ahead. When the current price is greater than the forward price there is a "backwardation", while if the forward price is greater than the current price, there is a "contango". The differences on an one month, two month and three month spread are shown in Table 8.

 TABLE 8: Spot Less Forward Prices In The Month
 (Backwardation/Contango)

TRADING MONTH	ONE MONTH DIFFERENTIAL	TWO MONTHS DIFFERENTIAL	THREE MONTHS DIFFERENTIAL
Dec. '83	-0.05	0.09	-
Jan. '84	0.07	0.26	-
Feb. '84	0.22	0.59	-
March '84	0.08	0.11	0.20
April '84	0.19	0.26	0.25
May '84	0.05	0.05	-0.05
June '84	0.00	-0.01	0.19
July '84	-0.28	-0.46	-0.57
Aug. '84	-0.40	-0.85	-0.89
Sept. '84	-0.48	-0.72	-0.79
Oct. '84	-0.33	-0.40	-0.39
Nov. '84	-0.22	-0.38	-0.13
Dec. '84	0.18	0.32	0.48
Jan. '85	0.24	0.39	0.68
Feb. '85	0.25	0.64	0.81
March '85	1.08	1.60	1.69
April '85	0.68	0.96	0.93
May '85	0.77	0.93	0.99
June '85	0.42	0.80	0.90
July '85	0.38	0.69	1.04
Aug. '85	0.40	0.74	1.07
Sept. '85	0.54	0.87	1.16
Oct. '85	0.37	0.70	0.97
Nov. '85	-0.02	0.59	1.13
Dec. '85	1.89	2.95	4.09
Jan. '86	1.68	2.87	3.89
Feb. '86	0.91	2.00	2.72

 The data of Table 8, which are plotted in figure VIII, show two very clear features:

(i) the market shows a contango for most of 1984 and then a backwardation for 1985. This is equally true for all three differentials. The backwardation reaches a peak in late 1985;

(ii) there is a clear relationship between the average differentials over the various degrees of forwardness.

These differentials must reflect expectations of future price movements so that they contain information on how expectations change and whether the expectations were correct. For example, if the one, two and three month prices are all set successively lower than the current price it is reasonable to infer that the "market" sees on balance the possibility of a decline in spot prices over time, with that possibility becoming ever more certain the more time elapses. From the graph of differentials it is very noticeable that almost without exception if the one month forward price is set below (above) the current price, then the two month price will be even more below (above) the current price, and the three month price will be further away still. There is no notable occasion on which (say) the one month price was below the current price and the two month price was nearer to the current price (indicating the expectation of a fall in price followed by a partial recovery). A fortiori the differences were never in opposite directions. This suggests very strongly that expectations were very much formed on an extrapolative basis. The two and three month differentials are much closer to each other than to the one month spread in 1984, but by 1985 they too often were far apart.

The other way of looking at the price data is to concentrate on prices set for a given month at various prior dates. Table 7

SPOT LESS FORWARD PRICES

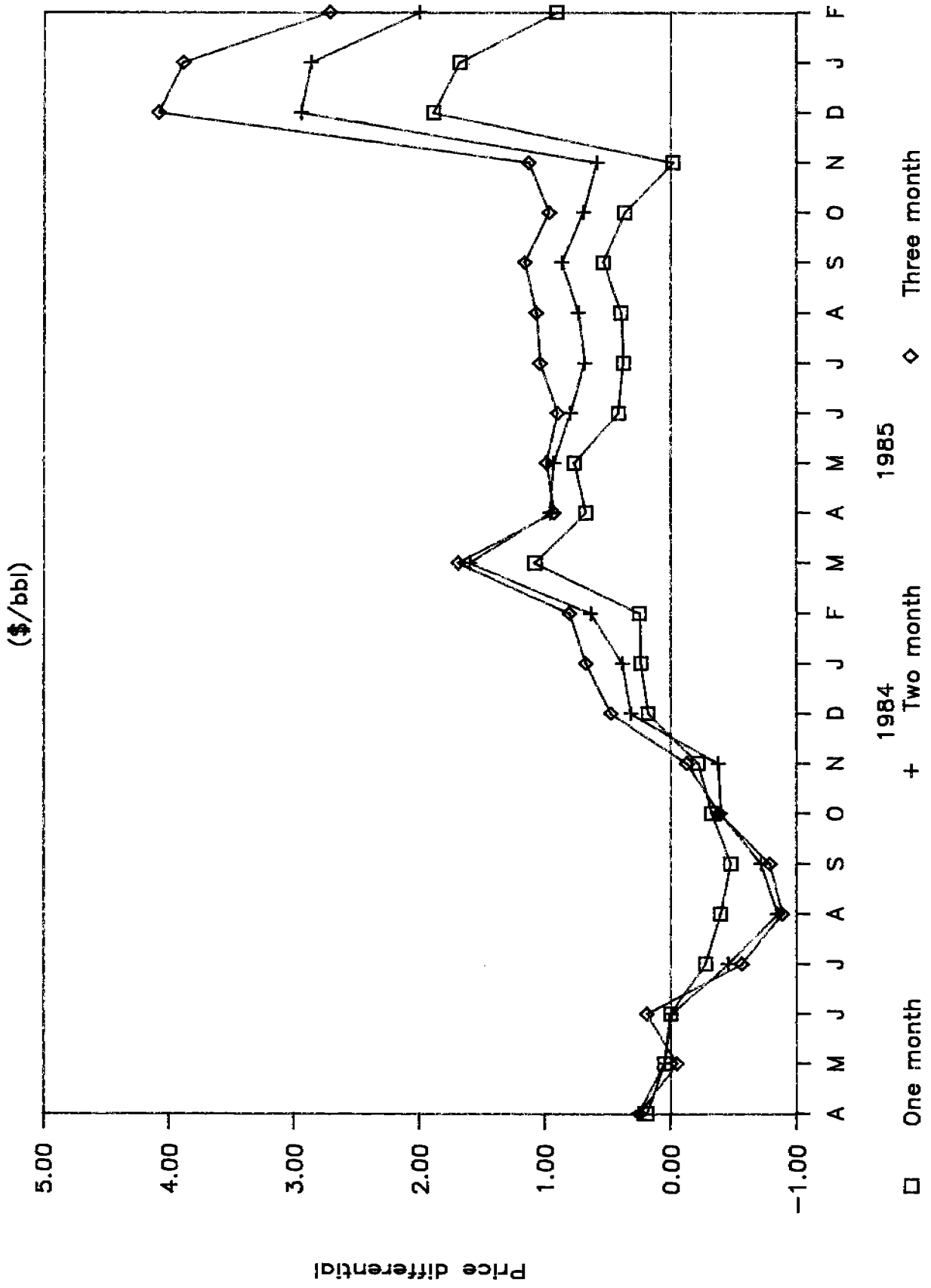


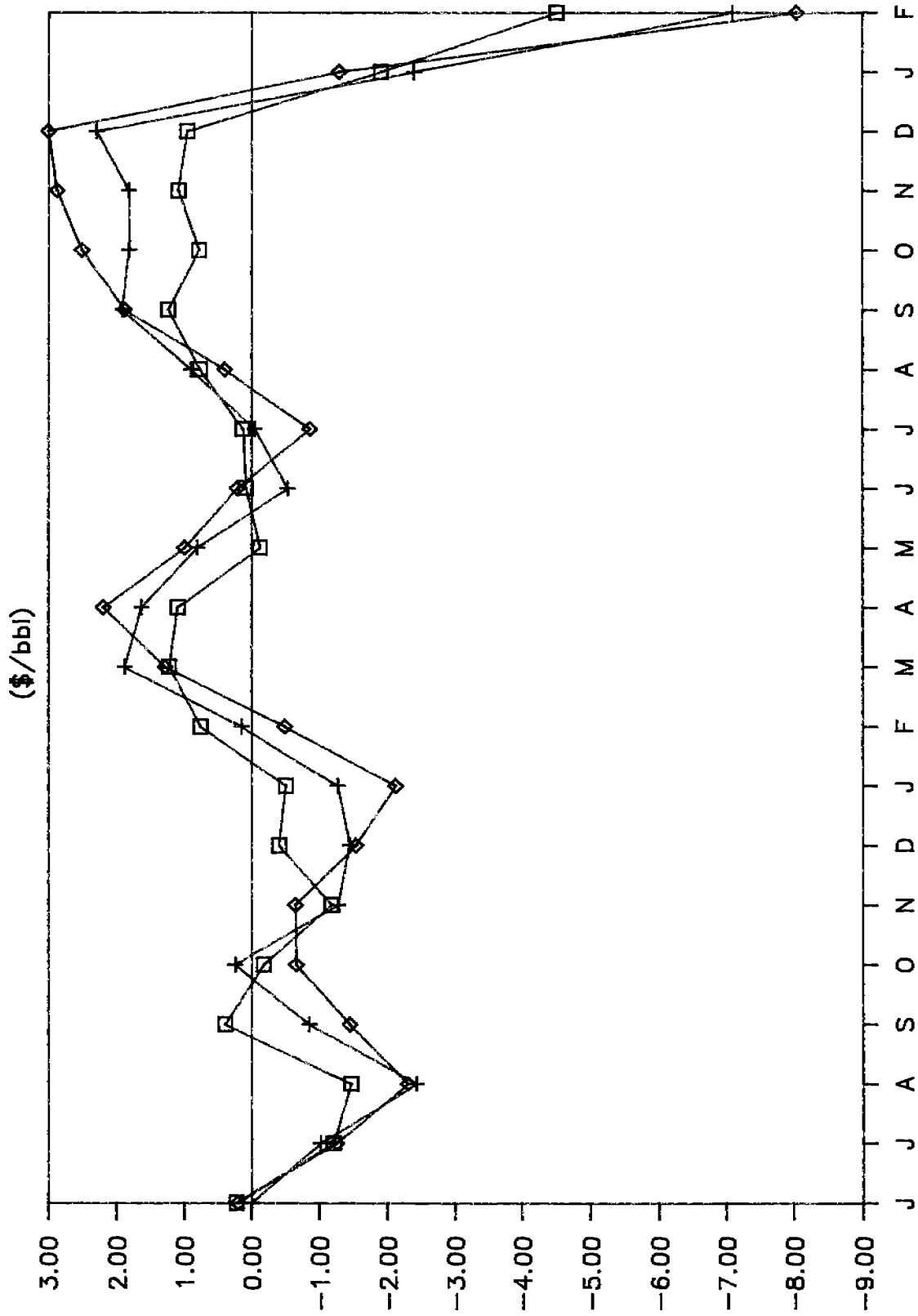
FIGURE 8

can be used to see whether there is a steady convergence to the current price as the time span shortens. If a three month forward deal is set on the basis of what the parties think may be actually happening "spot" in three months, then these forward prices are predictions of the spot price that eventually emerges. The accuracy of these predictions is calculated by taking the difference between the spot for a given month and the one month forward price for that month set in the previous month etc. These predictions for the three series are plotted in Figure 9 and are given in Table 9.

TABLE 9: The Prediction Errors Made by Forward Prices at Different Lengths

MONTH	ONE MONTH ERROR	TWO MONTHS ERROR	THREE MONTHS ERROR
Dec. '83	-0.05	-	-
Jan. '84	0.39	0.10	-
Feb. '84	0.67	1.13	-
March '84	0.32	0.96	-
April '84	0.35	0.96	-
May '84	-0.24	-0.05	-
June '84	0.22	0.00	0.21
July '84	-1.21	-1.02	-1.25
Aug. '84	-1.46	-2.43	-2.30
Sept. '84	0.39	-0.85	-1.44
Oct. '84	-0.18	0.24	-0.66
Nov. '84	-1.18	-1.27	-0.65
Dec. '84	-0.41	-1.44	-1.53
Jan. '85	-0.51	-1.26	-2.12
Feb. '85	0.76	0.15	-0.49
March '85	1.23	1.89	1.29
April '85	1.10	1.64	2.20
May '85	-0.13	0.81	1.00
June '85	0.08	-0.54	0.21
July '85	0.13	-0.05	-0.86
Aug. '85	0.77	0.90	0.40
Sept. '85	1.24	1.92	1.89
Oct. '85	0.78	1.82	2.51
Nov. '85	1.09	1.83	2.87
Dec. '85	0.96	2.30	3.00
Jan. '86	-1.90	-2.39	-1.29
Feb. '86	-4.51	-7.10	-8.04

FORECAST ERRORS



1 month ahead
 2 months ahead
 3 months ahead

1984 1985

FIGURE 9

The prediction errors, which as we shall see can play a crucial role in the market show that there was three distinct episodes. Up to the end of 1984 there was no clear pattern - there was both backwardation and contango in this period and usually the prediction error on a one month forward deal was around 50 cents. In 1985 the market saw a run of eleven months (with a single negative in May) in which the one month prediction error was positive (i.e. spot higher than the one month forward price of the previous month). The errors in the last five months of this period were nearly \$1. In the final two months the errors became negative again and particularly in February 1986 were very much greater than anything that had previously been experienced. The two and three month errors show the same qualitative behaviour but the size of the errors is much greater. The prediction errors can be related to the backwardations by the following equation:

$$\frac{S(t) - f(t,t-1)}{\text{Prediction error}} = \frac{S(t) - S(t-1)}{\text{Change in Spot Price}} + \frac{S(t-1) - f(t,t-1)}{\text{Backwardation in Previous Month}} \quad (4)$$

Hence in a stationary market the prediction error is equal to the backwardation. However if spot prices are moving rapidly down then the prediction error will be large unless the backwardation increases in the previous month. We see that in December 1985 and January 1986 backwardation was large by historical standards but that in the event the spot price moved to a much greater extent. Interestingly the backwardation in February narrowed again so that a continuation down of the spot

price moderated there would be a further large prediction error for March 1986.

3. THE AGENTS AND THEIR TRADING MOTIVES

As pointed out in the introduction there are three distinct types of trading function in the Brent Market. There are producers (whether integrated or not) who wish to sell physical crude (wet barrels); there are refiners who need to buy physical crude; and there are those who neither wish to get rid of or obtain physical crude.

We begin with the owners of crude. Prior to the abolition of BNOC in the spring of 1985, there were three separate sources of wet barrels:

- (i) non-integrated producers who had to sell;
- (ii) integrated producers who might choose to sell on the market even though they could have used the crude themselves;
- (iii) BNOC which had acquired oil as part of the general taxation arrangements.³

Given the lack of storage facilities for oil that was no longer "in the ground", the first and third categories provided a steady (and increasing) flow of crude oil to the market. The second category was also very important and there is evidence to suggest that there was an increase in this activity from mid 1984 (this in turn may be an important factor in the rapid growth of the market at that date). The motive for this activity has become known as "tax-spinning". The taxation of oil passed on to

the refining part of an integrated company was related to the selling price. If the oil were merely internally transferred then an imputed price was assigned to the transaction and this price was the "official" BNOC price while this existed (shown in Table 10). During virtually all the period in question, the spot market price was lower than the official price so that integrated companies, in order to establish a lower tax-reference price, found it profitable to sell their own crude and buy back from another seller. Selling "back to back" is not permitted for these purposes i.e. A cannot sell to B and simultaneously B sell to A. Even a small transaction cost on the deal would not offset the fall in taxation liability when the market price was well below the official price. This tax spinning of course equally gave integrated refiners a reason to buy from the market and not to take oil directly from the firm's own production.

After the abolition of BNOC there was a need for a new tax-reference price, and it appears that the price current in a thirty-day period (the average price in the period preceding the deal) was regarded as the tax-reference price on crude actually transferred by an integrated company to its subsidiaries. Hence if an integrated producer could sell and buy back oil for that month at a price less than the average price in the relevant tax-reference period he could lower his tax liability. The obvious way to avoid transacting at the current (average) spot price (time t) is to sell forward (in month $t-1$) and hope that the one month (say) forward price in month $(t-1)$ is lower than the spot price in t ; in other words hope that the prediction error mentioned in the previous section would be positive. If it was,

then a reduction in tax liability would have been achieved. However, if the prediction error turned out to be negative and the integrated company did not succeed in passing the parcel on then the tax liability would be greater than if it had waited and sold spot (or transferred it internally). The abolition of BNOC probably introduced greater uncertainty into tax spinning because the movement of the spot price is not perfectly predictable while the BNOC price is a given datum. The abolition of BNOC could have been expected to force deals made for tax spinning into the forward market whereas before the abolition spot deals were definitely advantageous whenever the spot price was below the official price.

 TABLE 10: BNOC Official Price For Brent Compared with Spot Prices

MONTH	OFFICIAL PRICE	SPOT PRICE	MARGIN
December 1983	30.00	28.68	1.32
January 1984	30.00	29.12	0.88
February 1984	30.00	29.72	0.28
March 1984	30.00	29.82	0.18
April 1984	30.00	30.09	-0.09
May 1984	30.00	29.66	9.34
June 1984	30.00	29.83	0.17
July 1984	30.00	28.59	1.41
August 1984	30.00	27.41	2.59
September 1984	30.00	28.20	1.80
October 1984	28.65	28.50	0.15
November 1984	28.65	27.65	0.90
December 1984	28.65	27.46	1.19
January 1985	27.25	26.77	0.48
February 1985	26.75	27.29	-0.54
March 1985	27.00	28.27	-1.27
April 1985	28.25	28.29	-0.04
May 1985	27.40	27.48	-0.08

Source: The Market for North Sea Crude Oil

The upshot of this arrangement of the taxation system was that it was often advantageous for the bulk of North Sea

production to be traded on the market provided that companies having sold (as producers) or bought (as refiners) could then be fairly certain of balancing the transaction either then (or later) at a fairly similar price. Of course if the market for a particular crude were too thin then the firm could not count on being immediately able to find what it needed and the risk of an adverse price movement might make the manoeuvre more risky, and the advantages from tax-spinning less clear cut.

The second feature of these companies dealing in physical oil is that their production or requirements for a few months ahead is highly predictable. This led to the possibility of hedging. Given that a company knew that it would be selling (say) a certain amount of oil in the next month (either because it was integrated or because it was tax spinning), it might feel that a guaranteed price established now would be better than their expected spot price at the time of sale. In a similar fashion, a refiner might be willing to "buy hedge" to reduce future uncertainty. As in the standard analysis of such markets the hedger would be prepared to pay a premium (the risk premium) in order to secure a certain price. Hence if a seller expects the price next period to be $PE(t+1)$ he would nevertheless be prepared to sell forward now at prices above $PE(t+1) - r$ (where r is the risk premium). Analogously, a buyer would be prepared to pay now up to an amount r over and above the price he expects to rule in the next period. The key to defining a hedged transaction is to note that the agent starts off with a physical position (a need to sell or buy) and reduces uncertainty by operating in the forward market.

The other type of transaction that has taken place (in ever increasing numbers) is a speculative deal. Here an agent who starts with no uncertainty (no requirement to sell or buy physical) initially increases uncertainty by buying or selling forward and subsequently closes his position by the offsetting transaction for the same period. The expected return for this risky move is the potential profit on the difference between buying and selling prices. If a speculator buys low and subsequently sells high the gain could more than offset the transaction costs and any risk premium involved.

In practice, where integrated companies might both sell and buy they could do so to a larger extent than the number of actual cargoes they wished to dispose of. Although ex post it is possible to link a particular deal to the ownership or not of the physical crude it is not possible to do so ex ante. In fact, the company will have a choice as to which deal to use actually as the one to which the physical cargo is attached and accordingly will choose that which suits it best. Hence it is not always possible to label a particular deal as a 'hedge' or as 'speculation'. Nevertheless, it is evident that both motives must be present in the market.

In this framework all deals, except for those which are agreed for a particular day, are forward to different extent and hence may involve these two elements.

4. THE DETERMINANTS OF THE SIZE OF THE MARKET

Given the very rapid growth in the size of the Brent market plus the substantial increase in the implied length of daisy chains (average number of paper deals per wet cargo) we can see that speculative activity has become increasingly important. Indeed, the data of Section 2 make it evident that month by month there have been fluctuations in the number of deals made that cannot possibly be simply changes in the amounts of physical trading (although no doubt this too did vary because of production levels, demand shifts and inventory requirements). There has certainly been a large variation in the number of speculative deals as well as the trend increase. Given also that the pattern of dealing, in terms of forwardness of new deals, has also varied substantially, it is necessary to find an account of the market (as opposed to the individual) that would explain the three features. We shall see that all three features can be related to a key concept - the distribution of expected prices. However, before we use this idea to interpret market behaviour, it is helpful to make some remarks about the long-run role of speculation in a market.

If we hypothesize a market in which all deals were speculative in the sense defined above (and which we shall see is a long run impossibility) then the key feature is that the set of

transactions as a whole is a "zero sum game". Any profit made by one agent by buying low and selling high will be exactly balanced by the losses of others who sold low and bought high (this follows because all deals were within the market). In practice, given that there are transaction costs (search costs of telephoning around for quotations, brokers' fees or costs of obtaining financial guarantees), the game is in fact a negative sum game. In the long run it is not possible for all firms to be winners. Of course in the short run this position is sustainable but eventually those firms who had persistently lost (either through bad luck or through inferior intelligence or strategy) would be forced out of the market. In a pure negative sum game all firms would be forced out of the market by this process unless there was a constant stream of new entrants who had not perceived the true nature of the game and who thought they could systematically win.⁴

Hence we can see that a purely speculative market could not be sustainable in the long run. Some capital must constantly be injected into such a market in order to convert it into a positive sum game. Depending on the amount of this injection a larger or smaller number of speculative deals would be sustainable. If we hypothesised a situation in which there were no persistent winners (or losers) then on average (i.e. over the long run) each deal makes a margin for each firm (the total injected capital divided by twice the number of deals). Hence the sustainable number of deals per period is related to the size of the financial injection per period, and if we have an account of the source of the injection we can provide an account of the

"monetary base" of the market. The only main source for the injection comes from the hedging motive. Here, as we pointed out, there is a willingness to trade, if necessary at prices different from those expected, in order to secure the certainty.

If a "sell hedger" expected the price next period to be PE ($t+1$) he would be prepared to sell for $(PE - r)$, while a "buy hedger" expecting the same price would be prepared to pay up to $(PE + r)$ now in order to secure certainty. Hence a speculator can intervene at some prices within this range. If he buys from the producer at P_1 , and sells to the refiner at P_2 (both of which are in the ranges where the hedgers see profits) then he makes a margin $(P_2 - P_1)$. If this is larger than his risk premium then he too makes a profit.

i.e. Net gain to sell hedger:

$$P_1 - (PE - r)$$

(for $P_1 > PE - r$) (5)

Net gain to buy hedger:

$$(PE + r) - P_2$$

(for $P_2 < PE + r$) (6)

Net gain to speculator:

$$P_2 - P_1 - r \quad (7)$$

Total market gain is r . The gain to the market comes because the two separate risks are combined by the speculator into a single risk (that of buying or selling short). It has to be assumed that the speculator is an efficient link between the parties or else they could combine directly and would be able to produce a "market" gain of $2r$. The speculator here survives by specialisation (i.e. lower costs of search) or if he has a lower

risk premium. This account sees the hedgers putting money into a "kitty" (r per deal) which can then be appropriated by the speculators if they are sufficiently able in finding deals. The size of the kitty is then determined solely by the amount of wet cargoes - the more the wet cargoes the larger the number of speculative deals that can be supported. The lower the risk premium needed by each speculator the more speculative deals could be sustained by the market.

This account omits two very important themes. Firstly, it takes no account of the situation where expectations differ, and secondly, it takes hedging to be the sole motive for sellers of wet cargoes to use the market. In fact, as we pointed out earlier, the integrated producers have another motive for selling. If they can sell and then buy back at prices lower than the official price (average spot prices since mid 1985) they can then make a tax gain. This may encourage them to be willing to risk selling for low prices, hoping to find a matching purchase, even though this is below the expected price less risk premium. If this were so then it would inject further funds into the market.

So far our account links the number of deals sustainable in the long run to the amount of "wet trading". However, as we have shown, the growth and variability in the paper market for Brent cannot be linked solely to any reasonable interpretation of the sale of wet cargoes. Of course there can be a short or even medium-run over-shooting of the market and in the number of paper deals relative to the number of wet deals. Every speculator attributes his losses to bad luck and not to the fundamental

problem of overcapacity in speculators. Eventually losses sustained would force out some of these traders and the news of these losses would be expected eventually to discourage further entry. This then would leave the problem of variability and it is here that the role of differential expectations is crucial.

We have seen that for a given expected price the speculator will be willing to buy (or sell) at certain related price ranges. If we generalise this argument to consider the case where expectations differ as between speculators then we have in effect a supply and demand type model. At any price there is a group of speculators willing to sell (those who expect to make a profit by selling short and buying at a lower price later). The higher the price the larger the number of speculators who expect the future prices to be lower than it and hence are willing to sell - the supply of potential deals rises with the price. The actual shape of the supply curve depends on the distribution of expected future prices. If expectations are all similar the supply curve will rise very steeply around the mean of these prices - all speculators suddenly see a profit motive in selling. If expectations are very diverse then the supply curve is very flat.

A similar picture relates to the demand curve - this shows the willingness of speculators to buy now (expecting future prices to be higher). As the current price rises the demand by speculators falls. The shape of the demand curve is similarly determined by the dispersion of expectations. Now two speculators can make a deal which they both see ex ante as profitable only if their expectations are further apart than twice the cost of the deal. The seller in accepting a price P

must expect a future price (to close his position) not higher than $P - r$ (where the risk premium also includes his transactions cost). The buyer must expect at least a future price of $P + r$. Hence a deal is possible only between agents whose expectations are at least $2r$ apart. Hence the maximum number of deals depends at any time on the number of speculators whose expectations are more than $2r$ apart. If expectations are very widely spread then the number of deals can be high but if expectations are very narrowly spread then the number of deals will be smaller. Thus we see that the variability in paper trading is likely to be strongly affected by the dispersion of expectations held by traders.

The final dimension to forward trading that must be considered is the degree of forwardness. Traders may have a choice on how far forward to deal. Of course producers or refiners, facing seasonal variations in production or demand, will wish to hedge nearer or further away on average in order to smooth out their uncertainty. However, as we have shown, the degree of variability both in the index of forwardness and the number of deals for various months is not likely to be explicable solely in terms of the basic hedging motive although the abolition of BNOG may have encouraged tax-spinners to trade further forward. Deals further forward are likely to be made against an expected price which is more uncertain so that the risk premium for hedges is higher. This should make it possible for a speculator to make a larger profit particularly since he will not need to hold his position open until the contract month arrives. He can (say) buy a three month cargo now hoping to sell

it next month at a margin whereas the producer sells now for a fixed delivery point. Any requirement of producers or refiners to trade further forward will increase the "kitty" available to speculators. However the distribution of expectations is also crucial. If views are more diverse for further ahead deals then the number of such deals will rise, whereas if views are more homogeneous then the number of such deals will decline. This may well explain why there is a strong correlation between the number of deals and the degree of forwardness. If the dominant feature explaining variability in deals over a two or three month period is the distribution of expectations (i.e. special production or financial constraints operative in a single month are smoothed out) then only a rise in the dispersion of views is likely to cause a rise in the number of deals. This effect is generally likely to be stronger for deals made with a greater time horizon since it is the normal state of affairs that uncertainty is higher the longer is the horizon. Thus shifts in the dispersion of expectations will produce more deals further ahead and this will be reflected in the forwardness index at the time and the backwardness index when the deals expire.

The determination of the distribution of expectations depends on many factors both subjective and objective and clearly no theoretical model can be easily constructed. However, it does seem that whenever a "new" situation appears the lack of experience with it is likely that different agents will react in different ways and the dispersion of views will increase. For example, once it became clear in the Autumn of 1985 that a change in OPEC strategy was imminent, the general view may have been

that prices would have to fall. However, the speed and magnitude of the fall were very unpredictable and the dispersion of views around a lower average expected price may well have increased. It is important to stress that if the price falls a long way to a new lower level, just as there are those willing to sell at that price (because they expect to be able to buy back at a lower price) there are those willing to buy (i.e. who see it profitable because on balance they must expect to sell for more).

5. AN INTERPRETATION OF THE BRENT MARKET BEHAVIOUR

In this section we attempt to synthesise some of the principal elements of the preceding sections.

We start with an account of the reasons for the growth of trading in Brent. This begins with the need for non-integrated producers and BNOC to sell their oil to refiners and was reinforced by the perception of integrated companies that they could lower their tax liability by selling crude and buying back other crude (tax spinning) provided that the selling price was less than the current BNOC price. After the abolition of BNOC integrated companies, by selling forward, could still gain provided that the forward price turned out to be lower than the price ruling during the month that the forward contract fell due (and they had been able to buy back at a similar price). All this activity (in wet barrels) was greatly amplified by the involvement of speculators in the market who, by taking views on likely future prices, tried to make a margin on buying or selling short and then covering their position at a later date. As well as the growth in the market caused by the growth in tax-spinning and the associated multiple of paper deals that this could support as speculators learnt to use the market, there was also considerable variation in the total amount of trading month by month. We have suggested that an important part of this

volatility in quantity was related to changes in the dispersion of expectations held by those speculating in the market. When there was consensus on the likely price outcome the opportunities for trading decreased, and when views were very disparate the number of deals increased.

The actual movement of prices was of course largely determined by outside factors. During 1984 and 1985 the spot price level fluctuated but showed no signs of a trend decline (there were three consecutive declines from April 1985 to July 1985 but a sharp recovery took place thereafter). During all this time the market was in backwardation, although not to a very great extent until December, which suggests that a mild price fall was expected. Without the actual fall in spot prices occurring the "prediction" error (spot less the forward in the previous month) was persistently positive in 1985 and this gave opportunities for successful tax-spinning after BNOC had been abolished.

However at the end of 1985 the spot price fell very rapidly - by four dollars on average between December 1985 and January 1986 and by a further six dollars between January and February. Even though the one and two month backwardations were unusually large from December on they were not large enough to prevent large negative prediction errors being made. In particular it is remarkable that in January, when the spot price had already fallen four dollars, the backwardation for February was only \$1.68. In the face of the six dollar price fall those who had sold crude forward in January for February had made a potential loss of \$4 a barrel in relation to their tax liability. Anybody

who had sold crude in November for February saw a loss of \$8 in relation to their tax liability.

This extremely rapid fall in prices must have had a second type of effect. Those deals which were speculative - where someone sold short in order to buy later (and someone else bought long in order to sell later) - must have seen very large profits and losses.

The situation at the beginning of 1986 illustrated well the problems of this informal forward market. At a time when there were a very large number of deals coming to fruition - January 1986 being the second highest month ever, with the degree of backwardness at that time being especially high - the average deal for January had been made two months earlier and with a rapid price fall that had not been fully anticipated there were bound to be a large number of traders who started to perceive the possibilities of a loss before they could close out their position. The need to find a trader with sufficiently opposite views to do a deal puts great strain on the mechanics of an informal market, especially if a risk of default is perceived. Such a problem would not exist with a futures market where the agency itself buys and sells and positions are paid up as they are entered into.

The danger signals for this market are then three:

- (i) the spot price starts to move faster than allowed for in the previous backwardation (or contango);
- (ii) the number of deals to be integrated into daisy chains is large in relation to the number of wet cargoes available;
- (iii) the backwardness of the maturing deals is high so that the

forecasting error is likely to be larger.

The future of the market must depend on the perception of future episodes of a similar nature and on the potential gains to be made from using the market. As we have argued, on balance the purely speculative transactions were being supported by the wet deals made by non-integrated and integrated producers and the tax collecting agency (if it takes taxes in kind). Clearly, the non-integrated companies and the tax agency would need some outlet for their sales, while the integrated producers would continue to use such a market if they thought they could lower their tax liability while doing so without incurring too large losses on the selling and buying back of oil. The experience of 1985, where forecasting errors were persistently positive may have given a sense of false security. The experience at the beginning of 1986 may make tax-spinning a more cautious activity. If the use of the market by integrated producers were to decline then the volume of speculative activity that could be supported would also decline in proportion, so that the market could shrink substantially.

The second change that could occur is in respect to those deals which are obviously speculative (sellers who were not producers or buyers who were not refiners). The risks of default having been exposed by the 1986 crisis, sellers and buyers are likely to become much more concerned as to the ability of a partner in a proposed deal to meet his obligations. When prices are not moving rapidly it is unlikely that he will be sustaining a large loss but with price moves of the magnitude of those in early 1986 the losses could be substantial (a November deal for

February which was not closed out until February would have lost the long buyer about \$5 million - about half the value of the cargo). As willingness to trade dries up the risk of losses actually increases and the prophecy becomes self-fulfilling. The experience of those traders who were long by January may cause a substantial withdrawal, at least temporarily from the market.

This description makes it clear that the market can work in a stable environment well but that certain changes and shocks will almost inevitably place strains on it which by its nature it is unable to accommodate.

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