Solving the Problem of Rice Price for Peasants Employing the Game Theory

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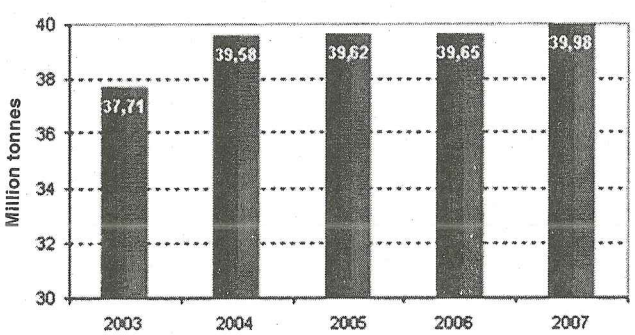
Fall in price after good harvests has become an obsession with peasants and then, an unwelcome visitor, and a challenge to society. Dealing successfully with this challenge depends on viewpoint and approach to the nature of the problem in reality.

With favorably geographical position, Vietnam, with over 80% of its population living on agriculture, has become the world's second largest exporter of rice. Its food output in the past five years has been rather stable and passed the 39-million-tonne mark from 2004 on. It exports some 4.5 million tonnes of rice a year on average. However, fall in price after good harvests has become an obsession with peasants and then, an unwelcome visitor, and they have had to accept this visitor for years.

Vietnam's Rice Output 2003 – 2007



Source: Vietnam's Agricultural Development Report

Many researches have been carried out and regulatory policies worked out to find the best solution to the problem, but the unwelcome visitor seems very stubborn and unwavering. What is the cause of this situation? Of course, we have learnt about various causes from the mass media, such as uneven quality of rice, poor-quality rice strains, excess of supply to the demand, and peasants' lack of market economy, etc. Whatever solutions that could bring about benefits for the producers must be adopted because it is the real way to deal with the problem.

In this article, we want to offer a new interpretation in an effort to find out a good solution to the production of rice in Vietnam. This article only tries to raise a new study direction and is based on deduction from a model of applied theory, therefore it may imply certain mistakes and shortcomings when examining the problem. We appreciate all feedback from readers and researchers who are interested in the agricultural development and want to find reasonable solutions that can help peasants overcome obstacles to their business.

Before analyzing the situation, we want to present here a classical story in the game theory.

In the Table 1, there are two persons (A and B) who are considered as suspects and arrested by the police. The police separate both prisoners and interrogate them. No prisoner knows what the other testifies. Sentence they get depends on the statement the other makes. They face the following options:

- If A remains silent and B betrays his friend: A receives a 10-year sentence while B gets only one year because of his cooperation.
- If B remains silent and A betrays his friend: B receives a 10-year sentence while A gets only one year because of his cooperation.
- If each betrays the other, each receives a 5-year sentence.
- If both remain silent, they are sentenced to only two years in jail for a minor charge because the police have insufficient evidence for a conviction.

Because each one doesn't know what option

the other will take, they decide to betray the other to reduce risk.

It's worth noting that this is the most frequent outcome of the story. When each doesn't know what action the other takes, ones usually consider the possible worst caused by each action by the other and choose the option that minimizes the maximum possible loss (called minimax theorem). In this game, both A and B want to receive the lightest sentences (the quarter I), but lack of information about the other forces them to betray each other and get the result presented in the quarter IV.

Table 1. Results of game between A and B

Result matrix		A's strategy	
		Staying silent	Betraying
B's strategy	Staying silent	-2 (I) -2	-1 (II) -10
	Betraying	-10 (III) -1	-5 (IV) -5

We assume that there are only two rice planters in the market with a fixed demand for rice. In harvest time, peasant A doesn't know whether peasant B sells his output after the harvest or not, and vice versa. Many events may take place:

(1) Peasant A sells his rice right after the harvest while peasant B keeps it back: There may be some shortage of rice, and peasant A can sell his rice at a higher price and gains big profit while peasant B misses the chance to sell rice at high prices and may suffer some warehousing cost and damage to his rice.

(2) Peasant B sells his rice right after the harvest while peasant A keeps it back: There may be some shortage of rice, and peasant B can sell his rice at a higher price and gains big profit while peasant A misses the chance to sell rice at high prices and may suffer some warehousing cost and damage to his rice.

(3) Both A and B don't sell their rice and they may sell it at a higher price and gain bigger profit.

(4) Both of them sell their rice right after the harvest and they have to sell at a low price and gain smaller profits.

Table 2. Results of game between peasants A and B

Result matrix		A's strategy	
		Not selling now	Selling now
B's strategy	Not selling now	Win (I) Win	Win (II) Lose
	Selling now	Lose (III) Win	Lose (IV) Lose

We see again that the dominant feature of the model falls into the quarter IV, where peasants decide to sell the rice after harvest to cover cost although they know this decision may bring about some losses.

Can this analysis be expanded with a bigger market where more than two peasants produce rice, and they lack information about the supply and demand for rice and the rice price? There are the following problems with production of rice in the Mekong Delta, and in Vietnam in general:

- Most peasants produce rice at small scale, and they have to sell their rice after harvest because of the shortage of capital.
- They have no facilities for storing the rice.
- They lack market information (supply, demand, and price)
- They have almost no right to set the selling price.

Thus, the extension of the model in the Table 2 may include some shortcomings:

+ The game theory applies only to a bilateral monopoly where two players have the right to set the price, while, in reality, individual peasants have no such a right.

+ There are always many peasants in the market, therefore changes in market forces and prices are different from the assumption that there are only two peasants. Whether a peasant sell his rice or not has no effect on the market price (his produce is vary small in comparison with the rice output for sale.)

+ Export of rice from Vietnam depends a lot on fluctuations on the world market (good or bad harvest in rice producing countries, such as China, India and Indonesia, which affects the supply of rice).

+ Domestic demand for rice is affected by certain policies on export and food reserves,

therefore peasants find it hard to predict changes in the rice price on the world market.

Although the model contains some shortcomings, its dominant feature may occur and it doesn't lose its meaning when a series of peasants decide to sell (or not to sell). Their action may affect the supply and make the rice price to rise. Most peasants want to be in the quarter I of the Table where they can gain the highest profit. The question now is how their expectation comes true.

To answer this question, and deal with the shortcoming of the model, we had better look back on some events that took place in the last April when the rice price rose by 60% - 100% (*Lao Động* April, 28, 2008):

- "... The rice price rose suddenly because customers caused a rush on rice. Investigations show that the supply of rice doesn't decrease but information about the shortage of rice on the world market made them worry..." (Lê Hồng Quân, Chairman of the HCMC People's Committee): Cause: lack of information.

- "The state of disorder in the HCMC market for rice and in some other provinces in the past two days came into being when the price rose suddenly. This may be caused by some speculators." (Trương Trung Việt, Vice- Director of the HCMC Service of Trade). Cause: false shortage.

- "Rice was sold out and where has it gone? it might go to families. If one million buy rice to keep in reserve and each family buys 50kgs, the market demand is 50,000 tonnes. Such a volume of rice equals 10,000 truckloads." (Vietnamnet, April 28, 2008). Cause: rice reserve.

- "In a short term, the price is determined not only by market forces, but also expectations of sellers and buyers. With this in mind, we can easily understand the reason for this rush on rice." (dantri.com April 28, 2008). Cause: mentality of sellers and buyers.

From these facts we can see that the price may fall into the quarter I because of inexact information about the market, false shortage, and idea of keeping rice in reserve and mentality of sellers and buyers. At that time, consumers didn't pay attention to product quality or brand names and what they want was a chance to buy the price in need.

At macroeconomic level, the Government didn't expect such a situation, but it leads to a question of how to use regulatory instruments to ensure benefits for peasants, or in other word, how to direct the market to the quarter I.

We assume that all other factors in the model, such as quality of farm products, brand names and possibility of exporting rice, don't change, the supply must be reduced drastically if we want to bring the market to the quarter I. But the situation in which both peasants keep 100% of their output in reserve can't take place. If the producers keep back part of their produce, the supply certainly falls. When the rice becomes rare, the price will rise and peasants can benefit from the situation. We temporarily call it a reasonable reserve ratio.

If the output of the two peasants equals 10 and they want to keep back 10% of their output, the supply of rice is 9, thus the price may be higher than in the case in which the supply is 10. In a larger scale, if all peasants and provinces have a reasonable reserve ratio, the market for rice may be beneficial to peasants.

The task is to determine the reasonable reserve ratio for each period, and in the long run, a policy on this ratio is much needed. In other words, the solution is to encourage peasants to keep back their produce in order to reduce the supply. Some measures to achieve this aim may be:

- The government gives some incentive to construction of warehouses and silos, and provides peasants and owners of silos with information to help them make right decisions. This effort allows more options for peasants (selling after harvest, hiring place in silos, or offering options).

- Incentives can be given to construction of silos and reserving warehouses in provinces that produce rice in large quantities. The rice can be seen as a kind of credit with reasonable interest rate based on the part of output kept in reserve.

A new mechanism and policy can help develop a more effective market for rice and bring about more profits for peasants ■

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