The impact of trade liberalisation on comparative advantage of food crop production in a transformation economy: the case of Vietnam – A Policy Analysis Matrix

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Abstract

This paper uses a Policy Analysis Matrix (PAM) as the main analytical tool to study the change in comparative advantage of rice production due to trade liberalisation (including both domestic and international trade liberalisation). After summarising food crop production performance and explaining its development, the paper demonstrates how a PAM can be constructed and used to estimate price distortions and simulate comparative advantages. It then discusses the results of sensitivity analyses showing the effects of macroeconomic policy changes including trade liberalisation on the rice sector's comparative advantages in Vietnam**.** The estimated results show relatively strong comparative advantages of Vietnam in rice production, especially when trade barriers and policy distortions are removed. However, in the future, the rice sector in Vietnam needs to become more competitive in a freer trade regime.

Keywords: Food production, comparative advantages, trade liberalisation, Domestic Resource Cost, Policy Analysis Matrix (PAM).

Introduction

In recent years, Vietnam has undergone a radical transformation process and remarkable changes in economic policies and institutions in general and in agricultural policies in particular. The economy responded vigorously during the period 1992-1997, the GDP grew at an annual average rate of 8.5%. With macroeconomic reform and trade liberalisation, the economic environment of Vietnam has changed fundamentally. Vietnam became a member of AFTA in 1995 and thus it is facing opportunities as well as challenges in the process of fulfilling its commitments. Agriculture is one of the most important sectors in

Vietnam. Agriculture (including forestry) accounts for 25,4% of the GDP in 1999. Agriculture in Vietnam is relatively diversified with different crops and forms of livestock. However, food production (and foremost rice) has always been the most important source of income in agriculture. A major question for food crop production in Vietnam is what the possible effects of trade liberalisation and market reform would be on the comparative advantage of food crops (especially rice) given the removal of trade restrictions, the current population growth and expected income growth.

The following section briefly characterises food crop production and especially rice development and the government's rice policy. Section 3 discusses the relevance of the theoretical framework of PAM in rice production. Section 4 undertakes the empirical estimation of a PAM for the typical rice-producing province in the Mekong River Delta and conducts some sensitivity analyses of policy options with trade liberalisation to study the likely changes of protection coefficients and especially domestic resource costs (DRCs). Section 5 draws conclusions for policy and further research needs.

The performance of food crop production in Vietnam

The major food crops in Vietnam are rice, maize, sweet potatoes and cassava. Rice has always been the main staple of the country. The statistics for the 25 year period of 1975-1999 showed that 80%-90% of cereal output of the country comes from rice. The share of rice in total cereal output increased over time reaching 91,5% of total food crop output in 1999. The growth rate of rice production also went up considerably: from an average of 4,6% for the period 1975-1985 to 4,9% for the period 1986-1998. Between 1975 and 1999, rice output almost tripled. The main factors contributing to the rapid growth of rice output were rice yields and cropping intensity. Rice land also expanded in the Mekong River Delta, while in the Red River Delta the land for rice growing is scarce and close to the limit.

The Mekong River Delta can now be considered as the main rice bowl of the country. Paddy output of the Mekong River Delta in 1989 was 2,37

times that of the Red River Delta and it reached 15,3 million tons in 1998 which is 2,85 times that of the Red River Delta. A similar picture emerges when paddy output per capita of the two deltas is compared. Paddy output per capita in the Mekong delta reached 908 kg in 1998 which is 2,54 times that of Red River Delta.

The rice yield for the period 1986-1999 grew, on average, 3% per annum. The yield growth can be attributed to the introduction of higher-yielding varieties especially in the period of 1994-1999 and better irrigation systems. Another very important factor is the policy reform in agriculture: Resolution No.10 in 1988 recognised the farm household as the central unit responsible for its production decisions and Resolution No.5 in 1993 established private land use rights for farmers. These two resolutions provided the main production incentives for farmers resulting in substantial yield and production increases. The paddy yields in two main deltas, in contrast to overall output, are not much different. In recent years, the yield in the Red River Delta was even higher reaching 5,13 tons/ha/cropping season in 1998 in comparison with 4,07 tons/ha/cropping season of the Mekong River Delta.

Before the economic reforms, Vietnam suffered from a persistent food shortage and the country was a chronical rice importer. The year 1989 marks the change: For the first time, Vietnam exported 1,42 million tons of rice (with a value of US$ 310 million) to the world. Since then rice production grew continuously with an average rate of 5,6% per annum in the period of 1989-1999. With an average population growth in the same period of 2%, Vietnam has solved the problem of supplying sufficient food for the population and proved a steady capability in rice exporting. Given the fact that the domestic demand for rice lags behind supply growth, the future of the rice sector depends on rice exports.

Concerning the rice trading and export policy, the government has removed restrictions on domestic rice trading. The domestic rice trade is now mainly operated by the private sector which is certainly more flexible and more efficient compared to the former system of state-owned food companies. In contrast to domestic rice trading, rice export is still heavily controlled by the state sector with the presence of export quotas. Rice export quotas are approved by the Prime Minister and operated by the

Ministry of Trade with the aim of ensuring food security and keeping the domestic prices stable. Rice exporting is mainly undertaken by State-owned Enterprises (SOEs), particularly by Vinafood II. Barriers to entry into the rice export business are the most limiting factors in the development of an efficient marketing system. However, there has been significant progress in liberalising market entry. In 1997, provincial authorities were given two-thirds of available rice export quotas and in 1998, even more companies (state and private) were given licences in rice exporting. Private companies are recently also allowed to export, although their market share is still small. The next quota policy reform may include an auction system of quotas.

The Policy Analysis Matrix (PAM) Approach

The structure of a PAM can be described as a product of two accounting identities (Monke and Pearson (1989)): one defining profit as the difference between revenues and costs and the other measuring the effects of price distortions (distorting policies and market failures) as the difference between observed private prices and social prices. Estimating a PAM helps to simultaneously determine the economic efficiency of the system, the level of distortions in the input and output markets, and the extent to which resources are transferred among agents (subsidies and taxes).

Table 1. A typical Policy Analysis Matrix

	Revenue	Costs		Profit
		Tradable inputs	Domestic factors	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Effects of divergences	I	J	K	L

$$B = \sum_{i=1}^{n} P_i Q_i \qquad C = \sum_{i=1}^{m} W_i L_i \qquad F = \sum_{i=1}^{n} P(s)_i Q(s)_i \qquad G = \sum_{i=1}^{m} W(s)_i L(s)_i$$

Profit at private prices: D= A-B-C , Profit at social prices: H= E-F-G

Output transfers: I= A-E, Input transfers: J=B-F,

Factor transfers: K= C-G Net transfers: L=D-H=I-J-K

Where:

- Pi, P(s)i: are prices of input i measured in private and social prices respectively.
- Wi, W(s)i : are prices of domestic factor i measured in private and social prices respectively.
- Qi, Q(s)i: the quantity of input i to be used
- Li, L(s)i: the quantity of domestic factor i to be used.

In a PAM, costs of inputs are classified and disaggregated into their tradable and non-tradable components. Revenues, costs and benefits are valued using both market (private) prices and accounting (social) prices. Tradable inputs include those inputs which can be traded in the international market, e.g. imported fertilisers and pesticides. Non-tradable inputs are mainly domestic factors that basically can not be traded in the world market, e.g land, labour and local capital. It is also noted that most inputs contain a combination of some tradable and non-tradable components. Thus, it is needed to construct more detailed cost tables.

Social prices are calculated on the basis of the country's opportunity cost ("most profitable alternative") of inputs and outputs. For tradable inputs and outputs: The social prices for these goods may be derived by using world prices. Specifically, the social price of a tradable output (rice) or a tradable input (fertiliser) at the farm-gate is the international border price adjusted for domestic transportation, processing and marketing costs; these prices are referred to as import and export parity prices or sometimes border price equivalents. For domestic factor costs: the social valuation process begins with observed market prices and then adjusts those prices for the effects of factor market distortions. It is most difficult to estimate the social values for domestic factors. Basically, there are 3 major domestic factors in agriculture: land, labour and capital. For

consistency, all costs and returns in a PAM are calculated on a per land unit (ha) basis.

From PAM results, one can derive directly indicators of price distortions and comparative advantages. Three main indicators of price distortions, namely, Nominal Protection Coefficient (NPC), Nominal Protection Coefficient on tradable Inputs (NPI) and Effective Protection Coefficient (EPC) which reveal the presence of taxes, subsidies, trade restrictions or an inappropriate exchange rate and show incentive (or disincentive) to farmers, can be estimated from PAM. The Domestic Resource Cost Ratio (DRC) which is the most important indicator measuring the comparative advantage can also be estimated directly based on PAM results.

The PAM model is a partial equilibrium, single-market model useful for analysing transfer effects of market distortions. It is a partial equilibrium model because it basically deals with economic relations in a single sector. The greatest advantage of PAM is that it allows the disaggregation of the production activities and their costs. The cost components are examined directly and in detail. It is also a useful tool to estimate directly indicators of distortions and comparative advantages. The PAM model, of course, has its limitations as it does not examine the relations between sectors of the economy and dynamic intersectoral effects of policy changes. A partial equilibrium model like PAM can be appropriate as it can simulate direct relations in the sector. To lessen the limitations of PAM, sensitivity analyses are conducted to take into account possible dynamic changes in the economic environment. Sensitivity analyses are also used to simulate the effects in the future of different policy options.

Empirical estimation and results

The estimation is undertaken for the DongThap province – one of the biggest rice-producing provinces in Mekong Delta in the 1997-1998 season. The data for the cost structure of producing rice in Dongthap is based on official investigations conducted by the Government Pricing Committee. Other macroeconomic data which was used to derive the

social prices of input and domestic factors was collected from different organisations mainly, the General Statistical Office, the Ministry of Trade, the Ministry of Agriculture and Rural Development, and FAO.

Decomposing inputs

An important and difficult task in constructing a PAM is decomposing the inputs into their tradable and non-tradable components and estimating their social prices. In order to estimate the social costs of rice as well as of imported inputs, it is necessary first to estimate the shadow exchange rate which is used to convert the international prices from US dollars into Vietnamese dong. The shadow exchange rate, in principle, is calculated based on the exchange premium which takes into account the trade barriers effects. However, for the time being, the private market exchange rate is used as a proxy for the rate instead of the government official rate which contains policy distortions.

Estimating social prices

It is then the task of estimating social prices. Based on the detailed cost data and all input requirements for rice production in DongThap in 1997-1998, the price of chemical fertiliser which is imported through the Saigon Port has been calculated. The detail costs table of fertiliser was used to decompose its costs into tradable and non-tradable components. Other inputs are also discomposed and their social prices are estimated by excluding the respective distortion, if any, for each component. Domestic factors need special treatments when they are socially valued. The social price of land is estimated as the sum of state land rent (or so-called agriculture tax) and private land rent (the rent paid among farmers when the land is hired). This sum can be considered as a proxy of “opportunity cost of land” as it is a real cost of land when it is hired. The social cost of labour is estimated by the average pay that a farmer receives working for others. This pay can also be considered as “opportunity cost of labour” as it prevails in a relatively free labour market. The commercial interest rate is utilised to derive the social price of capital used in the production as it reflects the “real price” of capital in the market.

Assuming Dongthap a representative rice-growing province for Vietnam, the baseline results are presented in table 2.

Table 2. PAM and Coefficients for rice production in Dongthap, season 1997-1998

	Total Revenue	Tradable inputs	Domestic resources	Profits
Private prices	9811000	2407538	2328000	5075462
social prices	10666000	2458290	4478000	3729710
transfers (divergence)	-855000	-50752	-2150000	1345752
NPC	0,92	EPC	0,90	
NPI	0,98	**DRC**	**55%**	

NPC=0,92 shows that overally the farmers are slightly taxed on rice product, while tradable inputs are slightly subsidised (NPI=0,98). The figure of EPC=0,90 indicates that there are still negative incentive effects in rice policy (or an equivalent tax on rice farmers). However, getting a DRC of 55% Vietnam is shown to have a comparative advantage in rice production. A low coefficient of DRC shows a relatively strong competitiveness of Vietnam in the world market.

Sensitivity analyses

Selected sensitivity analyses were undertaken to see how sensitively DRCs react to the changes in different trade liberalisation policies. During the process of trade liberalisation, import tariff and export subsidies are supposed to be gradually eliminated. Therefore, the shadow exchange rate which affects both input costs and farm parity prices of exported rice would change. The first sensitivity analysis was carried out with a reduction of 5% in the shadow exchange rate (SER). The second sensitivity analysis was done by assuming the fluctuations in world market prices which are very likely to happen in the context of an open economy. In this sensitivity analysis, two scenarios are considered with 10% increase and 10% decrease in international rice prices. In the third sensitivity analysis, a 10% change in imported fertiliser – the most important input – due to trade liberalisation was examined. The fourth sensitivity analysis included water charges policy which was drafted by the MARD, in the cost structure of rice. The fifth sensitivity analysis examines the effect of change in the land costs and the last scenario

formulates the effect of change in the labour cost on DRC. All results of sensitivity analyses are summarised in table 3.

Table 3. Estimated PAM parameters in different scenarios (compared to the base run)

	Base run	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
NPC	0.9198	0.9675	0.92 (0.9197)	0.9198	0.9198	0.9198	0.9198
NPI	0.9794	0.9936	0.9794 (0.9794)	0.9809	0.9794	0.9794	0.9794
EPC	0.902	0.9593	0.9042 (0.8992)	0.9022	0.902	0.902	0.902
DRC	**0.5456**	**0.5802**	**0.4837 (0.6256)**	**0.5346**	**0.5968**	**0.6044**	**0.5797**

Scenario 1: 5% reduction in the shadow exchange rate

Scenario 2: 10% increase, and 10% decrease in the world rice price (figures in brackets)

Scenario 3: 10% decrease in the imported fertiliser price

Scenario 4: Water charge as drafted, at 420.000 dong(US$ 30)/ha

Scenario 5: Private land rent increased by 25%.

Scenario 6: Real labour cost increased by 20%.

The results indicate that the protection coefficients do not change very much, while the comparative advantage of rice production in Vietnam is relatively sensitive to the change in the economic environment due to trade liberalisation such as a reduction in the shadow exchange rate, price of import fertiliser, an introduction of water charges or changes in land and labour costs. Especially a small change in world rice market significantly affects its comparative advantage.

Conclusion

This paper analyses the price distortions and the impact of trade liberalisation on the comparative advantage of food crops (especially rice) in the context of a transformation economy, here Vietnam, by using the Policy Analysis Matrix (PAM) model. The estimated results show a relatively strong comparative advantage of Vietnam in rice production.

As PAM is a partial equilibrium model, it has an advantage of measuring directly costs as well as policy effects. However, it inherits some limitations as it cannot capture dynamic effects of intersectoral linkages. To fill this gap and simulate possible economic changes resulting from trade liberalisation, some sensitivity analyses were conducted. The results of sensitivity analyses show that in the years to come with a freer trade, Vietnam still has good comparative advantages in rice production. However, its comparative advantages can also deteriorate in some cases especially when there is a fluctuation in the world market rice price. Further research is needed looking more closely at the effects of increased efficiencies in input, land, capital and labour markets as well as at the effects of changes in the world and regional food supply on the comparative advantages of rice production.

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