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The Effect of an Export Levy on the Malaysian Cocoa Industry

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ABSTRAK

Kajian ini cuba menerangkan implikasi ekonomi levi eksport terhadap industri koko Malaysia. Keputusan menunjukkan bahawa levi eksport akan menurunkan harga pengeluar dan menaikkan harga eksport. Justru itu pengeluaran dan eksport akan menurun. Penggunaan domestik dan import pula akan bertambah.

ABSTRACT

This study attempts to elucidate the economic implications of an export levy on the Malaysian cocoa industry. The results indicate that the imposition of an export levy would lower producer prices and raise export prices. Hence production and exports would decline. Domestic utilization and imports, on the other hand, would increase.

INTRODUCTION

Bearish cocoa prices and escalating production costs have adversely affected the cocoa industry. Cultivated cocoa area has declined at an average annual rate of 12.8% in the past five years. There have been cases of cocoa land being diverted into alternative, and more lucrative, crops such as oil palm. Hence production of cocoa beans has declined from 247,000 tonnes in 1990 to 131,475 tonnes in 1995. This reduction in production has caused a shortage of domestic cocoa beans in the market for grinding and further downstream activities.

The National Agricultural Policy (NAP) 1992-2010 identified a strong potential in the downstream activities as an option to sustain the growth of the cocoa industry. The local utilization rates of cocoa beans are projected to increase from a level of 28.3% (70,000 tonnes) to 45.7% (160,000 tonnes) by 2010 (Ministry of Agriculture 1992).

To ensure a sufficient domestic supply of cocoa beans, the cocoa manufacturers group is asking the government to impose a levy on the export of local cocoa beans. As the manufacturers would surely benefit from the imposition of the levy, the question arising here is who will have to pay for the levy and how much? Will the importing countries bear the total amount of the levy or do the cocoa producers bear a portion of it? Would the intended gains in domestic grinding through export tax imposition outweigh the expected reductions in production and exports?

Studies by Mad Nasir (1994) on palm oil and Mad Nasir and Mohd. Shahwahid (1994) on sawntimber indicate that the export levy reduced the producer prices and in turn the producer's income. Further the levy has also resulted in reduced supply and export levels. As intended, the levy has encouraged domestic utilization owing to its effect of lowering domestic prices.

This paper attempts to elucidate the economic implications of an export levy on cocoa beans. This study is useful in that it can indicate to policy makers and industry participants the favourable economic impact or otherwise arising from the imposition of an export levy on cocoa beans, one of the country's primary commodity exports.

INCIDENCE OF EXPORT LEVY

The distribution of the burden of the levy depends on the price elasticities of demand and supply of cocoa. *Fig. 1* provides a graphical exposition on this point. The free trade equilibrium is determined by the intersection of the excess supply curve ES_1 with the excess

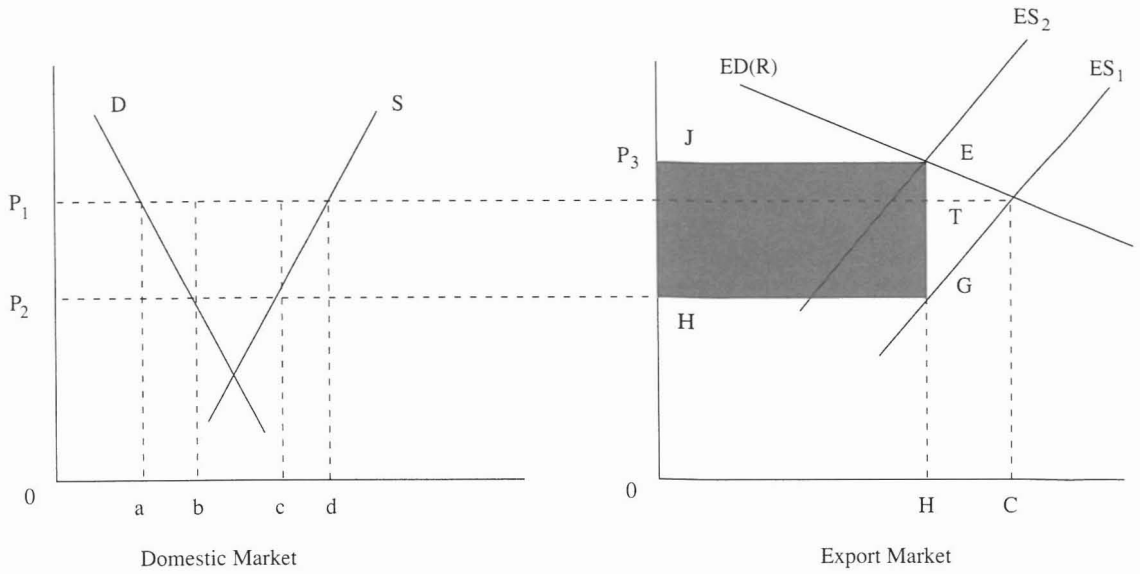

Fig. 1. The effect of fixed export levy on domestic and export markets

demand curve ED(R) for the rest of the world. The excess supply is the horizontal difference between S and D, measuring the amount supplied for export. In this setting, the free trade domestic and boarder prices are P_1. An imposition of a levy can be illustrated by a vertical shift in the excess supply curve from ES_1 to ES_2 by the amount of the levy. Assuming that the ED(R) curve is not perfectly elastic, this export tax levy pushes up border prices to P_3, but depresses domestic price to P_2. Thus the new equilibrium price that importers have to pay, P_3, will be higher than the pre-levy price (P_1). However, the price increase (P_3-P_1) is less than the amount of the levy. Thus the burden of the levy will be shared by importers and producers as well. In the diagram, importers will bear P_3-P_1 of the levy, while producers will bear an amount of P_1-P_2.

In the domestic market, at the free trade price P_1, the export volume is ad units. Domestic production is Od and domestic consumption is Oa. The export tax lowers the domestic price to P_2, increasing domestic consumption by ab, but decreasing production by cd. Thus, exports fall to ac.

The ability of the Malaysian producers to shift this export levy forward to importers depends on the elasticity of the export demand, which in turn partly depends on the bargaining strength of the Malaysian producers. The impact on cocoa bean production and export is negative, but the shaded area JEGH is captured by the government as tax revenue. Export quantity is expected to decline from OC to OH after the imposition of the tax. Together with the price reduction received, it is likely that producers will suffer declining income.

METHODOLOGY

Model Specifications

The specifications of the cocoa beans market model follow that of Mad Nasir (1993). The model consists of five behavioural equations and two identities. The behavioural equations describe the production, exports, domestic demand, imports and export price. The identities define the domestic price and stock level of cocoa beans.

Production of Cocoa Beans

The specification of the cocoa supply equation are based on the model developed by Wickens and Greenfield (1973). This model is an improvement over the models developed by

Nerlove (1958), Bateman (1965), Ady (1968) and Behrman (1968) in the explicit treatment of the tree stock as capital and in constraining the harvesting decision by the existing productive capacity. Following Wickens and Greenfield, the cocoa supply can be specified as:

$$PRCB_t = f\ (PRCB_{t-1}, PRCB_{t-2}, \Sigma\ PC_{t-i}) \qquad (1)$$

where PRCB = production of cocoa beans (tonnes)
PC = price of cocoa beans (RM per tonne)

The production of cocoa beans is hypothesized to be some function of production lagged by one ($PRCB_{t-1}$) and two ($PRCB_{t-2}$) periods and a distributed lag of current and past prices.

Demand for Cocoa Beans

Demand for cocoa beans is a derived demand which can be obtained from the solution of the maximization of a profit function. Export demand for cocoa beans can be specified as follows:

$$EXCB_t = f\ (EXPC_t, WIPT_t, XCR_t) \qquad (2)$$

where EXCB = export demand for cocoa beans (tonnes)
EXPC = export price of cocoa beans (RM per tonne)
XCR = exchange rates (RM/US$)
WIPI = world industrial production index (1980=100)

The price of final products is proxied by the industrial production index as in Yusoff (1988) and Mad Nasir (1993). Since cocoa beans are an intermediate raw material, it can be expected that if industrial activities are higher, the demand for cocoa beans would increase. The coefficient of exchange rate variable is expected to be positive. A depreciation of the exchange rate would mean that cocoa beans are relatively cheaper to foreign buyers, and hence this would increase their demand.

The domestic demand for cocoa beans can be specified as follows:

$$DDCB_t = f\ (PC_t, IMPC_t, MPI_t) \qquad (3)$$

where DDCB = domestic demand for cocoa beans (tonnes)
IMPC = import price of cocoa beans (RM per tonne)
MPI = Malaysian industrial production index (1980=100)

It is expected that the price of cocoa beans would be negatively related to the quantity demanded. Since imported beans are used for blending with local beans, the cross-price elasticity of import price is anticipated to be negative. The quantity demanded should be positively associated with the economic activity of the processing sector which is represented by the industrial production index.

In case of import demand for cocoa beans, its specification is similar to that of export demand, and may be specified as follows:

$$IMCB_t = f(IMPC_t, MPI_t, XCR_t) \qquad (4)$$

where IMPC = import of cocoa beans (tonnes)

Price of Cocoa Beans

Following Hwa (1979), Tan (1984) and Mad Nasir (1993), the price equation can be expressed as:

$$EXPC_t = f\ (STCB_t, WPC_t, EXPC_{t-1}) \qquad (5)$$

where STCB = stock of cocoa beans (tonnes)
WPC = world price of cocoa beans (US$ per tonne)

Equation (5) indicates that the export price of cocoa beans is a function of the stock levels, price in the previous periods and the world price of cocoa beans. The price is expected to have a positive relationship with one-period lagged price, and negative relationship with stock level. In order to link the world market with the domestic market, the world price of cocoa beans is incorporated in the price equation, and its coefficient is anticipated to be positive.

The domestic price of cocoa beans (PC_t) can be obtained as follows:

$$PC_t = EXPC_t - MC_t - XLV_t$$

where MC = marketing costs
XLV = export levy on cocoa beans

Closing Identities

The model is closed by the following identities:

$$STCB_t = STCB_{t-1} + PRCB_t + IMCB_t - EXCB_t - DDCB_t$$

Data and Estimation Technique

The sample period for this study was from 1972 to 1995. The data applied in the analysis were obtained from the Department of Statistics, Malaysia; Ministry of Primary Industries and International Financial Statistics of the International Monetary Fund. The estimation technique applied to the specified model is the two-stage least squares.

RESULTS

Estimated Equations

The estimates of the cocoa market model are presented in Table 1. In the production equation, the price of cocoa beans lagged three years is significant at the 1% level, reflecting the impact of this variable at the time the investment decision was made. The current price of cocoa beans, which represents the harvesting decisions, however, is not an important determinant of cocoa production. The coefficient is, as expected, positive. The coefficient on lagged production is significant at the 1% level, and the adjustment coefficient is 0.146, indicating that the adjustment to the equilibrium level is quite low, partly due to the long biological nature of the production process.

The coefficient for the price of natural rubber is negative and significant at the 5% level, suggesting that there is competition in terms of resources between cocoa and natural rubber.

The estimates obtained for the export demand equation are consistent with *a priori* expectations. The own price elasticity is 0.344. The industrial production index influences the demand for many primary commodities such as rubber (Yusoff 1988) and palm oil (Mad Nasir *et al.* 1988). The results confirm the finding by Yusoff and Salleh (1987) that the export demand for cocoa is inelastic.

The estimated coefficients in the domestic demand equation have the expected signs. The own price, however, is not significant. The results suggest that imported beans and local beans are complementary in their usage, as indicated by the negative coefficient of the import price, and is significant at the 5% level. The importation of cocoa beans is desirable for blending to produce premium chocolate products.

The results of the import demand equation indicate that the import price, industrial production index and exchange rates are all significant determinants of the import demand for cocoa beans. The elasticity with respect to import price is 0.464.

The estimated coefficients in the export price equation all carry the expected signs. The price flexibilities with respect to stock levels and world prices are 0.005 and 0.579 respectively. The coefficients on lagged prices indicate that the adjustment of price to achieve equilibrium is relatively fast. The results are consistent with the findings by Hwa (1979) that changes in primary commodity prices are determined by stock disequilibrium, and the speed of price adjustment toward equilibrium is generally faster for agricultural commodities than industrial commodities.

Effects of Export Levy

The estimated model is simulated over a 20-year period, without and with the export levy. For this exercise, a duty of 20% of export price of cocoa beans is assumed. The average simulated values of the endogenous variables, without and with export duty, are presented in Table 2.

The imposition of an export levy means that producers will receive a smaller share of world prices. It is found that the imposition of an export levy of 20% lowers producer prices by an average of 14.4%, and raises the export price by 3.9%. This means that producers have to bear the burden of 70.5%, and importing countries bear the burden of 29.5% of the 20% levy of export prices. Thus the outcome of the levy falls mainly on the producers rather than the foreign buyers. This is expected since the domestic price is basically determined by the world market, which in turn is influenced by the global factors such as supply, demand and stock levels.

As the export price becomes relatively higher with the imposition of export duty, a resultant decrease in exports is expected. Exports of cocoa beans decrease by an average of 0.6%. Production also declines, at 6.4% due to lower domestic prices. The domestic utilization and imports, however, increase by an average of 0.8%, respectively, since the domestic price of cocoa beans is lower with the imposition of export

TABLE 1
Estimated structural equations

Production

$$PRCB_t = 14967.791 + \underset{(0.973)}{0.296}\ PC_t + \underset{(1.526)}{0.659}\ PC_{t-1} + \underset{(2.524)}{1.089}\ PC_{t-2} + \underset{(3.219)}{1.588}\ Pc_{t-3}$$

$$+ \underset{(2.503)}{2.153}\ PC_{t-4} + \underset{(1.834)}{2.787}\ PC_{t-5} - \underset{(-2.137)}{196.18}\ RSS1_{t-3} + \underset{(17.801)}{0.854}\ PRCB_{t-1}$$

$R^2 = 0.992$ h = -0.014

Export Demand

$$EXCB_t = -73283.372 - \underset{(-2.262)}{5.536}\ EXPC_t + \underset{(16.940)}{81.385}\ WIPI_t + \underset{(1.408)}{14501.225}\ XCR_t$$

$R^2 = 0.975$ D.W. = 2.014

Domestic Demand

$$DDCB_t = -11193.923 - \underset{(1.265)}{0.559}\ PC_t - \underset{(2.323)}{1.578}\ IMPC_t + \underset{(9.272)}{0.729}\ MPI_t$$

$R^2 = 0.858$ D.W. = 1.740

Import Demand

$$IMCB_t = 2207.72 - \underset{(-2.789)}{0.030}\ IMPC_t + \underset{(2.884)}{0.003}\ MPI_t - \underset{(-4.392)}{847.241}\ XCR_t$$

$R^2 = 0.936$ D.W. = 1.883

Export Price

$$EXPC_t = 656.639 - \underset{(-0.081)}{0.0014}\ STCB_t + \underset{(11.660)}{1.894}\ WPC_t + \underset{(3.367)}{0.281}\ EXPC_{t-1}$$

$R^2 = 0.970$ h = 0.495

Note: Numbers in parentheses are t-values.

TABLE 2
Average simulated values of endogenous variables without and with export duty

Variables	Without export duty	With export duty	% Change
Production (t)	159,633.59	149,382.72	- 6.4
Export (t)	117,362.24	116,640.79	- 0.6
Domestic utilization (t)	41,655.01	41,983.87	0.8
Imports (t)	504.32	508.31	0.8
Export price (RM/t)	4488.03	4662.86	3.9
Domestic proce (RM/t)	4096.06	3507.32	-14.4

duty. The increase in imports is due to the complementary relationship between imported and local beans for blending to obtain the desired flavour and colour of cocoa products.

CONCLUSION

In light of the prevailing low cocoa bean prices, the imposition of an export duty as an instrument to discourage exports, and simultaneously encourage domestic downstream activities, should not be recommended since it will further lower the domestic prices and hence production. Furthermore, due to the inelastic export demand, the effect on exports is only marginal. While it is recognized that the domestic grinding and downstream activities should be encouraged, other strategies should be sought to overcome the problem of shortages of the local supply of cocoa beans.

One such strategy is production efficiency through labour-saving and land-augmenting technology. Like the palm oil and rubber industries, the cocoa industry is facing labour scarcity problems, i.e. the land/labour ratio is high. Labour productivity as such can be raised significantly by adopting modern technologies which will simultaneously improve land productivity.

The progress in tree mechanization has hitherto been relatively slow. Universiti Putra Malaysia has conducted studies on mechanized cocoa pod breaking, cocoa seed separation, fermentation and an integrated roasting system. With increasing shortage and rising cost of labour, there is a need to intensify research in this area. Collaboration between research institutes and other agricultural engineering organizations abroad, as well as with local universities, is desirable in order to develop a suitable technology framework for more mechanized intensive operations in the cocoa industry.

To date, there is still a wide disparity between estates and smallholders' yield. The poor performance of the smallholder sector is attributed to non-optimum production and marketing practices and financial constraints. Farm management practices are still much below the recommended ones. Thus agronomic management to improve the smallholder farming system must be emphasized to improve yield. An inventory to determine technology transfer and adoption among smallholders and factors that influence technology adoption should also be undertaken.

Harvesting, postharvest, fermentation and drying practices can influence cocoa yield. Harvesting must be done at right maturity. The use of sharp knives to harvest the fruits and uniform harvest intervals should be practised. Care should be taken to ensure that the beans are not damaged during pod splitting, and the infected and healthy beans are separated. If pod storage is practised, the pods should be kept as dry and aerated as possible by placing them in the shade for not more than nine days. Cocoa beans which have undergone spreading and pod storage before fermentation would have a higher recovery rate (around 40%) compared to those which are fermented immediately after harvest (33-35%). Drying under the sun or at 50-60°C if using an artificial dryer will ensure that the resultant beans are plump and the shells are easily loosened during the winnowing process. Proper drying also decreases the percentage of double and clump beans. During secondary processing, the level and efficiency of roasting, grinding and winnowing processes must be controlled to minimize the percentage of waste (nib in shell, dust).

The transfer of technology model in Malaysia still follows the traditional approach which was introduced in the 1950s. In this approach, technology is created at the research institutes and transferred to the target audiences. Such an approach does not consider the differences among the farmers in a specific locality in terms of farm size, education level, age, manpower, capital and the like. Not only does this result in only the 'resource rich' farmers adopting the recommended technology but in a generally low level of adoption.

While efforts in agricultural production research and extension are vigorous, it appears that marketing and marketing extension have not been fully emphasized and developed in the past. In the chain of agricultural development, marketing in general (and marketing extension in particular) appears to be the weakest link. This lack of emphasis on marketing extension has been due to greater attention being given to other aspects of farming, lack of suitably trained personnel and the complexity of the marketing system. Thus it is very timely that marketing extension should be emphasized not only to producers but also to marketing intermediaries

to obtain better quality of beans and returns and hence production.

The efforts of the Malaysian Cocoa Board and the Department of Agriculture to jointly embark on a programme to rehabilitate the smallholding sector are very timely. Together with the on-going rehabilitation programme undertaken by the estates, the productivity is anticipated to increase and will partially offset the production loss through reduction in hectarage.

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