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MARKET EFFICIENCY IN PALM OIL AND COCOA FUTURES

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MARKET EFFICIENCY IN PALM OIL AND COCOA FUTURES

By

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For Uma and Ratnam
-May this work be a source of inspiration for you.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADF =Augmented Dickey-Fuller

CPO =Crude Palm Oil

EMH =Efficient Market Hypothesis

FAMA=Federal Agricultural Marketing Authority

FPE =Final Prediction Error

ICCA =International Cocoa Agreement

ICCO =International Cocoa Organisation

KLCE =Kuala Lumpur Commodity Exchange

MR =Malaysian Ringgit

PORLA=Palm Oil Research and Licensing Authority

RBD =Refined, Bleached and Deodorized

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Futures markets play an important role in the price discovery and forward pricing of agricultural commodities. Agricultural product prices have been found to be particularly volatile and susceptible to sharp fluctuations which expose producers and traders to increased risks in handling these products. For countries like Malaysia which depend on commodity earnings for a substantial portion of their inflow of foreign exchange, severe fluctuations in prices could have unfavourable effects on the economy.

The effects of futures prices on cash prices have been the subject of much research in recent years. The contention is that if the futures market is efficient, then futures prices should provide unbiased forecasts of cash prices in order to facilitate optimal production and storage decisions. Many empirical studies have in fact shown that futures trading leads to more efficient spot markets. The development of futures markets in Malaysia was to fulfil the need for an efficient pricing and hedging

mechanism for Malaysia's primary commodities. Whether that objective has been fulfilled after twelve years since the setting up of the Kuala Lumpur Commodity Exchange (KLCE) is the subject of this study. Over the years, the commodity base of the exchange has expanded from crude palm oil (CPO) to rubber, tin, cocoa and refined, bleached and deodorized (rbd) palm olein. The pricing efficiency of the CPO futures market is evaluated in this study since it has important inferences for the later established futures markets. The hypothesis tested is whether the futures market is informationally efficient. Comparisons are made with cocoa futures which were introduced only recently on the exchange and which represents another commodity where Malaysia has had to depend on world markets for domestic price determination.

This study evaluates pricing efficiency by using the cointegration approach which examines the nature of the relationship between cash and futures prices for a commodity. This method overcomes the problems associated with previous methods on testing futures market efficiency. Assessments on the efficiency of the market are based on the degree of divergence and the speed of adjustment between cash and futures prices. Daily prices over the period 1981 to 1992 were used for CPO and a two year period between 1989 and 1990 were covered for cocoa.

The results obtained indicate that in the case of the CPO market, with only one exception, there was generally cointegration between cash and futures prices for the period studied, implying pricing efficiency in the market. It was also found that a

mechanism existed which brought cash and futures prices into alignment whenever they diverged. The evidence also points to the dependence of cash markets on future markets for price indications. The only exception was in 1984, and this was the year in which the KLCE was embroiled in a crisis. The structural defects of the market appears to have affected the pricing performance to such an extent that futures and cash prices went out of alignment. In the case of the cocoa market, the results indicate that futures and cash prices were cointegrated and there was pricing efficiency. But the subsequent decline of trading interest in the market indicates that there were structural defects which had led to a loss of confidence in the market and affected liquidity. This study therefore underlines the possible influence of market structure on the pricing performance of the market.

Abstrak tesis yang dikemukakan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Master Sains.

KECEKAPAN PASARAN BAGI PASARAN SERAHAN HADAPAN MINYAK SAWIT MENTAH DAN KOKO

Oleh

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Pasaran serahan hadapan memainkan peranan yang penting di dalam penemuan dan letak harga di masa hadapan bagi keluaran pertanian. Harga pertanian didapati mengalami ketidakstabilan yang ketara yang mendedahkan pengeluar dan peniaga kepada risiko tinggi dalam pengendalian komoditi. Bagi negara seperti Malaysia yang bergantung kepada pendapatan eksport bagi sebahagian besar daripada perolehan tukaran asing, turun naik harga yang mendadak boleh menjejaskan ekonomi.

Kesan harga serahan hadapan kepada harga tunai telah menjadi tajuk bagi beberapa penyelidikan sejak beberapa tahun yang lalu. Hujah umum ialah sekiranya pasaran serahan hadapan itu cekap, maka harga serahan hadapan seharusnya memberi ramalan yang tepat terhadap harga tunai untuk memudahkan keputusan untuk pengeluaran dan penyimpanan yang optimum. Banyak penyelidikan empiris telah menunjukkan bahawa urusniaga serahan hadapan mewujudkan pasaran tunai yang cekap. Pewujudan pasaran serahan hadapan di Malaysia ialah untuk memenuhi keperluan mekanisme

penemuan harga dan lindung nilai yang cekap bagi komoditi pertanian utama Malaysia. Sama ada matlamat ini telah dicapai selepas dua belas tahun penubuhan Bursa Komoditi Kuala Lumpur (BKKL) adalah menjadi objektif utama kajian ini. Komoditi yang diperniagakan di BKKL telah dipelbagaikan daripada minyak kelapa sawit mentah (MKSM) kepada getah, timah, koko dan rbd olein sawit. Kecekapan harga pasaran serahan hadapan minyak sawit mentah adalah dinilai di dalam kajian ini kerana penilitian ini boleh digunakan sebagai penunjuk kepada pasaran serahan hadapan lain yang diperkenalkan kemudian. Hipotesis yang diuji ialah pasaran ini mempunyai kecekapan dari segi maklumat. Perbandingan dibuat dengan pasaran koko yang baru saja diperkenalkan di bursa ini dan merupakan satu lagi komoditi di mana Malaysia bergantung kepada pasaran dunia untuk penentuan harga.

Kajian ini menilai kecekapan harga dengan menggunakan kaedah kointegrasi yang mengambil kira corak perhubungan di antara harga tunai dan harga serahan hadapan. Kaedah ini mengatasi masalah yang berkaitan dengan kaedah lain yang menguji kecekapan pasaran sebelum ini. Penilaian terhadap kecekapan pasaran adalah berdasarkan kepada jurang perbezaan dan kelajuan pengubahsuaian di antara harga tunai dan serahan hadapan. Harga harian bagi tempoh dari 1981 hingga 1992 digunakan bagi MKSM dan dari 1989 hingga 1990 bagi koko.

Keputusan kajian ini menunjukkan bahawa bagi pasaran MKSM, kecuali bagi satu tahun sahaja, terdapat kointegrasi di antara harga tunai serahan hadapan sepanjang

tempoh kajian, dan ini bermakna terdapat kecekapan harga dalam pasaran ini. Didapati juga bahawa ada mekanisme yang menyebabkan harga serahan hadapan dan tunai sealiran apabila berlaku pemesongan. Terdapat juga bukti pergantungan harga tunai kepada harga serahan hadapan untuk penentuan harga. Tetapi keadaan sebaliknya berlaku pada tahun 1984 apabila berlaku krisis di BKKL. Kelemahan struktur pasaran telah mempengaruhi prestasi harga dengan begitu ketara sehingga harga serahan hadapan dan tunai tidak lagi sealiran. Bagi pasaran koko pula, keputusan kajian ini menunjukkan wujudnya kointegrasi di antara harga serahan hadapan dan tunai dan wujudnya kecekapan harga. Namun urusniaga ke atas kontrak serahan hadapan telah berkurangan kerana masalah ketidaksempurnaan struktur yang menjejaskan kepercayaan peniaga dan juga kecairan pasaran. Kajian ini menyarankan tentang kemungkinan pengaruh struktur pasaran terhadap prestasi letak harga.

CHAPTER I

INTRODUCTION

Importance of the Agricultural Sector

Agricultural product prices are important both economically and politically, in particular to developing countries like Malaysia, since they influence the level of farm incomes, the welfare of consumers and the amount of export earnings. The agriculture, forestry and fishing sector remains an important sector in the Malaysian economy as evidenced by its significant contribution to the country's Gross Domestic Product and export earnings. It is the second largest contributor to the Gross Domestic Product of Malaysia, accounting for 16.3% in 1992. Agricultural exports are also the country's second largest foreign exchange earner, accounting for 17.4% of total export earnings in 1992. In addition, the sector is the largest source of employment and currently employs 25.9% of the labour force (Malaysia, Bank Negara, 1992).

Agricultural commodity prices are much more volatile than the prices of industrial goods. The international price of cocoa, for example, dropped 21% within a period of four months in 1986. The international price of coffee doubled between 1975 and 1977 and then dropped 50% in the subsequent eighteen months (Economic Intelligence Unit, various issues). Industrial products seldom exhibit short-run changes of similar magnitude. With Malaysia's continued dependence on the agricultural sector, agricultural

price fluctuations could have significant impacts on the economy and price stabilisation is desirable to reduce disruptions to the growth of the economy.

Malaysia is a leading producer and exporter of several primary commodities, including natural rubber, palm oil, cocoa, pepper, timber and tin. In the case of palm oil, Malaysia is the world's largest producer and exporter accounting for 53% of world output and 66.8% of world exports in 1992 (Oil World, 1992). Palm oil is currently the second most important vegetable oil in the world oils and fats market, accounting for 14.35% of world production of seventeen major oils and fats, ranking only behind soyabean oil which contributed 20.23% of world output. In terms of world exports of oils and fats, palm oil is currently leading with a market share of 32% while soyabean oil has a share of 16.2%. Palm oil and palm kernel oil have become the production growth leaders in the oils and fats complex since the early seventies (Mielke, 1991).

The oil palm is today regarded as the country's golden crop and it takes up about one-third of the country's total cultivated area, exceeding even rubber since 1989 (Malaysia, Ministry of Primary Industries, 1990). Export earnings from palm oil products are the most important source of foreign exchange earnings from the agricultural sector, after petroleum and timber products. Palm oil contributed 5.2% of the country's foreign exchange earnings in 1992. The sector also provides a source of livelihood to about 200,000 rural families in government land schemes and individual smallholdings and employment to about 120,000 workers on estates. A substantial number of workers

are additionally employed in ancillary supporting industries in trading, milling, processing and manufacturing.

Cocoa is another crop which has featured importantly in the country's agricultural diversification programme. With government emphasis on reducing overdependance on only one or two crops, the cocoa sector has expanded rapidly from a position of insignificance in the sixties to be the most important crop after rubber and oil palm in terms of cultivated area. Much of this rapid growth took place in the eighties under favourable world market prices.

With production soaring to earn Malaysia a place in the league of the world's biggest cocoa producers, earnings from exports of cocoa have increased sharply over the past decade from a mere RM200 million in 1980 to almost RM1 billion in 1988 before a slump in world cocoa prices slashed revenue to RM750 million in 1990. Exports of cocoa beans and products currently contribute about 4% of total export earnings in the agricultural sector.

Malaysia's current status in world production has made it a force to be reckoned with in the determination of the world cocoa price. Its participation is seen to be crucial in any international efforts to stabilize the price of cocoa as evidenced by recent attempts to persuade Malaysia to join the International Cocoa Organisation.

General Background of the Palm Oil Industry

Production

Malaysia's success in the oil palm industry is a fairly recent phenomenon. The oil palm, generic name *Elais Guineensis*, a perennial tree crop from which the palm oil is extracted, was introduced to Malaysia in 1870 as an ornamental plant. The first commercial planting began only in 1917 and large scale cultivation took place in 1961 as a result of the country's extensive agricultural diversification programme to reduce dependence on rubber, tin and coffee which were then the major sources of foreign exchange earnings. In 1960, Malaysia produced only about 100,000 tonnes of palm oil, but by the 1970's production had increased five-fold to 500,000 tonnes (PORLA, Various Issues) (Table 1). Prior to the 1960's about two-thirds of the world's palm oil was produced in Africa but by 1966, Malaysia had emerged as the world's leading producer and exporter of palm oil. Output continued to increase rapidly to 2.57 million tonnes in 1980 and 6.37 million tonnes in 1992. Malaysia is expected to produce 8.0 million tonnes of crude palm oil from a total planted area of 2.5 million hectares by the year 2000.

As shown in Table 1, oil palm cultivation in Malaysia has expanded rapidly as a result of the conversion of large tracts of private rubber holdings to oil palm estates as well as large scale cultivation by federal and state governments in new land areas. Total

Table 1

Oil Palm Planted Area and Production in Malaysia

Year	Area (hectares)	Production (tonnes)
1960	54643	91793
1961	57143	94846
1962	62079	108171
1963	71030	125691
1964	83200	122913
1965	96947	150411
1966	122703	189687
1967	153610	225758
1968	190765	282984
1969	231176	352096
1970	291263	431069
1971	328821	589090
1972	389751	728958
1973	459194	812614
1974	557846	1045975
1975	633339	1257573
1976	713009	1391965
1977	792670	1612747
1978	852979	1785525
1979	938863	2188699
1980	1069507	2573173
1981	1140538	2822144
1982	1226585	3510920
1983	1287664	3016481
1984	1361176	3714795
1985	1482399	4131782
1986	1543385	4543755
1987	1672875	4531960
1988	1805923	5027496
1989	1946559	6056501
1990	2029464	6094622
1991	2094028	6141353
1992	2167396	6373461

(Source: PORLA, Palm Oil Update, Various Issues)

hectarage expanded from 54,643 hectares in 1960 to 2.03 million hectares in 1990 (PORLA, 1993). The steady increase in hectarage is shown in Table 1.

The success of the palm oil industry in Malaysia has been attributed to a number of factors. Among these are the expansion in planted area as a result of the government's agricultural diversification programme in the sixties, the introduction of new high-yielding varieties of oil palm, the adoption of the plantation system which was already practised in rubber estates, the implementation of a land-development programme, and the introduction of the Cameroon weevil in the early eighties to aid in pollination (Fatimah and Roslan, 1987). Malaysia's success in a highly competitive market has also been attributed to its ability to produce high-quality, low-cost vegetable oil (Larson, 1991). In general, palm oil appears to have a worldwide production cost advantage. Bastin (1989) found that the competitive advantage of palm oil versus the oilseeds produced in the EEC is considerable and without financial production support, the oilseeds would lose out to palm oil.

Various steps have been taken by the government to strengthen the marketing and reinforce the quality aspects of palm oil as well as promote palm oil usage. The current approach of the government is to consolidate Malaysia's position in the world market for oils and fats by striving to improve efficiency to bring about cost reductions so that Malaysian palm oil will remain cost-competitive and able to withstand low market prices (Malaysia, Ministry of Primary Industries, 1990).

Exports

Palm oil exports have increased tremendously since the sixties. Exports in 1960 totalled below 100,000 tonnes but expanding output which was increasingly channelled to overseas markets saw total exports rising to 5.94 million tonnes in 1990 (PORLA, 1993). Since then there has been a slight fall in export volume to 5.57 million tonnes in 1991 and 5.56 million tonnes in 1992. Part of the slowdown in export volume has been attributed to higher prices for palm oil which curtailed offtake from major importing countries. However, this did not affect export earnings from palm oil which increased 6.1% to six billion Malaysian ringgit in 1992 as average export prices rose from RM836.50 per tonne in 1991 to RM916.50 in 1992.

The health and nutritional implications of palm oil have recently become a widely debated topic. In view of the wide-ranging implications on Malaysia's economy, research efforts have been stepped up in this area to counter allegations by certain groups against palm oil. Malaysia has realized the need to develop new markets in order to reduce dependence on traditional markets and at the same time to expand and service existing markets. Some success has been achieved in this effort and Malaysian palm oil has made inroads into China, Iran and Egypt (Malaysia, Ministry of Primary Industries, 1990).

Palm oil has the potential for further growth in the world market share for oils and fats given its versatility in a variety of food and non-food applications, its good nutritional quality and its competitive cost of production *vis-a-vis* other vegetable oils (Malaysia, Ministry of Primary Industries, 1990). Its market share of world exports of oils and fats is expected to rise to 42% in the years 2003 to 2007 compared to 32% in 1990 and 21% in 1980 (Mielke, 1991). It is expected to remain as a significant contributor to the Malaysian economy in the years ahead, given the government's commitment and emphasis on the industry. The country's plan for 1991 to 1995 reiterates that oil palm, rubber and cocoa will continue to be the mainstay of the economy (Malaysia, Sixth Malaysia Plan 1991- 1995). Hectarage expansion is expected to grow at 1.8% annually from two million hectares in 1990 to 2.2 million hectares in 1995.

Prices

Palm oil is one of the major sources of supply in the world market for oils and fats which consists of at least twenty-six types. Palm oil has to compete in a market containing some thirteen principal vegetable oils and oilseeds, two types of marine oils and three categories of animal fats. These are both for edible and non-edible uses and include annual oilseed crops as well as perennial tree crops.

Palm oil is used in the manufacture of a wide variety of products, including margarine, cooking fat and soap. Almost all vegetable oils are used as cooking oils and