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Assessment of Comparative Advantage of Rice Production in Malaysia

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Introduction

The rice crop has an important role in Malaysian society as it fosters agricultural activity and contributes to the nourishment of a rising population. This sector is an important source of employment and constitutes a significant pillar of the Malaysian agricultural production. The consumption of rice has increased consistently since the 1980s and had nearly doubled by 2010. Rice is considered a daily staple food and Malaysians consume between 2.6 million to 2.8 million tons of rice annually. However, the current production is not able to meet the growing demand since Malaysia only produces 70 percent of its total rice needs. The other 30 percent are imported from suppliers such as Thailand, Vietnam and Pakistan. Clearly, as the population increases and rice consumption grows, the gap between demand and supply of rice will widen further. Malaysia's lack of self-sufficiency in rice results in heavy dependence on rice imports which cost the country millions of ringgit annually and increasing Malaysia's trade deficit.

There have been a series of dramatic changes in the rice scenario globally, precipitated by a hike in the price of petroleum and unfolding world food prices, coupled with the rising price, particularly the tripling of Thai rice price and other major exporting countries in 2008 (Pandey, 2010; Jamora and von Cramon Taubadel, 2012). The 2008 food crisis led to an increase in input costs and reduced profits. While the input costs place further financial pressure on farmers, they continue to struggle to maximize profits and make end meets. Like in any other developing countries, Malaysia being a net importer of rice was caught in the tension of the food crisis (Tey et al, 2009; Timmer, 2007)

This has prompted the Malaysian authorities to readdress the agricultural industry and structurally adjust policy in order to increase production and become 100 percent self-sufficient. The primary aim of the policy is to increase domestic paddy production by improving yields through the utilization optimal inputs, new technology, and improved farm management. Policy also provides incentives for paddy production such as price support and a yield increase incentive. In the Third National Agriculture Policy (1998-2010), eight granary areas were designated as permanent rice growing areas responsible for achieving at least 65% self-sufficiency. The Eight Malaysia Plan (2001-2005) increased this target to 72 percent, and the Ninth Malaysia Plan (2006-2010) increased it further to 90%. However, these targets were not met. Recently, the Minister of Agriculture and Agro-based Industry announced that Malaysia is determined to achieve its target to end rice imports and be fully self-sufficient by 2020 (New Straits Times, 2014).

Against this background, there are several pertinent questions can be raised: Is rice sufficiently profitable privately to provide farmers with the incentive to maintain or expand output? Is rice production in Malaysia socially profitable, and hence should Malaysia endeavor for self-sufficiency? Answers to these questions are essential in order to evaluate the current policy environment. If Malaysia is not competitive in rice production, then the government's plan to become self-sufficient by 2020 would impose costs on the rest of the economy. This might be politically desirable, but if rice is not competitive, then Malaysia would be better off putting its agricultural resources to other uses where they generate higher returns, and using these proceeds to import rice instead. Therefore, a comparative advantage assessment of rice production is required to address the issue of rice self-sufficiency in the country and shed light on these questions.

Material and Methods

In the 1980s, the government confined further irrigation developments in order to enable rice double cropping toeight designated Granary Areas. Of these, four have been chosen as the study areas: Muda Agricultural Development Authority (MADA); Kemubu Agricultural Development Authority (KADA); Barat Laut Selangor Integrated Agricultural Development (BLS); and North Terengganu Integrated Agricultural Development (KETARA). The data employed in this study are collected from various national and international published and unpublished resources. For estimating the PAM, we required a comprehensive set of data including yields, input and output requirements over the period of 2011-2012.

The policy analysis matrix (PAM), as developed by Monke and Pearson (1989), is a double entry bookkeeping analytical framework that helps policymakers to address central issues regarding the agricultural policy developments. PAM is widely used for measuring the impact of policy on competitiveness and farm level profits, the influence of public investments on the efficiency of the agricultural system, and the effects of the agricultural research and development on economic efficiency and comparative advantage (Siggel, E., 2006 and Masters and Winter-Nelson, 1995). PAM takes into account policy influences on costs and returns of agricultural production and investment projects. The principal strength of PAM is that it provides a straightforward policy-induced transfer analysis and allows varying levels of disaggregation. In addition, PAM results show the net effects under the complex and contradictory policies as well as the individual effects of these policies. However PAM also suffers from weaknesses, one of which is the assumption of fixed input-output coefficients or static nature. Production is described by a string of techniques of which each has a fixed input-output coefficient and represents some share of total production, whereas some do not consider the results to be realistic in a dynamic setting (Nelson and Panggabean, 1991).

The PAM framework also provides important indicator for calculating the protection rate by different ratio such as NPC, EPC, DRC, and SCB for measuring comparative advantage that are used throughout this study. The domestic resources cost (DRC) is widely used to measure comparative advantages or relative efficiency between agricultural commodities (e.g. von Cramon-Taubadel et al, 2008 and 2009). DRC was developed simultaneously in the 1960s by Bruno (1965) in Israel and by Krueger (1966) in United States. The DRC is defined as the shadow value of non-tradable inputs used in an activity per unit of tradable value added.
DRC indicates whether the use of domestic factors is socially profitable (DRC<1) or not (DRC>1). We calculate the DRCs to enable cross-commodity comparisons in each Malaysian state. The commodities can be ranked according to the DRC values and thus can provide indications on comparative advantage or disadvantage within that state.

Results and Discussion

The main results of the protection and comparative advantage coefficients for four granary areas are shown in Table 2.We estimate Domestic Resource Cost (DRC) and Social Cost Benefit (SCB) in order to measure the competitiveness of the rice sector in Malaysia. DRC compares the domestic resources costs measured at social price with the value added measured in the social prices. The use of the social prices in DRC measure allows us to test whether the employment of scarce domestic inputs in the production of rice generates positive returns for Malaysia (von Cramon Taubadel and Nivyeykyi, 2008).

Table 2: Summary results of different indicators of protection and comparative advantage

Areas	2011						2012					
	DRC	SCB	PC	SRP	PNRL	SNRL	DRC	SCB	PC	SRP	PNRL	SNRL
KADA	0.92	0.95	12.51	0.62	3432	274	0.90	0.93	8.15	0.47	2842	349
MADA	0.97	0.98	31.36	0.62	3262	104	0.84	0.88	5.11	0.48	3380	661
KETARA	1.19	1.11	-6.93	0.88	2874	-415	1.13	1.08	-6.84	0.60	2101	-307
BLS	0.86	0.91	10.89	0.88	5703	524	0.78	0.85	4.76	0.56	4239	891

The empirical analysis presented here demonstrates that three of four study areas(BLS, MADA and KADA) have comparative advantages in the production of rice (DRC<1) in 2011-2012. However, the results indicate no comparative advantage for rice production in KETARA area as the DRC is greater than one.

From the national viewpoint, it is desirable to produce rice in the three granary areas and expand its production since the social value added is greater than the cost of its import. However, the estimated DRCs are closer to unity, indicating that there may be some competing demand on resources for production of other crops.Moreover, the closer the DRC value is to one, the more a small change in prices can tip it which means the more sensitive it becomes. With the estimated DRC of rice grown in KETARA observed to be greater than one under import parity price, this shows no comparative advantage,and thus the emphasis on attainment of self-sufficiency in rice production appears to be uneconomically justified and remains debatable.

Nevertheless, average DRC results, such as those presented here, should be interpreted with caution. These results are based on aggregated data that most certainly conceals relevant variation and the underlying distribution of competitiveness across a set of heterogeneous producers (von CramonTaubadel et al, 2008). In other words, the results presented here aggregate very efficient farms that are more competitive than average with other less efficient farms that are less competitive than average. This can have great far-reaching implications for policy conclusions based on PAM results. For example, support based on the average competitiveness will over-support some farms and under-support others. Therefore, only cautious conclusions based on average DRC are drawn and further analysis of DRC distributions is required to determine what factors influence whether farms are competitive.

The results in Table 3 show the divergences between private and social profits, or in other words the effect of different policy transfers, such as output, input, factor and net policy transfers. The values of the output transfers (private revenues less social revenues) are all positive, while the values for input transfer (difference between private and social prices of tradable inputs) and the factor transfers (difference between private and social prices of non-tradable inputs or domestic factors) are all negative. The positive values of output transfers point to the system receiving protection, i.e. the government protective policies affect thesystem positively, resulting from a price subsidy scheme of RM240.1/mt. The negative values of the input transfers indicate that the producers buy inputs at a lower price than the world market price due to the subsidy policy on fertilizers, lime and pesticides. The same is true for the factor transfer values that demonstrate the

Table 3: PAM results of rice production in major granary areas in Malaysia in 2011-2012[1]

Granary Area	Year	Output Transfers (RM/ha)	Tradable Input Transfers (RM/ha)	Domestic Factor Transfers (RM/ha)	Private Profitability (RM/ha)	Social Profitability (RM/ha)	Net Policy Effects (RM/ha)
KADA	2011	1772.95	-284.38	-1100	3431.60	274.27	3157.33
	2012	1252.35	-140.6	-1100	2841.60	348.65	2492.95
MADA	2011	1571.15	-204.76	-1200	3324.64	348.73	2975.91
	2012	996.03	-122.66	-1600	3379.73	661.04	2718.69
KETARA	2011	1315.57	-204.66	-1100	1921.84	-698.39	2620.23
	2012	1161.45	-46.44	-1200	2100.95	-306.94	2407.89
BLS	2011	2284.75	-194.44	-1100	4165.28	586.09	3579.19
	2012	2064.27	-84.08	-1200	4239.07	890.72	3348.35

costs of non-tradable inputs are lower than their social prices. This can be attributed to the primary factors of production, mainly land since the social and private values of land are determined in relation to alternative uses.

Overall, the net transfer policy for all regions is positive. The net transfer is the sum of output transfer, the tradable input transfer and factor transfer. The net transfer is the difference between private profits and social profits. Because social profits are positive in each granary areas except KETARA area, the systems could operate profitably without any policy transfers. In addition, the result of private profits clearly indicates that rice production is highly profitable in some granary areas at private prices. However, at social prices profitability is much lower.

Conclusions

The results indicate that three out of four granary areas have comparative advantages in producing rice with Domestic Resource Cost values or DRCs less than one. Conversely, the results indicate no comparative advantage for rice production in the KETARA area, as DRC is greater than one.Similarly, Social Cost Benefit or SCB values in these areas are less than 1, indicating that the comparative advantages in rice production are noteworthy.

With this regard, it is evidently that social profitability is appears given on average in three of the areas, and here there are clearly farms that produce a net surplus for the country. These farms have to be identified by further research using disaggregated data, and studied more closely. They generate social profits, but they might still depend on support to generate sufficient incomes for their families. In this case, policy should focus on encouraging structural change which enables these farms to grow to the point where they can generate sufficient income from social profits alone, ie. without (or with much less) subsidy. This way the government could get more self-sufficiency for less money. In the other region, the average farm is not producing a social profit. But here too there probably are farms that are profitable socially. In all four regions (and especially in the one) there must be many farms that are not producing a social profit. Thus, further research with disaggregated data is needed to determine why this is the case, and how the situation can be improved.

[1] Exchange rate: US$1= RM3.05 AND EUR€= 4.25 (Oct 21, 2011: US$1= RM3.06 and EUR€= 4.27 (Oct 31, 2012); US$1= RM2.96 and EUR€= 4.21 (Nov 30, 2014)

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