THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Determinants of the Price of Natural Rubber in Malaysia

Mohd Faizal Basri
Senior Lecturer, Faculty of Management and Economics,
Universiti Pendidikan Sultan Idris, Malaysia
Mohammed Saifullah Hapka
Student, Faculty of Business and Management,
Universiti Teknologi MARA, Malaysia
Mohamad Nizam Jaafar
Senior Lecturer, Arshad Ayub Graduate Business School,
Universiti Teknologi MARA, Malaysia
Amirul Afif Muhamat
Senior Lecturer, Faculty of Business and Management,
Universiti Teknologi MARA, Malaysia

Abstract:
This paper aims to determine the factors that will affect the volatility of natural rubber price (represented by SMR20) in Peninsular Malaysia. With the objectives of describing the high volatility in natural rubber (NR) price may be a result of demand of NR (import), supply of NR (export), currency exchange rate and crude oil price. The data used for this study is from year 2000 until 2015 that were obtained from Department of Statistics of Malaysia, Malaysian Rubber Board (MRB), and Bank Negara Malaysia (BNM). The relationship between the independent variables and the price of NR were tested using descriptive and multiple regression analysis. The findings indicated that demand of rubber, supply of rubber and currency exchange rate has an impact towards natural rubber price. However, crude oil price failed to support one of the hypotheses between crude oil price and natural rubber price. As for conclusion, the rubber industry can no longer be viewed from the narrow perspective of a mere supplier of raw rubber. Developments in the last decade give a clear indication of the vast potentials for the industry when it is developed in a more integrated manner. Rubber cultivation per se does not generate attractive returns to investment, rubber products manufacturing and rubber wood industries offer lucrative returns.

Keywords: Natural rubber, rubber price, Malaysian rubber, SMR20

1. Introduction

Natural rubber (NR) is a vital agricultural commodity used in the manufacture of a wide range of products. Its production from the rubber tree (hevea brasilliensis) plays a major role in the socio-economic fabric of many developing countries (Barlow et al., 2014). Over the last three decades, the Malaysian Rubber Industry has shown very significant achievements despite the country's economy undergoing a revolution from agriculture-based to industrial-based in the 1980, with the implementation of the Industry Master Plan (IMP). The Malaysian rubber industry remains an important contributor to the country's export earnings. In 2014, it generated RM15. 2 billion compared with RM5.5 billion in 2000, a three-fold increase. An important contributor to this growth was Malaysia's emergence as the world's leading exporter of latex gloves. These were valued at RM12.2 billion or 80.3% of the total rubber products exported in 2014 (Azmi and Alavi, 2013).

However, Malaysia's position as a major producer of natural NR has declined over the years to six places after Thailand, Indonesia, Vietnam, China and India. Realizing the importance and challenges facing future of Malaysian rubber industry, numerous strategies have been formulated over the years to transform it and ensure its sustainability. The latest strategies of Malaysian Rubber Board (MRB) and those included in the National Economic Areas (NKEA), were formulated and launched in 2010 and 2011 respectively. They are based on of the aspirations for national transformation by the year 2020: Malaysia is meant to become a high-income nation in which the farmers are course included. Among these are the 440,000 families which are still dependent on rubber as a main source of income (Azmi and Alavi, 2013).

Therefore, under the Economic Transformation Programmes (ETP) announced by the Government in 2010, the special programme section NKEA was introduced referring to 12 economic sectors of the country which act as an engine for the success of ETP. The rubber industry has been designated as one of the sectors under a special focus together with the palm oil industry. Through this listing, the rubber industry is expected to increase its contribution to the Gross National Income (GNI) from RM18.9 billion as registered in 2009 to RM52.9 billion by 2020, with the implementation of 4 Entry Point Projects (EPPs) that have been identified (Chin et al., 2013).

The paper aims to determine the effect of demand of rubber, supply of rubber, currency exchange rate, and crude oil price on price of NR in Malaysia. The scope of this study would focus on the rubber price in Malaysia primarily the rubber price of SMR20 which is the common grade of Malaysian rubber in the Peninsular of Malaysia.

2. Literature Review

2.1. Demand and Supply of Natural Rubber

Supply and demand is a model for understanding the how prices and quantities are determined in a market system. The explanation works by looking at two different groups; buyers and sellers and asking how they interact. Buyers bid against each other and thereby raise the price, while sellers bid against each other and thereby lower the price. Burger and Smit (1989) studied the long-term and short-term analysis of the natural rubber market. It included the economies of key players in the natural rubber market both on the demand and supply side, and price fluctuations.

The fundamental factors influencing natural rubber prices are demand and supply, while other factors have indirect effects through changes in the fundamentals of demand and supply. For example, rise in the world economy results a rise in rubber demand, a decline within the price of natural rubber influences a falling share of synthetic rubber in total rubber consumption, and a weak currency exchange within the producing countries encourages a rise in exports and output from these producing countries and therefore an increase in world natural rubber supply (Khin et al., 2008).

According to Devlin and Coates (2011), most of the run-up in commodity prices to mid-2008 can be explained by a series of unexpected demand shocks, combined with a weak supply response. The supply and demand model depend on a high degree of competition, which means that there are enough consumers and sellers within the marketplace for bidding to take place. This implies in other business tested with a report shown that stronger demand for food crops and animal product in conjunction with slow growth in agricultural productivity and low stocks leads to upward pressure on prices (IMF and UNCTAD, 2011).

Based on Byerlee (2014), the significant increase in natural rubber price between year 2001 to 2012 was because of growing demand from China and other rapidly industrializing countries, and when 2012, prices have fallen owing to holdup within the Chinese economy and excess supply within the market.

2.2. Currency Exchange Rate

Prices of rubber cannot be determined in confrontation of demand and supply only. The exchange rates of dominant consumers and producers plays a role. With respect to volatility in the exchange rate market, Hooper and Kohangen (1978) note that changes within the margin of the exchange rate changes drop to changes within the relative price of the international product. Cavalcanti et al. (2015) found that increase in exchange rate can increase the commodity prices which will increase in price and eventually will increase the expansion rate.

Meanwhile, DeGrau we (1988) noted that the exchange rate risk produces substitution and financial gain effects on the product markets, that is, exports tend to increase if the margin of rate change is volatile. Doroodian (1999) concludes that fluctuation in exchange rates exert overall negative effects in international trade for developing countries.

2.3. Crude Oil Price

Sang et. al. (2012) concludes each change in environmental condition factors moreover as volatilities within the rate of exchange market and crude oil market are assumed to be associated with the fluctuation of Thai rubber price returns. Burger et. al. (2002) found that at every short-run supply model, a 1% increase in worth of RSS1 in Singapore, other things unchanged, will increase in total production of natural rubber (TPNR) by 0.1%, 0.06%, 0.18% and 0.07% in Malaysia, Indonesia, Thailand and Philippines, respectively.

Crude oil is one amongst the most important raw materials to produce synthetic rubber. Crude oil, natural and synthetic rubber prices are highly correlate, and they move in cycle with one another. It's determined that rubber prices usually follow the trend of crude oil prices. Crude oil prices can possibly be a determinant of the changes of the natural rubber market. High crude oil prices can lead to high synthetic rubber prices which is able to influence the natural rubber prices. On the other hand, low crude oil prices can make synthetic rubber prices a lot of competitive and it's putting pressure on natural rubber prices (Khin et al., 2012). When price of crude oil goes up, it has a negative result on the whole economy as crude oil is used within the production of just about everything including rubber. Khin et al. (2011) found that, the high price of crude oil continues to be a problem with concern all over the globe, particularly, developed countries that based on agriculture such as Malaysia.

Agricultural commodities prices are predicated on complex interactions among multiple factor include crude oil prices, demand and supply scenario that influence the growth of agricultural like natural rubber. Gruss (2014) found that between 2003 and 2013, oil prices in American Latin nearly quadrupled and influence metal prices by tripled, whereas food prices doubled, and costs of agricultural merchandise rose by about 50%.

3. Methodology

The study adopts the descriptive design, where the data of the variables from 2000 to 2015 are included and analysed using E Views. The data on rubber price was collected from Malaysian Rubber Board (MRB) focusing on the price of SMR20 natural rubber in Peninsular Malaysia. Meanwhile the data for the independent variables were taken from MRB, Department of Statistics of Malaysia and BNM. Data were analysed using descriptive and multiple regression analysis.
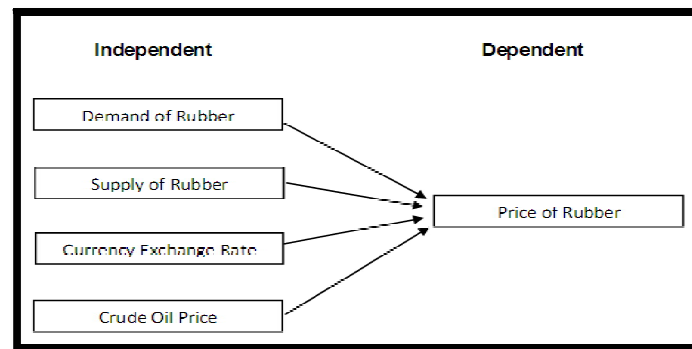
3.1. Theoretical Framework

Figure 1: Theoretical Framework

The initial estimation equation formulated for analysis is shown below:

$Y_t = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon$

(Equation 1)

Where;

Y	=	Dependent variable which is Price of Rubber
α	=	Constant number of equations
β	=	Coefficient Beta value
x_1	=	Independent variable which is Demand of Rubber
x_2	=	Independent variable which is Supply of Rubber
x_3	=	Independent variable which is Currency Exchange Rate
x_4	=	Independent variable which is Crude Oil Price
ε	=	Error

4 Results and Discussion

4.1. Descriptive Analysis

Table 1 summarises the descriptive analysis for the research variables in this dissertation. The dependent variable of this dissertation is natural rubber price (SMR20), while the independent variables are demand of rubber in, supply of rubber, currency exchange rate and crude oil price.

	Natural Rubber Price - SMR20 (RM)	Demand of Rubber-Import (Tonnage)	Supply of Rubber-Export (Tonnage)	Currency Exchange Rate (USD/RM)	Crude Oil Price (RM/Barrel)
Mean	6.3884	9,291,125	886,336	3.5114	219.7063
Median	5.9525	9,401,000	908,138.5	3.5833	226.685
Maximum	13.4833	12,159,000	1,137,552	3.8000	327.93
Minimum	2.0556	6,110,000	342,403	3.0594	92.45
Std. Dev.	3.1087	1,793,855	197,430.2	0.2859	88.3837

Table 1: Descriptive statistics

From the result, the minimum value of natural rubber price (POR), demand of rubber (DOR), supply of rubber (SOR), currency exchange rate (CER), and crude oil price (COP) are 2.0556, 6,110,000, 342,403, 3.0594 and 92.45 respectively. On the other hand, the maximum value of natural rubber price, demand of rubber, supply of rubber, currency exchange rate and crude oil price are 13.4833, 12,159,000, 1,137,552, 3.8000 and 327.93 respectively.

Standard deviation represents the relative dispersion of the macro variables from the means value, thus the standard deviation for natural rubber price, demand of rubber, supply of rubber, currency exchange rate and crude oil price are 3.1087, 1,793,855, 197,430.2, 0.2859 and 88.3837 respectively.

	POR	DOR	SOR	CER	COP
POR	1.0000				
DOR	0.7258	1.0000			
SOR	0.0429	0.1794	1.0000		
CER	-0.8621	-0.8430	0.2014	1.0000	
COP	0.8175	0.8603	-0.1340	-0.9085	1.0000

Table 2: Pearson's Correlation Coefficient Test

The Pearson's correlation coefficient test above was used to measure the strength between attributes or variables as presented in Table 4.2. The relationship range indicators as follows: (.9-1) is a very high (positive/negative) correlation;

(.7-.9) is a high (positive/negative) correlation; (.5-.7) is a moderate (positive/negative) correlation; (.3-.5) is a low (positive/negative) correlation; and (.0-.3) has little (positive/negative) correlation. Thus, POR has a high correlation with DOR, CER and COP, and has little correlation with SOR. As for DOR, it has a high association with CER and COP, and low association with SOR. Meanwhile, SOR has a low association with CER and COP. Finally, CER has a very high association with COP.

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
DOR	0.0000	231.0944	7.8033
SOR	0.0000	44.2269	1.9658
CER	12.1054	1287.827	7.9539
COP	0.0001	55.8109	7.3520

Table 3: Variance Inflation Factor (VIF)

There is no problem of multicollinearity that may constitute a problem to the regression analysis if the VIF values are less than 10. If VIF is more than 10, hints which the problem of multicollinearity. Table 3 shows that the CVIF for demand of rubber, supply of rubber, currency exchange rate and crude oil price are 7.8033, 1.9658, 7.9539 and 7.3520 respectively. All the VIF are less than 10 and shows that there is no problem with multicollinearity with the set of predictors.

4.2. Multiple Regressions

	Coefficients	Standard Error	t	p
DOR	-0.0000	0.0000	-2.2177	0.0486**
SOR	0.0000	0.0000	2.8823	0.0149**
CER	-12.3957	3.4793	-3.5627	0.0045***
COP	0.0158	0.0108	1.4562	0.1733
Constant	51.3702	15.0535	3.4125	0.0058
R²	0.8584			***p<0.01
Adjusted R²	0.8069			**p<0.05
F. Change	16.6728			
Significance F	0.0001			
Durbin-Watson Statistic	1.0288			

Table 4: Multiple Regressions

Table 4 presents the multiple regressions in this study. The Adjusted R-Squared is sufficiently high (80.69%), with the variance in behaviour to rubber price explained by the variance and influence demand of rubber, supply of rubber, currency exchange rate and crude oil price. The results show that F. Change is significant with $p<0.01$, with demand of rubber being negative and significant (with t-statistic -2.2177 and having insignificance with $p<0.05$ level, .0486) to rubber price. The result also shows that supply of rubber has positive and significant to rubber price (with t-statistic 2.8823 and having significance with $p<0.05$ level, .049). This indicates that the factor of demand of rubber and supply of rubber are significant encouraging factors in changes of rubber price.

Meanwhile, currency exchange rate is statistically negative and significant in relation to rubber price (with t-statistic -3.5627 and having significance with $p<0.01$ level, 0.0045). This indicates that the currency movement of currency exchange rate encourage the volatility of rubber price. Crude oil price in other hand, not significant towards rubber price (with t-statistic 1.4562 and having insignificance with $p>0.05$ level, 0.1733). This indicates that the factor of crude oil price reflects insignificant encouraging factor in rubber price.

4.3. Summary of Hypotheses Results

Hypothesis		Results			Previous Study
		p-value	Regression		
H1	Demand of rubber (tonnage) have relationship with the price of rubber (RM)	0.0486	Accepted	Negative relationship at 5% significance level	Burger and Smit (2000), Khin et al. (2008), Devlin et al. (2011), IMF and UNCTAD (2011), Byerlee (2014)
H2	Supply of rubber (tonnage) have relationship with the price of rubber (RM)	0.0149	Accepted	Positive relationship at 5% significance level	Burger and Smit (2000), Khin et al. (2008), Devlin et al. (2011), IMF and UNCTAD (2011), Byerlee (2014)
H3	Currency exchange rate (US$/RM) have relationship with the price of rubber (RM)	0.0045	Accepted	Negative relationship at 1% significance level	Hooper and Kohangen (1978), DeGrauwe (1988), Doroodian (1999), Cavalcanti et al. (2015)
H4	Price of crude oil (RM/barrel) have relationship with the price of rubber (RM)	0.1733	Rejected	No relationship	Burger et. al. (2002)

Table 5: Summary of Hypotheses Results

5. Conclusion

This study has contributed to an understanding of natural rubber price behaviour by considering several predictive variables. The predictive variables, namely, demand of rubber, supply of rubber, currency exchange rate and crude oil price are based on suggestion from previous inconclusive results and past studies (Khin et al., 2008). Findings from this study failed to support one of the hypotheses between crude oil price and natural rubber price, while demand of rubber, supply of rubber and currency exchange rate were found as predictive variables of natural rubber price. Although researchers have shown increased interest in determining the key factors that contribute to volatility of the natural rubber price, the findings for predictive variables on such behaviour are still open for discussion.

The rubber industry can no longer be viewed from the narrow perspective of a mere supplier of raw rubber. Developments in the last decade give a clear indication of the vast potentials for the industry when it is developed in a more integrated manner. Rubber cultivation per se does not generate attractive returns to investment, rubber products manufacturing and rubber wood industries offer lucrative returns. The main competitive edge of Malaysia's integrated rubber industry is the comprehensive R&D and technical back-up as well as the several incentives offered by the government to all sectors of the industry. This has largely enhanced Malaysia's productivity in terms of output per unit of land, labour and capital.

Several recommendations may be applicable for future and further research. First, there is a need for evaluate the climate factors that influencing the tapping days to produce the natural rubber. Second, future research may include effect of future market activities towards the natural rubber price. Next, government intervention, policies and encouragement may also affect the natural rubber price. Influence by International Natural Rubber Organization (INRO), which joins by the producers' countries, may also affect the movement of natural rubber price. On the other hand, China as the major producer of rubber-based product may influence the market price as China is the major importer and natural rubber consumption in the world. Lastly, future research may expand the research to the world natural rubber prices instead of Malaysia's price only.

6. References

i. Azmi, I. M., & Alavi, R. (2013). Patents and the practice of open science among government research institutes in Malaysia: The case of Malaysian Rubber Board. World Patent Information, 35(3), 235-242.

ii. Barlow, C., Jayasuriya, S., & Tan, C. S. (2014). The world rubber industry. Routledge.

iii. Burger, K., & Smit, H. P. (1989). Long-term and short-term analysis of the natural rubber market. Weltwirtschaftliches Archiv, 125(4), 718-747.

iv. Burger, K., & Smit, H. P. (2000). Natural rubber in the coming decade policies and projections. International Rubber.

v. Burger, K., Smit, H., & Vogelvang, B. (2002). Exchange rates and natural rubber prices, the effect of the Asian crisis. Zaragoza (Spain), 28, 31.

vi. Byerlee, D. (2014). The fall and rise again of plantations in tropical Asia: History repeated?. Land, 3(3), 574-597.

vii. Chin, M. J., Poh, P. E., Tey, B. T., Chan, E. S., & Chin, K. L. (2013). Biogas from palm oil mill effluent (POME): Opportunities and challenges from Malaysia's perspective. Renewable and Sustainable Energy Reviews, 26, 717-726.

viii. De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade. Staff Papers, 35(1), 63-84.

ix. De V. Cavalcanti, T. V., Mohaddes, K., & Raissi, M. (2015). Commodity price volatility and the sources of growth. Journal of Applied Econometrics, 30(6), 857-873.

x. Doroodian, K. (1999). Does exchange rate volatility deter international trade in developing countries?. Journal of Asian Economics, 10(3), 465-474.

xi. Devlin, W., Woods, S., & Coates, B. (2011). Commodity price volatility. Economic Round-up, (1), 1.

xii. Gruss, B. (2014). After the boom–commodity prices and economic growth in Latin America and the Caribbean (No. 14-154). International Monetary Fund.

xiii. Hooper, P., & Kohlhagen, S. W. (1978). The effect of exchange rate uncertainty on the prices and volume of international trade. Journal of international Economics, 8(4), 483-511.

xiv. IMF, O., & UNCTAD, W. (2011). Price Volatility in Food and Agricultural Markets: Policy Responses. Food and Agricultural Organization, 1-10.

xv. Khin, A. A., Chong, E. C., Shamsudin, M. N., & Mohamed, Z. A. (2008). Natural rubber price forecasting in the world market. Paper in agriculture sustainability through participative global extension, Putrajaya, 15-19.

xvi. Khin, A. A., Zainalabidin, M., Nasir, S. M., Chong, E. C. F., & Mohamed, A. F. (2011). Estimation methodology of short-term natural rubber price forecasting models. Journal of Environmental Science and Engineering, 5(4).

xvii. Khin, A. A., Zainalabidin, M., & Hameed, A. A. A. (2012). The impact of the changes of the world crude oil prices on the natural rubber industry in Malaysia. World Applied Sciences Journal, 20(5), 730-737.

xviii. Sang, W. C., Sriboonchitta, S., Rahman, S., Huang, W. T., & Wiboonpongse, A. (2012). Modeling volatility and interdependencies of Thai rubber spot price return with climatic factors, exchange rate and crude oil markets.