
UNIVERSITI PUTRA MALAYSIA

# COMPARATIVE ANALYSIS OF FORECASTING PERFORMANCE : CRUDE PALM OIL FUTURES (CPO) PRICES VS EXPERT OPINIONS

ABDULLAHI FARAH AHMED

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By

ABDULLAHI FARAH AHMED

Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of Science in the Faculty of Agriculture
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July 2001

*DEDICATED*
*TO*
*MY BELOVED PARENTS,*
*FARAH AND AWRALA*

Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master Science

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**Chairperson: Ismail Abd Latif**

**Faculty: Agriculture**

The main economic functions of the futures market are to provide price discovery and risk management facilities. It is well known that the futures market can function well only when the futures prices provide accurate price forecast to subsequent cash prices. The greater the degree of price forecast accuracy, the greater the effectiveness of the futures market in terms of performing its economic functions. If the market is not efficient, effective transmission of information from one market to another will be impaired, thus the value of the futures market in price discovery and hedging.

The creation of the crude palm oil (CPO) futures market in Malaysia was to fulfil the need for an efficient pricing and hedging mechanism for Malaysia's palm oil. Therefore, the extent to which CPO futures market has served as an efficient center of price discovery and risk management, has been the focus of considerable research. In general, debate has centered around the extent of which futures market provide price leadership to cash market and the ability of futures market to predict subsequent spot

debate has centered around the extent of which futures market provide price leadership to cash market and the ability of futures market to predict subsequent spot price in accurate way. Empirical evidence has shown that CPO futures prices performed relatively better compared to other forecasting models. However, no comparison is made in forecast accuracy of CPO futures with expert opinion. This approach is unique in the sense that it examines the relative efficiency of *ex ante* forecasts rather then *ex post*.

The objectives of this study are: firstly, to evaluate the forecast accuracy of the CPO futures market relative to expert prediction. Secondly, to test the relationship between the futures, forward and cash prices, to examine whether these price series have the same properties and relationship in the long-run.

AGS and the Johansen's cointegrations techniques were used to analyze the forecast accuracy and log-run relationship over, $1^{st}$, $2^{nd}$, $3^{rd}$ and $4^{th}$ month spreads of futures and forward prices. The analyzed sample data consists of the daily end-of-month trading prices of the futures, cash, and forward prices for the period from January 1989 to December 1999.

The findings of this study suggested that the forward forecast accuracy price was superior to the futures. It implies that the forward prices which represent expert prediction of cash price, contain more information for price discovery than CPO futures prices in the one month and two months horizons. This finding indicated that the CPO of futures market is relatively less efficient. Hence, the use of futures prices for short-term price forecasting may be more biased than relying on expert forecasts.

Furthermore, it was found that the futures and cash prices were cointegrated for up to two months spread. Similarly forward and cash prices were also cointegrated for up to two months into the future. This suggests that futures and forward prices can be used to predict subsequent spot price up to two month in advance. It was also detected that an error correction mechanism exists which brought cash and futures price into equilibrium whenever they diverged. The evidence also points to the dependence of cash market on futures markets for price leadership.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**KETEPATAN RAMALAN HARGA: HARGA NIGA HADPAN MINYAK SAWIT MENTAH (MSM) VS RAMALAN PAKAR**

**Oleh**

**ABDULLAHI FARAH AHMED**

**Julai 2001**

**Pengerusi : Ismail Abd. Latif**

**Fakulti: Pertanian**

Fungsi ekonomi utama pasaran niaga hadapan adalah untuk menyediakan kemudahan penemuan harga dan pengurusan risko. Pasaran niaga hadapan akan dapat berfungsi dengan baik apabila harga niaga hadapan memberi ramalan yang tepat keatas harga tunai yang berikutnya. Lebih tinggi ketepatan harga niaga hadapan meramal, maka lebih tinggi keberkesanan pasaran ini melaksanakan fungsinya. Pasaran yang tidak cekap akan menjejaskan aliran licin maklumat dari satu pasaran kepada pasaran yang lian; lantas melemahkan fungsi pasaran niaga hadapan dalam melaksanakan fungsi lindung nilai dan pengurusan risko.

Pewujudan pasaran niaga hadapan Minyak Sawit Mentah (MSM) bertujuan untuk memenuhi keperluan mekanisme letak harga dan lindung nilai yang cekap untuk industri kelapa sawit Malaysia. Maka isu ini iaitu sejauh mana pasaran ini berfungsi sebagai pusat penemuan harga dan pengurusan telah menjadi fokus kepada beberapa penyelidikan. Secara umum, debat tentang isu ini menjurus kepada sejauhmana pasaran

niaga hadapan berlaku sebagai ketua harga kepada pasaran tunai dan keupayaannya meramal harga tunai yang berikutnya dengan tepat. Bukti empirik menunjukkan bahawa harga niaga hadapan MSM boleh meramal dengan baik berbanding dengan model unjuran. Namun, masih belum ada perbandingan dibuat tetang ketepatan unjuran niaga hadapan dengan ramalan pakar. Perbandingan antara dua kaedah ini adalah unik kerana keduanya membandingkan kecekapan relatif unjuran *ex ante* dan tidak *ex post.*

Objektif kajian ini adalah: pertama; untuk menilai ketepatan ramalan pasaran niga hadapan MSM berbanding dengan ramalan pakar. Kedua; untuk menguji perkaitan antara harga niaga hadapan, hadapan dan tunai. Ketiga; untuk meneliti sama ada siri-siri ini menampilkan tabii dan perkaitan yang sama dalam jangka masa panjang.

Kajian ini menggunakan ujian AGS yang dipelopori oleh Ashley, Granger dan Schmalensee (AGS) untuk menguji perhubungan jangka masa panjang bagi jeda antara harga niaga hadapan dan hadapan bagi bulan pertama, kedua, tiga dan keempat. Data yang dianalisis adalah data harian bagi harga niaga dihujung bulan bagi niaga hadapan, hadapan dan tunai untuk jangka waktu Januari 1989 hingga Disember 1999.

Kajian mendapati bukti yang bererti yang menyokong kepada hujah bahawa ramalan hadapan adalah lebih baik daripada niaga hadapan. Ini menyarankan bahawa harga hadapan yang juga mewakili ramalan pakar keatas harga tunai mengandungi lebih maklumat untuk membantu penemuan harga dibandingkan dengan harga niaga hadapan terutama bagi bulan pertama dan kedua. Penemuan ini mencadangkan bahawa pasaran niaga hadapan MSM adalah tidak secekap dibandingkan dengan harga hadapan. Maka,

penggunaan harga naiga hadapan dalam jangka masa pendek mungkin bias berbanding dengan ramalan pakar. Lagipun, didapati bahawa harga niaga hadapan dan tunai berkointegrasi sehingga jeda dua bulan. Harga hadapan dan tunai juga berkointegrasi sehingga dua bulan kehadapan. Ini mencadangkan bahawa harga niaga hadapan dan hadapan boleh digunakan untuk meramal harga spot yang berikutnya dua bulan lebih awal. Kajian mendapati bahawa mekanisme pembetulan ralat wujud yang membawa harga niaga hadapan dan tunai kedalam keseimbangan apabila keduanya tidak selari. Penemuan kajian juga menunjukkan kepada pergantungan pasaran tunai kepada niaga hadapan untuk ketua harga.

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| | |
|---|---|
| AGS | =Ashley, Granger and Schmalensee |
| ARIMA | = Autoregressive Integrated Moving Average |
| COMMEX | =Commodity and Monetary Exchange |
| LIFFE | = London International Financial Future Exchange |
| MARMA | = Multivariated-autoregressive Moving Average |
| ML | = Maximum-likelihood |
| MPOB | =Malaysian Palm Oil Board |
| PORIM | =Palm Oil Research Institute of Malaysia |
| PORLA | =Palm Oil Registration and Licensing Authority |
| U | =Theil's Inequality Coefficient |
| VAR | =Vector Autoregressive |
| FELDA | =Fedaral Land Development Authority |
| FELCRA | =Federal land Consolidation and Rehabilitation Authority |
| CPO | =Crude Palm Oil |
| RISDA | =Rubber Industry Smallholders Development Authority |

# CHAPTER 1

# INTRODUCTION

## 1.1 Malaysian Palm Oil Sector

### 1.1.1 Introduction

The progressive pursuit of oil palm cultivation had evolved Malaysia from a mere producer of crude palm oil (CPO) into a more diversified producer of new and higher value-added downstream food and non-food products.

In 1998, Malaysia's palm oil accounted for 49.9 per cent of the world production and 67.6 per cent of the world trade in palm oil. Palm oil had emerged as a major player in the international oils and fats market. Export earnings from palm oil and related products increased from RM 2.60 and 6.3 billion in 1980 and 1990, respectively, which increased to 22.64 billion in 1998, making the oil palm industry the second largest export earner in the country after electrical and electronic products. The industry provides employment to about 350,000 workers in the plantations, government land schemes and supporting industries and services (PORLA, 2000).

### 1.1.2 Production

Production of palm oil from Malaysia has been increasing over the years from 92,000 tonnes in 1960 to 2.6 million tonnes in 1980 and to 10.55 million tonnes in 1999. This was due to the increase in matured area, particularly in Sabah. However,

as Table 1.1 shows the production decreased by 8.3 per cent from 9.06 million tonnes in 1997 to 8.3 million tonnes in 1998. The decline in production was the lower yield of fresh fruit bunches due to stress cycle experienced by the oil palm trees which occurs every three or four years, as happened in 1994. In 1994 there was still a fall in yield production from the previous year but having rested, the palms increased their yields from 1995-1997. This decline in production was also associated with the haze and prolonged dry spell which affected Malaysia in the second half of 1997 due to the El-Nino phenomenon (PORLA, 1999).

Production is still mainly from Peninsular Malaysia with 7.427 million tonnes (70.4 per cent) in 1999 as shown in Table 1.1. The share of total production is declining in Peninsular Malaysia as the share of East Malaysia expanded. Thus,the Peninsula produced only 70.4 per cent of the total production in 1999 compared with 76.4 per cent in 1980. Production of crude palm oil in 1999 increased to 10.55 million tones, reflecting an growth of 26.9 per cent or 2.23million tones compared to 8.32 million tones in 1998 (PORLA, 2000).

This was mainly attributed to the favorable weather conditions and rainfall distribution as well as constant sunshine throughout the year. These ensured more effective pollination and formation of palm fruits. Consequently, the oil palm fruit yield per hectare increased to 19.26 tonnes compared to 15.98 tonnes recorded in 1998. The increase in matured oil palm areas also contributed to the expansion in crude palm oil production.

Table1.1: Share of production and growth of crude palm oil by state, 1980-1999 (Tonnes)

| State/Year | 1980 | | 1990 | | | 1995 | | | 1999 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tones | Share % | Tonnes | Share % | Change % | Tonnes | Share % | Change % | Tonnes | Share % | Change % |
| Johore | 737,674 | 28.7 | 1,681,428 | 27.5 | 127.9 | 1,847,764 | 23.7 | 9.9 | 2,425,163 | 23 | 31.2 |
| Pahang | 460,669 | 17.9 | 1,264,547 | 20.7 | 174.5 | 1,571,236 | 20.1 | 24.3 | 1,867,106 | 17.7 | 18.8 |
| Perak | 368,609 | 14.3 | 779,352 | 12.8 | 111.4 | 997,161 | 12.8 | 27.9 | 1,220,922 | 11.6 | 22.4 |
| Selangor | 445,350 | 17.3 | 630,122 | 10.3 | 41.5 | 614,707 | 7.9 | -2.4 | 618,857 | 5.9 | 0.7 |
| N.Sembilan | 168,198 | 4.9 | 337,827 | 4.7 | 5.5 | 393,088 | 4.1 | 5.0 | 452,398 | 4.3 | 15.1 |
| Terengganu | 107307 | 3.9 | 299,540 | 3.6 | 4.9 | 307,331 | 4.0 | 3.9 | 410,047 | 3.9 | 33.4 |
| Kelantan | 27,034 | 1.1 | 125,010 | 2.0 | 362.4 | 163,225 | 2.1 | 30.6 | 215,723 | 2.0 | 32.2 |
| Kedah | 11,932 | 0.5 | 802,62 | 1.3 | 572.7 | 102,473 | 1.3 | 27.7 | 128,701 | 1.2 | 25.6 |
| Penang | 41,721 | 1.6 | 73,088 | 1.2 | 75.2 | 53,657 | 0.7 | -26.6 | 46,086 | 0.4 | -14.1 |
| Malacca | 26,830 | 1.0 | 46,801 | 0.8 | 74.4 | 43,938 | 0.6 | -6.1 | 42,835 | 0.4 | -2.5 |
| P. Malaysia | 2,395,324 | 76.4 | 5,317,977 | 72.9 | 87.1 | 6,094,580 | 72 | 78.0 | 7,427,838 | 70.4 | 21..9 |
| Sabah | 156,471 | 6.1 | 678,995 | 11.1 | 333.9 | 1,493,623 | 19.1 | 120.0 | 2,664,516 | 25.2 | 78.4 |
| Sarawak | 22,378 | 0.9 | 107,651 | 1.8 | 381.1 | 222,363 | 2.8 | 106.6 | 461,564 | 4.4 | 107.6 |
| Sabah/Sarawak | 178,849 | 23.6 | 786,646 | 27.1 | 12.9 | 1,715,986 | 31.6 | 22.0 | 3,126,080 | 29.6 | 82.2. |
| Malaysia | 2,574,173 | 100.0 | 6,104,623 | 100.0 | 137.1 | 7,810,566 | 100.0 | 27.9 | 10,553,918 | 100 | 35.1 |

Sources: PORLA, Palm Oil Update, various issues.

The ending stock in 1999 at 1,175,693 tonnes was higher than that of 1998, which was at 824,815 tonnes. With production of palm oil being forecast at 10.8 million tones for 2000, it is anticipated that the scenario for palm oil in 2000 would be another favorable one. Thus, approximately 12 million tonnes of palm oil would be available for trade from Malaysia in 2000 against 11.4 million tonnes in the previous year (PORLA, 2000).

The world production of palm oil had witnessed a rapid growth compared to other oils and fats during the 1980-1998. Thus the palm oil's share of the world oils and fats production increased to 18.6 per cent in 1999 from 13.3 per cent in 1990, while that of soyabean oil rose to 22.8 per cent from 19.4 per cent during the same period as shown in table 1.2. In 1998, Malaysia contributed 52.9 per cent of the world palm oil production, while Indonesia 30 per cent (Table 1.3).

The world oils and fats production reached 108.8 million tonnes in 1999, an increase of 14.9 per cent or 14.12 million tonnes from 1995. A significant share of the increase comprised of vegetable oils, which grew at 14.0 per cent per annum as against 6.9 per cent per annum for animal oils and fats. Soybean oil remained the largest oils and fats produced at 24.7 million tonnes, followed by palm oil at 20.3 million tonnes, rapeseed oil at 12.9 million tonnes, sunflower oil at 9.2 million tonnes and tallow at 7.5 million tonnes ( Table 1..2).

Table1. 2: World production of 17 oils and fat, 1980-1999 ('000 tones)

| Oils & Fats | 1980 | | 1990 | | | 1995 | | | 1999 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tonnes | Share % | Tonnes | Share % | Change % | Tonnes | Share % | Change % | Tonnes | Share % | Change % |
| Soyabean Oil | 13,382 | 22.4 | 16,097 | 19.4 | 20.3 | 20,307 | 21.5 | 26.2 | 24,755 | 22.8 | 21.9 |
| Palm Oil | 4,543 | 7.6 | 11,027 | 13.3 | 142.7 | 15,118 | 16.0 | 37.1 | 20,277 | 18.6 | 34.1 |
| Rapeseed Oil | 3,474 | 5.8 | 8,160 | 9.8 | 134.9 | 10,976 | 11.6 | 34.5 | 12,936 | 11.9 | 17.9 |
| Sunflowerseed Oil | 5,024 | 8.4 | 7,869 | 9.5 | 56.6 | 8,686 | 9.2 | 10.4 | 9,237 | 8.5 | 6.3 |
| Groundnut Oil | 2,864 | 4.8 | 3,897 | 4.7 | 36.1 | 4,354 | 4.6 | 11.7 | 4,705 | 4.3 | 8.1 |
| Cottonneseed Oil | 2,992 | 5.0 | 3,782 | 4.6 | 26.4 | 3,870 | 4.1 | 2.3 | 3,811 | 3.5 | -1.5 |
| Coconut Oil | 2,716 | 4.6 | 3,387 | 4.1 | 24.7 | 3,446 | 3.6 | 1.7 | 2,499 | 2.3 | -27.5 |
| Olive Oil | 1,701 | 2.9 | 1,855 | 2.2 | 9.1 | 1,852 | 2.0 | -0.2 | 2,425 | 2.2 | 30.9 |
| Corn Oil | 866 | 1.5 | 1,477 | 1.8 | 70.6 | 1,854 | 2.0 | 25.5 | 1,989 | 1.8 | 7.3 |
| Palm Kernel Oil | 571 | 1.0 | 1,450 | 1.7 | 153.9 | 1,920 | 2.0 | 32.4 | 2,518 | 2.3 | 31.1 |
| Linseed Oil | 764 | 1.3 | 653 | 0.8 | -14.5 | 690 | 0.7 | 5.7 | 721 | 0.7 | 4.5 |
| Sesame Oil | 502 | 0.8 | 612 | 0.7 | 21.9 | 728 | 0.8 | 19.0 | 689 | 0.6 | -5.4 |
| Castor Oil | 346 | 0.6 | 438 | 0.5 | 26.6 | 486 | 0.5 | 11.0 | 433 | 0.4 | -10.9 |
| Vegetable Oils | 41,725 | 69.9 | 62,694 | 75.6 | 50.3 | 76,282 | 78.5 | 21.7 | 86,995 | 80.0 | 14.0 |
| Tallow | 6,283 | 10.5 | 6,813 | 8.2 | 8.4 | 7460 | 7.9 | 9.5 | 8,133 | 7.5 | 9.0 |
| Butter | 5,746 | 9.6 | 6,500 | 7.8 | 13.1 | 5722 | 6.0 | -12.0 | 5,819 | 5.4 | 1.7 |
| Lard | 4,691 | 7.9 | 5,509 | 6.6 | 17.4 | 5853 | 6.2 | 6.2 | 6,609 | 6.1 | 12.9 |
| Fish Oil | 1,214 | 2.0 | 1,378 | 1.7 | 13.5 | 1314 | 1.4 | -4.6 | 1,201 | 1.1 | -8.6 |
| Animal Oils/Fats | 17,934 | 30.1 | 20,200 | 24.4 | 12.6 | 20,349 | 21.5 | 0.7 | 21,762 | 20.0 | 6.9 |
| GRAND TOTAL | 59,659 | 100.0 | 82,894 | 100.0 | 38.9 | 94,636 | 100.0 | 14.2 | 108,757 | 100.0 | 14.9 |

Sources: Oil World, various issues.