

CHAPTER 5

Rice Policies in Myanmar: A Comparative Analysis with Vietnam

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A Comparative Analysis with Vietnam

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Abstract

This paper compares the development of the rice economy in Myanmar with Vietnam's. The rice economies in the two countries show a stark contrast in terms of productivity. To account for the yield gap between them, this paper considers the impacts of not only price policies but also production technology. As there is no clear deterioration or improvement in the terms of trade for rice producers in the two countries, the widening yield gap might be attributable to differences in technological changes. It is implied that Myanmar needs more public investments in agriculture, especially in irrigation and breeding of high-yield varieties seeds, in order to upgrade production technology.

The insufficient public investments in the agricultural sector in Myanmar might be due to lower marginal return to such investments, which in turn is related to the allocation mechanism of the state budget; the higher the delegation of budget to local governments, the higher the marginal return to public investments could be. A policy recommendation is more delegation of agricultural budget to local governments.

1. Introduction

Rice is a major export crop as well as a food staple both in Myanmar and Vietnam. Myanmar used to be the world's largest exporter in the 1930s, and its annual exports of milled rice reached around 3 million tons. However, the annual exports have shifted to several hundred thousand tons in the past two decades. In contrast, Vietnam once fell into a rice importer country in the 1980s due to inactive production. In 1989, it suddenly emerged as a rice exporter country with annual exports of over 1 million tons. Vietnam is now one of the biggest exporters in the world market, and its exports are around 5 million tons per annum. The performances of the rice economy in the two countries

since the early 1990s are characterized as stagnation in Myanmar and progress in Vietnam.

The sharp contrast in rice export performance is a reflection of changes in yield per harvested area. As of 1990, an annual average yield in Myanmar was 2.8 tons per hectare in terms of paddy, whereas it was 3.18 in Vietnam. In recent years, while an annual average yield in Myanmar is still estimated at around 3 tons per hectare, it surpasses 5 tons per hectare in Vietnam. In terms of rice yield, Vietnam is one of the top countries in Southeast Asia.

The importance of rice for the economy as a source of employment, food staple, and export earnings has led the government to implement various economic policies in both Myanmar and Vietnam. Until the 1980s, both governments imposed direct controls on rice prices in the domestic market. From the 1990s, both governments have used export controls as a measure to indirectly control the domestic rice price. Furthermore, both governments have made a considerable amount of public investments to enhance rice productivity. The purpose of this paper is to evaluate the impacts of these policies on rice production for the past two decades.

This paper aims to evaluate the impacts of rice policies by focusing on ‘changes’ in the rice yield of the two countries. The ‘level’ of rice yield in each country is affected not only by economic factors such as price controls but also by natural conditions like climate, soil, and availability of water. Thus, it is not appropriate to evaluate the policy impacts through comparison of the level of yield. In contrast, on the assumption that other conditions remain constant, comparison of changes in yields in the two countries allows us to evaluate the impacts of changes in policies.

There are a number of existing studies on trends of the rice economies of Myanmar and Vietnam. The stagnation of Myanmar’s rice economy is mostly associated with the repressive rice price policy (Takahashi, 2000; Fujita and Okamoto, 2005). As to the growth in rice yield in Vietnam, Nghiem and Coelli (2002), among others, emphasized the changes in incentives of producers due to policy reforms. However, as growth in yields has been sustained for more than 20 years since the removal of collectivization of agricultural production, there should be other factors that contributed to the growth. With some updated data, this paper reexamines the results of these existing studies.

This paper is structured as follows. Section 2 summarizes the rice production indices, including the trends in diffusion of modern high-yield rice varieties (HYVs) and in development of irrigation. In addition to macro level data, this section introduces some existing micro level analyses on the role of HYVs and irrigation facilities. Section

3 offers the framework of policy analysis. It considers the impacts of price controls, subsidies on inputs, and public investments in production technologies, on yields. Based on this framework, Section 4 examines the policies taken in Myanmar and Vietnam in the past two decades. It will confirm that there are no significant changes in repression of rice prices or in the terms of trade of rice producers, so that the changes in yields could be mostly attributable to technological changes driven by public investments. Section 5 examines the background why public investments in agriculture in Myanmar have been low compared with Vietnam, focusing on the delegation of the fiscal budget to local governments. Finally, Section 6 offers some concluding remarks.

2. Trends of Production

The performances of rice exports by Myanmar and Vietnam are considered as the reflection of the performances of whole rice economies in the two countries. Figure 1 illustrates the export performances in terms of the amount of rice exports for Myanmar and Vietnam for the period from 1961 through 2008. The figure also includes those values for Thailand, the world's top exporter, as a reference. As of 1961, Myanmar and Thailand competed for the top position in export volume of rice in the international market, and annual exports amounted to 1.5 million tons. Since then, Myanmar exports declined, and annual exports have seldom surpassed 1 million tons. In contrast, Vietnam's exports were marginal until 1989. In 1989, Vietnam recorded annual exports of over 1 million tons, and it turned into one of the top exporters.

=== Figure 1 ===

The following subsections illustrate the trends of rice production and yield in the two countries.

2.1 Myanmar

Figure 2 illustrates the trends of the rice production in terms of paddy and the planted areas to rice from 1990. The conversion rate from paddy to rice is approximately 0.6.¹ That is, 10 tons of paddies are necessary to produce six tons of

¹ According to data of the US Department of Agriculture, the conversion rate in Myanmar and Vietnam are 0.66 and 0.58, respectively.

milled rice. As there is concern of overestimation in the production statistics of the Myanmar government, especially for the 2000s, the production data in Figure 2 is complemented by the estimates from the US Department of Agriculture (USDA). For instance, while the production amount and planted areas in 2008 were 32.06 million tons and 8.09 million hectares in the Myanmar statistics, those were 17.50 million tons and 6.07 million hectares in the USDA estimates. The production amount in the Myanmar statistics is nearly double that of the USDA estimate.

The gap between the two data series widened in the 2000s. The production amount increased by 133 percent for the period from 1990 through 2008 according to the official statistics of the Myanmar government, whereas the USDA estimates indicated the growth rate for the same period was 28 percent. On the other hand, the population increased by 40 percent in that period. On the assumption that there is no significant change in per capita consumption and that the export amount has been mostly the same in these years, the USDA estimates imply a shortage of rice in the domestic market.² In contrast, the Myanmar government data implies that several million tons of rice disappeared or were smuggled each year. It is conjectured that the actual production amount lies somewhere between the two estimates.

=== Figure 2 ===

The growth in production amounts can be decomposed into the changes in planted areas and in yield. According the USDA data, annual production increased by 35 percent between 1990 and 2007, whereas the planted areas increased by 48 percent. This implies that the average yield declined by approximately 13 percent in the period. On the other hand, the Myanmar government statistics for the same period indicate that the annual production increased by 125 percent, and the harvested areas increased by 64 percent, so that the average yield increased by approximately 61 percent.

As to the planted areas, remarkable discrepancies between the Myanmar government statistics and the USDA estimates emerged in 2006. The Myanmar official statistics show that the planted areas increased by 18 percent within two years from 2005. The incremental areas were 1 million hectares; this is an unrealistic figure. In Myanmar, the government constrained producers' choice of crop and rather forced cultivation of paddy, so that paddy was grown in the marginal areas where the

² It might be the case that there were already considerable smuggling exports as of 1990, and smuggling functioned as a buffer to prevent a shortage of rice in the domestic market.

profitability of paddy cultivation had been low compared with other crops (Kurita et al., 2004). Therefore, it is unlikely that the planted areas to other crops were converted into rice in these two years. Should there have been an increase in the planted areas to rice, it would be due to reclamation of waste land or the double cropping of existing rice fields by irrigation.

Figure 3 summarizes changes in the average yields. In general, the yield of the dry season crop is higher than that of the monsoon season crop. While the Myanmar government statistics report the average yield for each of dry and monsoon seasons, the USDA data do not report the disaggregated data by seasons. Several points are worth noting on this figure. First, the discrepancies between the Myanmar government data and the USDA data widened considerably from 2004. Second, while the yield of the dry season crop is higher than that of the monsoon crop, the trend of the annual average yield has been close to the yield of the monsoon crop. As will be shown later in this section, this is due to the dry season crop accounting for only 20 percent in terms of the net planted areas to rice.

=== Figure 3 ===

2.2 Vietnam

Figure 4 summarizes the trends of rice production in terms of paddy and the planted areas in Vietnam. The official statistics of the Vietnamese government reports the production amounts and planted areas by three seasons, namely dry season (spring), wet season (autumn), and wet season (winter). In some areas, triple cropping is observed. In the period from 1990 through 2008, annual production almost doubled from 19.23 million tons to 38.73 million tons. The net planted areas increased by 23 percent from 6.04 million hectares in 1990 to 7.40 million hectares in 2008. This suggests that the growth in production amount is mostly attributable to the rise in yield.

As to the increase in the planted areas, it is mostly due to multiple cropping. There are two factors that helped the rise in multiple cropping. First, irrigation facilitated the expansion of the dry season crop. Second, selective breeding to shorten the growing period of paddy facilitated triple cropping. On the other hand, the net planted areas have been more or less declining since 1999.

=== Figure 4 ===

Figure 5 shows trends of the yields by cultivation seasons. The annual average

yield as of 1990 was 3.18 tons per hectare; it was close to that of Myanmar, 2.83 tons per hectare. The annual average yield went up to 5.23 tons per hectare by 2008. This is nearly twice as high as that of Myanmar in 2008, or 2.61 tons per hectare (USDA estimate). As in Myanmar, the yield is much higher for the dry season crop than the wet season crop. In addition, the proportion of the dry season crop in net planted areas is higher. In terms of the annual average yield, Vietnam is one of the top countries among Southeast Asian nations. For the high annual average yield in Vietnam, not only the sustained growth in the yields of both the wet and dry season crops but also the high proportion of the dry season crop contributed.

=== Figure 5 ===

2.3 Yield and Production Technology

This subsection considers the production technology that contributed to the growth in yields, especially in Vietnam. One of the important technological factors is the diffusion of high-yield varieties (HYVs). HYVs are improved varieties of paddy, which are responsive to dosages of chemical fertilizer. The diffusion of HYVs was often termed the ‘Green Revolution’. The Green Revolution in Southeast Asia started from the Philippines in the 1960s, and spread to neighboring countries.

The diffusions of HYVs in Myanmar and Vietnam are contrasting. In Myanmar, the government led the ‘All township special high-yield rice production plan’ from 1977 to encourage the diffusion of HYVs (Takahashi, 1992: 96-97). The share of the HYVs planted areas to total planted areas to rice was as low as 10 percent in 1976. It rapidly went up to 48 percent in 1981. However, the spread of HYVs has remained stagnant since then, and the share of HYVs planted areas remained at 59 percent as of 1993, which is the last year where the continuous time series data is available. In Vietnam, the spread of HYVs were gradual but steady, and HYVs spread reached 94 percent in 2002.

=== Table 1 ===

There are various conditions for HYVs to fully perform to potential. First is the use of chemical fertilizer. Since HYVs are an improved breed to be responsive to chemical fertilizer dosage, chemical fertilizer is the most important variable input. Second is the water level control. HYVs are vulnerable to floods or droughts. The dry season is suitable for HYVs for various reasons. Since rainfall is less in the dry season,

it is easier to control the water level once the water supply is secured by irrigation. Furthermore, the longer hours of sunlight help the growth of photosensitive paddy. Third, for the control of water supply, irrigation and drainage facilities are indispensable for modern varieties.

Table 2 summarizes the trend in the proportion of irrigated areas to the total planted areas to rice. The Red River Delta and the Mekong Delta are two major rice bowls in Vietnam, and the latter produces nearly half of the total output of the whole nation. This table indicates that the irrigation construction progressed rapidly in the 1990s in the Mekong Delta.

==== Table 2 ====

While the equivalent data for Myanmar are not available, relevant data on the development of irrigation are summarized in Table 3. The irrigated areas in this table do not necessarily refer to paddy fields but they include all crop fields. The net proportion of irrigated areas to the total planted areas to all crop remained as low as 16.9 percent as of 2008. On the other hand, there are some areas where double cropping is done without irrigation facilities; this includes the combination of the monsoon paddy with beans/pulses in the dry season. Beans and pulses do not require a lot of water supply.

The irrigated areas refer to the designed areas, and the areas suitable for double cropping of paddy with enough supply of water are smaller than the designed areas. Double cropping is done only in 15 to 30 percent of the irrigated areas. Furthermore, the double-cropped areas under irrigation are often smaller than the dry season paddy planted areas.³ Judging from these, the provision of irrigation infrastructure in Myanmar is underdeveloped versus in Vietnam. Such underdeveloped irrigation facilities may have hampered intensive use of agricultural land, and repressed the productivity of rice.

==== Table 3 ====

To see the contribution of HYVs and irrigation on productivity, it is worthwhile introducing some studies that analyzed the determinants of productivity with micro level data. If the use of HYVs and irrigation development enhance productivity, such a

³ Apart from irrigated areas, the dry season crop areas include those areas adjoining ponds and rivers, and areas which are flooded in the monsoon season.

relationship should be confirmed with micro level data. As planted rice varieties and availability of irrigation are different among farmers within a country, how these conditions affect productivity should be observable in micro level data.

Regarding the impact of HYVs on yield, Tran and Kajisa (2006) offered a panel data analysis with farm household data. Their study showed the evidence that in addition to a switch from traditional varieties to HYVs, HYVs have been improved continuously so that farmers with newer HYVs have continuously raised their productivity. Thus, the improvement of productivity due to HYVs is not a one-shot jump; rather, the continuous improvement of HYVs led to the growth in production in Vietnam.

In Myanmar, underdevelopment of HYVs is aggravated by the limited supply of quality seeds. As farmers take seeds from the harvested paddy repeatedly, the performance of HYVs deteriorates. While the diffusion of HYVs was nominally as high as 50 percent, it included the planted areas where the deteriorated seeds were used.⁴

As to the relationship between irrigation facilities and yields, Matsuno and Horino (2009) offered an analysis based on a farm household survey in Myanmar. They analyzed how the differences in the designs of irrigation and water drainage affect yields, using the dataset of adjoining paddy fields in one township. They found that the difference in the designs of irrigation and water drainage resulted in considerable variation in yields – not only whether or not irrigation is available but also the quality of irrigation matters on productivity.

Summing up these data and the evidence, it can be inferred that the differences in technological conditions in terms of the quality of HYVs and irrigation might account for the yield gaps between Myanmar and Vietnam.

3. Framework of Policy Analysis

This section offers the framework to analyze the impacts of policies on rice production in Myanmar and Vietnam. This framework is static and it presumes profit-maximizing farmers. It illustrates how (1) the price policies including export controls, (2) subsidies on inputs, and (3) public investments in irrigation affect the

⁴ For example, the government supplied 79,000 baskets of seed paddy in 2006. On the assumption that two baskets of seed paddy is necessary, then it amounted to only 0.2 percent of total planted areas to rice.

yields. It also assumes that farmers do not adjust planted areas but do adjust amounts of inputs. This assumption is appropriate for Myanmar as the government limited farmers' crop choice and encouraged rice production. This assumption allows us to focus on the productivity of a unit paddy field.

3.1 Price Policies

Price policies are regulations which reduce farmers' unit selling price of a paddy. They include forced procurement by the government at the official price from farmers, and export controls to secure the supply in the domestic market at affordable prices for consumers. The following illustration is on the price policy with export controls. Let us denote the unit price that farmers receive as \bar{P} . For rice exporting countries like Myanmar and Vietnam, when there is no export control, this producer price converges to the export price minus the marketing costs. On the assumption that both Myanmar and Vietnam are price takers in the international rice market, \bar{P} is determined by the international market, and it is autonomous from the changes in the supply and demand in the domestic market.

Figure 6 illustrates the farmers' revenue function for a unit paddy field. The vertical axis stands for the producers' revenue and production costs. The horizontal axis stands for the amount of variable inputs. Inputs include labor, chemical fertilizer, and pesticide, among others. Strictly speaking, we have to take into analysis the substitutability and complementarity among these inputs. For tractability of analysis, it is assumed that chemical fertilizer is the most important variable input, and that it dominates the changes in yields. Curve OA refers to producers' revenue from a unit paddy field. The producers' revenue is the yield of a unit paddy field multiplied by the rice price, \bar{P} . Line OB refers to the total input costs. The degree of Line OB indicates the marginal cost of production. Again, for simplicity of analysis, the fixed cost of production is abstracted, so that the total cost curve starts from the origin O .

=== Figure 6 ===

When there is no price control, a profit maximizing producer sets the input amount at L^* where the tangent of Curve OA is parallel with Line OB . The profits of the producer from a unit land is $CE=CL^*-EL^*$. The yield per a unit land is OD/\bar{P} .

Now, the effect of a price policy on the yield is considered. The export control represses the producer price to P' where $P' < \bar{P}$. The broken line Curve OA' refers to the revenue of the producer. Then, the profit maximizing producer chooses the input level L'

where the tangent of Curve OA' is parallel with Line OB . As $L' < L^*$, the yield gets lower as well. The yield also falls down to OX/\bar{P} .

3.2 Subsidies

In the above example, the policy to lower the producer price results in lower yield. However, the government might aim at harmonizing the low rice price for consumer protection with the encouragement of rice production. For such a policy objective, subsidies are useful.

Subsidies take various forms. One typical example is provision of chemical fertilizer at a low subsidized price. Another example is provision of seasonal loans at a subsidized low interest rate. These all lower the marginal production costs for producers.

Figure 7 illustrates the case where subsidies stimulate production. As in Figure 6, Curves OA and OA' refer to the revenue curves for producers with and without the price policy, respectively. As for production costs, Line OB refers to the situation without subsidies, and the dash Line OB' refers to the situation with subsidies. A profit maximizing producer takes into account the subsidies, and sets the amount of input at L'' where the tangent of OA' is parallel with the subsidized cost line OB' . In this particular case shown in Figure 7, compared with the case of no price controls and no subsidies (L^*), the yield is higher for the case of the price control with subsidies on inputs.

=== Figure 7 ===

This example shows that even when the price control is in operation, its negative effect on production can be offset by subsidies. Of course, when subsidies are not enough, the price policy may result in a decline in yield. What is important here is that we should focus on the relative price of inputs and output, or the terms of trade, rather than the output price level. The existing studies on the rice economies of Myanmar and Vietnam paid attention to the terms of trade.⁵

3.3 Technological Change by Public Investment

Another means to encourage production while repressing the domestic rice price for consumer protection is the public investment in improvement of rice productivity. Public investment to induce technological change includes infrastructures such as

⁵ These include Fujita and Okamoto (2005: 194-196) for Myanmar, and Nielsen (2003) for Vietnam.

irrigation and drainage, and research and development in breeding of HYVs. Since they have the characteristics of public goods in terms of non-rivalness and non-excludability, their provision through the market would result in undersupply.

Apart from public investment, technological progress is possible through farmers' private investment in mechanization. Examples include tractors for land preparation, and power pumps for irrigation. However, in comparison with public investment, these private investments are small in scale, and so are their impacts on the economy. In addition, private investments are more complementary with public investments; irrigation with power pumps is not possible without an irrigation channel. Thus, the role of public investment in agriculture is still important for technological change.

Figure 8 illustrates changes in the producer revenues due to technological progress. Technological progress such as breeding of HYVs raises the yield and expands the producer revenue curve outwards from Curve OA to the bold line Curve OI .

=== Figure 8 ===

Suppose that the government implements a price policy that represses the producer price lower than \bar{P} . Without complementary public investment, the revenue curve would shrink to Curve OA' . However, with complementary public investment, the technological progress shifts the revenue curve upward to Curve OI' , and the profit-maximizing producer chooses the input level of L''' for which the tangent of the revenue curve OI' is parallel with the marginal cost Line OB . In this particular example of Figure 8, despite the repression on rice price, the technological progress due to public investments raises the input level from L^* to L''' . Compared with the condition where there is neither price control nor technological progress, the yield goes up from OD/\bar{P} to OZ/\bar{P} .

As shown above, when we evaluate the impacts of the rice price policy on rice production, we have to take into account technological progress as well as changes in the terms of trade. With the policy mix of the price control and the public investments for technological progress, the government can harmonize the growth in production with the consumer protection.

In other words, to evaluate precisely the impact of the policy mix on rice production, we need to check the ratio of marginal revenue to marginal cost of production. However, it is beyond the scope of the present paper to identify the production function and calculate the marginal product. In addition, it is difficult to collect data on prices of inputs and subsidies. In this regard, the present paper remains a

qualitative analysis.

Finally, Figure 8 allows us to compare the impacts of price liberalization on productivity with the impacts of technological change. For the particular case of Figure 8, the impact of price liberalization only is to induce an increase in inputs from L' to L^* , and an accompanying rise in yield from OX/\bar{P} to OD/\bar{P} . How much a rise in the producer price stimulates production depends on the marginal productivity of inputs. When the revenue curve is flat like Curve OA , the growth in output due to price liberalization is limited. A number of empirical studies confirmed that the price elasticity of the supply of food crop is small (Fan and Pardey, 1997; Rosegrant et al., 1998; Kanwar, 2006). Their implication is that technological changes have a more significant effect than price liberalization.

4. Rice Policies in Myanmar and Vietnam

Regarding the stagnation in Myanmar and the progress in Vietnam, this section examines the relationship between changes in the yield of rice and changes in rice policies. As the 'level' of yield is dependent on environmental conditions such as climate and rainfall as well as natural resource endowments, it is difficult to explain the differences between Myanmar and Vietnam. However, the 'changes' in yield, *ceteris-paribus*, should be explained by changes in rice policies. To explain the gap between the performances of two rice economies, this section focuses on the relationship between the changes in yields and the changes in rice policies.

In Myanmar, based on estimates by the USDA, the growth in yield has been stagnant since 2004. Based on the framework of analysis from Section 3, it can be interpreted as either (1) the absence of technological progress or (2) the deterioration in the terms of trade for rice producers that cancel out the technological progress. As for Vietnam, the yield has grown continuously. This might be due to (1) technological progress, (2) improvement in the terms of trade, or (3) both.

4.1 Myanmar

First, the policies that affect the producer price are examined. Until August 1987, the government used to control the marketing of rice by the procurement and distribution system. In principle, farmers had to surrender all the harvest except for their own consumption and seed paddy. The procurement quota assigned to farmers was between 1.5 and 2.1 ton per hectare. Total procured rice amounted to approximately 40

percent of the total annual production. Commercial marketing of rice was in principle prohibited, whereas the black market was tolerated (Tin Soe and Fisher, 1990). As the procurement price was less than half of the black market price, the rice procurement system was effectively a heavy tax on the producers. On the other hand, rice exports were under the monopoly of the government; the government exported the remainder of the procured rice after domestic distribution.

In August 1987, the government announced the abolition of state rice procurement and allocation, lifted the direct price controls, and permitted the free market domestically. However, the government resumed the procurement and distribution system in 1988, though with a reduced scale. The procurement quota was 0.5 to 0.6 ton per hectare (Fujita and Okamoto, 2005: 235). The proportion of the procured rice to the total rice production was reduced to around 10 percent as well. The procurement and distribution system was maintained until April 2003.

As to export controls, rice exports by the private sector were prohibited after 1987, and the government monopolized rice exports until the procurement system was abolished in April 2003. While liberalization of rice export was announced after the abolition of the procurement system in 2003, it was not until December 2007 that export quotas were allocated to the private sector in the scale of several hundred thousand tons. The government imposed 10 percent export taxes on rice exports in the same way as for other exports commodities.

It is now questioned how these rice policies exerted impacts on the rice price. Figure 9 summarizes the trends of the domestic wholesale price and the export price in terms of the US dollar as well as their ratio. It also includes the export price of Thai rice as a reference. The ratio of the wholesale price to the export price can be considered an indicator of domestic market repression.

=== Figure 9 ===

Some interesting tendencies can be observed in this figure. First, the export price of Myanmar rice is linked with that of Thailand, with roughly a constant price gap. When grain prices soared worldwide from the second half of 2007, the export price of Myanmar rice followed that trend. Second, the relationship between the export price and the wholesale price of Myanmar is unstable. This suggests that the export control cut down the linkage between the domestic and international rice market.

Next, let us consider how repression of the rice price developed. Repression of the rice price can be measured in two ways. One is the ratio of the wholesale price to the

export price, and the other is the wholesale price in absolute terms. First, the ratio of the wholesale price to the export price fluctuated sharply, and there is no clear trend.

Between two prices in terms of the US dollar, the wholesale price fluctuated more than the export price. The fluctuation of the wholesale price in terms of the US dollar can be further decomposed into fluctuations in the wholesale price itself and in the exchange rate. Figure 10 illustrates such decomposition. In this figure, as for the exchange rate, its rise indicates appreciation of the local currency, the kyat, against the US dollar. The figure shows the trend of the wholesale price of rice in real terms (wholesale price/CPI), and the trend of the exchange rate (CPI/ exchange rate). The base year is 1997, for which the value of each series is set at 1. This figure shows that there is no clear trend of price repression in real terms as well; it has been fluctuating around one, the level as of 1997.

=== Figure 10 ===

Next, changes in the terms of trade for producers are considered. First, procurement with the official rate was reduced in 1988, and it was abolished in 2003. This raised the receipt of the producers. Second, there was a cut in the subsidies on chemical fertilizer. Until 2001, the bulk of the supply of chemical fertilizer was through government distribution. The government raised the distribution price of chemical fertilizer gradually, and it was close to the market price when the distribution was abolished in 2003 (Fujita and Okamoto, 2005: 195). Moreover, the amount of distribution had been mostly at random due to the budget limitation, so it is difficult to quantify the effect of fertilizer distribution.

For the period after 2004 where both rice procurement and chemical fertilizer distribution were abolished, the terms of trade can be captured by comparing the wholesale price of rice and the import price of fertilizer. Figure 11 shows the import price of urea, one of the main chemical fertilizers, and the ratio of the wholesale price to the urea import price. The figure shows that the fluctuation of the urea price transmitted into fluctuations in the terms of trade. As for the period from 2003, while the price of urea went up continuously, the appreciation of the kyat mostly set it off, leaving the terms of trade to improve.

=== Figure 11 ===

To sum up, judging from the changes in the wholesale price of rice and the terms

of trade, the repression on the producers has not been deteriorating. Therefore, the stagnant performance of the rice economy in Myanmar cannot be attributed to a worsening repression.

4.2 Vietnam

In 1981, Vietnam started the partial reform of the agricultural sector from the collective farming based on agricultural cooperatives to the contract system, where farmers could freely dispose of the residual products above the assigned production quota. The milestone of the reform was the Decree 10 in 1988 which made certain the shift from collective farming to individual farming of farm households. The land use title was clarified although it was initially relatively as short as 15 years. In addition, farmers were allowed to make decisions in production and marketing. In 1993, the Agricultural Land Act extended the land use title to 20 years and enhanced the title holder's right to exchange, transfer, and inherit land. These series of reforms were considered to have stimulated the producers' incentive to expand rice production.

Simultaneously, major reforms were undertaken on the rice market. In the domestic market, the government lifted the direct controls on rice prices and input prices such as chemical fertilizer in 1989. Entrance of private distributors into the domestic rice market was progressively liberalized and they soon came to handle the bulk of the domestic marketing of rice.

In contrast, rice exports have been effectively monopolized by the state-owned enterprises from the very beginning when Vietnam resumed rice exports in 1989 until now. Two giant state-owned enterprises, Vinafood I and Vinafood II, have the lion's share of rice exports. Nonetheless, the government deregulated the rice exports gradually, and the number of rice exporting state-owned enterprises increased. Finally, in 2001 the government stopped directing allocation of quota to individual state-owned enterprises. Since then, the government has controlled the rice exports by setting the targets for the national export volume over the years; within the targets, any authorized exporters have been, in principle, permitted to export rice, but once the targets have been reached, exports have been halted. The objective of this policy is to secure enough rice in the domestic market.

How did the changes in incentives of rice farmers and the series of rice market reforms affect the rice price in the domestic market? Figure 12 summarizes the producer price and the export price of rice (FOB, 15 percent broken). Since the quality of the rice is different in the domestic market and the export market, these prices are not suitable for direct comparison. Nonetheless, it is still useful to examine the trends of these two

time series. The producer price in terms of the US dollar has been mostly stable, whereas the export price turned from the downward trend into the upward trend in 2000. This suggests that the domestic price has been repressed and it has not been fully linked to the export market due to the export control. From the viewpoint of the price stabilization, it can be judged that the policy has been successful.

=== Figure 12 ===

To further evaluate the repression of the rice price in the domestic market, Figure 13 illustrates the trends of the retail price of rice and the consumer price index (CPI). For both time series, the value for 1991 is normalized to unity. The retail price and the CPI show very similar trends; the increase in CPI rather surpassed the retail rice price until 2007. This indicates that there was no sustained rise in the rice price in the domestic market.

=== Figure 13 ===

In summary, while a sustained growth in yield is observed in Vietnam, it is not appropriate to wholly attribute this growth to the price incentives of rice farmers. In fact, the domestic rice price has remained stable in real terms for two decades.

5. Determinants of Public Investment

The above analysis confirms that the large gap in yields of rice between Myanmar and Vietnam emerged in the absence of any clear changes in the terms of trade of the producers in both countries. This implies that the yield gap between two countries might be attributable to the differences in technological progress. This section sheds some light on the public investments that influence the technological progress.

5.1 Amount of Public Investment

To check the scale of public investments in the agricultural sector for both countries, Table 4 summarizes the indices of public expenditure in the agricultural sector. In terms of the percentage of GDP, Myanmar's public expenditure in the agricultural sector has been around 0.7 percent, whereas it has been above one percent in Vietnam. However, the corresponding figures for Indonesia and Thailand have been

around 2 percent, so that the Vietnamese figure is not so high, not to mention the Myanmar figure. In terms of the proportion of the agricultural sector expenditure in the total fiscal budget, the figure for Myanmar is higher than the Vietnamese figure. However, given that the agricultural production accounts for the higher share in Myanmar's GDP, this figure does not necessarily imply that the Myanmar government prioritizes the agricultural sector in its budget allocation.

=== Table 4 ===

The fiscal budget for the agricultural sector can be classified into the current and capital expenditures; current expenditures include personnel costs of the related governmental organizations, subsidies, and the maintenance costs of the agricultural infrastructure, whereas capital expenditures include investments in agricultural infrastructure. In Vietnam, capital expenditure accounts for more than 70 percent of the total agricultural budget, the bulk of which is spent on irrigation development (World Bank, 2000, 2005). As for Myanmar, while the breakdown of the capital expenditure is not available, it is presumed that the bulk is for irrigation development as well. Even if the proportion of irrigation investment in the total fiscal budget of the agricultural sector is the same for both countries, the total amount of irrigation investment as a percentage of GDP for Myanmar would be around a half of the figure for Vietnam.

Why is the fiscal budget for the agricultural sector, in particular irrigation investments, smaller in Myanmar compared with Vietnam? First, the fiscal revenues are smaller in Myanmar, so that fiscal expenditures eventually get smaller. Second, the marginal return of irrigation investments might be lower in Myanmar than in Vietnam, so that the government allocates smaller resources in irrigation development. Regarding the second conjecture, the marginal return of irrigation investment is discussed in some more detail in connection with the budget allocation system.

5.2 Budget Allocation System

This subsection discusses the relationship between the efficiency of public investment and delegation of budget from the central to local governments. There are two economics rationales as to why more delegation of budget to local governments might possibly enhance efficiency. First, there might be information asymmetry between the central and local governments; when local governments have more abundant information on the local geography than the central government, the delegation of budget to local governments might realize more efficient irrigation

development. Second, when the delegation of budget is combined with the delegation of the revenue sources in terms of collection of irrigation fees from producers, it would be an incentive for local governments to implement irrigation investments effectively.

In terms of the delegation of budget from the central government to local governments, there is a stark contrast between Myanmar and Vietnam. In Vietnam, the weight of the local government budgets in the total fiscal budget is higher, which may augment the efficiency of the public expenditure in the agricultural sector.

In Vietnam, the proportion of the local government budget in the total fiscal budget has been around 30 to 40 percent, which is the highest among ASEAN countries. In terms of the high proportion of the local government budget, Vietnam ranks with the federalism countries such as Australia and Germany (Ishizuka, 2004; Duc, 2005). In particular, the proportion of the local government budget in the total fiscal budget for irrigation investment is high. Table 5 shows the breakdown of the irrigation-related budget between the central and local governments for 1999-2002.⁶ The table shows that the local government budget accounted for 50 percent of the total public investment in irrigation in 1999, and 78 percent in 2002.

The irrigation fees in Vietnam (around USD 60 per hectare) are among the highest of Southeast Asian countries, and the rate of collection is also high (Hussain, 2005). Irrigation fees are one of the important revenue sources for local governments in Vietnam. In Myanmar, regional branches of the central government (Irrigation Maintenance and Management Bureau, the Irrigation Department of the Ministry of Agriculture and Irrigation) collected the irrigation fee, and the fee had been fixed at 10 kyat per acre (equivalent to USD 0.02 per hectare in 2007) for a long period until 2007 (Matsuno et al., 2009).⁷ This irrigation fee was by far the lowest among Southeast Asian countries.

==== Table 5 ====

When we discuss the high proportion of the local government budget, however, we must take into account the peculiar characteristics of irrigation development. In Vietnam, the central government (Ministry of Agriculture and Rural Development) takes charge of the large-scale primary canals which extend over plural regions and

⁶ Data only for this period was available to the author.

⁷ In 2007, the irrigation fee was increased by 200 times to 1,950 kyat per acre (Matsuno et al., 2009). This is equivalent to USD 10 per hectare, which is still lower than the fees in neighboring countries.

provinces, whereas the local governments (provincial or municipal) take charge of the smaller secondary and tertiary canals. Therefore, as irrigation development proceeds and the large-scale irrigation construction projects are completed, the proportion of the budget of local governments in charge of peripheral canal construction tends to have a higher share (World Bank, 2005).

As for Myanmar, while the quantitative data is not available, it is considered that the central government (Ministry of Agriculture and Irrigation) takes charge of the primary and secondary canals, and the producers themselves have to bear the cost of the tertiary canal construction (Fujita and Okamoto, 2005: 189; Matsuno et al., 2009). There is no notable allocation of budget to the local governments.

The data on the status of irrigation development is consistent with the above conjecture. All the irrigated areas are not always suitable for growing paddy in the dry season due to insufficient supply of water; the usable irrigated fields are often narrower than the designed irrigated fields. As for Vietnam, World Bank (2005: 92) estimated that only 50 to 60 percent of irrigated fields are suitable for double cropping. As for Myanmar, as shown in Table 3 in Section 2, only 15 to 35 percent of irrigated areas are used for double cropping. These figures suggest that the fiscal budget for irrigation is used more effectively in Vietnam than in Myanmar, and that the inefficient use of budget for irrigation, in turn, might have resulted in smaller allocation of budget for irrigation in Myanmar.

6. Conclusion

This paper investigated the reasons of the stagnant performance of the rice economy in Myanmar in comparison with Vietnam for the last two decades. As to the stagnant rice economy of Myanmar, the repressive price policies and export controls are often emphasized in the literature. This paper took into account the technological changes to explain the changes in performance.

The examination of the rice prices and the terms of trade of producers confirmed that there is no worsening trend in Myanmar, nor improving trend in Vietnam. This suggests that the widening yield gap between two countries might be attributable to technological change rather than the changes in their rice price policies. In fact, the rice farmers in Myanmar are equipped with less-elaborate irrigation facilities and lower-performing HYVs compared with their Vietnamese counterparts.

The technological progress of rice production depends, to some extent, on the

supply of irrigation facilities and HYVs, which in turn depends on the quantity and quality of public investments in these areas. Myanmar's public investments in these areas are inferior to those of Vietnam. This paper presented an argument that the higher delegation of fiscal budget to local governments would raise the marginal return to public investments. The extent of delegation of fiscal budget for the agricultural sector is higher in Vietnam than in Myanmar. Thus, the fiscal budget for agriculture is spent less effectively in Myanmar; the low efficiency of public expenditure would in turn result in smaller budget in that area. A policy implication for Myanmar is more delegation of the agricultural budget to local governments, especially in the areas of irrigation development.

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Table 1: Proportion of Modern Varieties Planted Areas to Total Planted Areas of Rice, 1976-2002

	Myanmar	Vietnam
	Unit: Percent	
1976	9	6
1981	48	17
1986	49	31
1991	51	51
1996	59 1/	83
2002		94

Source: International Rice Research Institute (IRRI), *World Rice Statistics*.

http://beta.irri.org/solutions/index.php?option=com_content&task=view&id=250 (accessed on March 4, 2011)

Note: 1/ value for 1993.

Table 2: Proportion of Irrigated Areas in Total Rice Field, Vietnam, 1980-2022

	National Average	Red River Delta	Mekong Delta
	<i>Unit: percent</i>		
1980	46	75	41
1985	49	73	46
1990	55	80	52
1995	64	89	64
1998	68	91	67
2002	85	100	91

Source: Adopted from Tran and Kajisa (2006:173) Table 1.

Table 3: Irrigated Areas and Double Cropping in Myanmar, 1974-2008

	All Crop				Rice	
	Planted Area (NET)	Double Crop Area (NET)	Irrigated Area (NET)	Double Crop Area under Irrigation	Wet Season Planted Area	Dry Season Planted Area
	<i>Unit: Thousand hectare</i>					
1974	8,103	1,397	976	144		
1984	8,359	2,156	1,085	190		
1989	8,209	1,643	1,005	157		
1994	8,951	3,191	1,555	356	4,849	1,077
1999	10,135	4,669	1,841	507	5,152	1,132
2004	11,415	6,016	1,927	709	5,824	1,034
2008	13,489	9,472	2,275	566		

Sources: CSO, Statistical Yearbook; Agricultural Statistics (1992/93 to 2004/2005).

Table 4: Indices of Agriculture-related Government Expenditure for Myanmar and Vietnam, 1992 to 2002

	Myanmar		Vietnam	
	1992	2002	1992	2002
Agricultural budget				
Percentage of GDP	0.73%	0.65%	1.0%	1.3%
Percentage of total fiscal budget	6.6%	10.4%	5.4%	5.2%
Capital expenditure as share of total agricultural budget	40.7%	60.4%	76.5%	76.8%

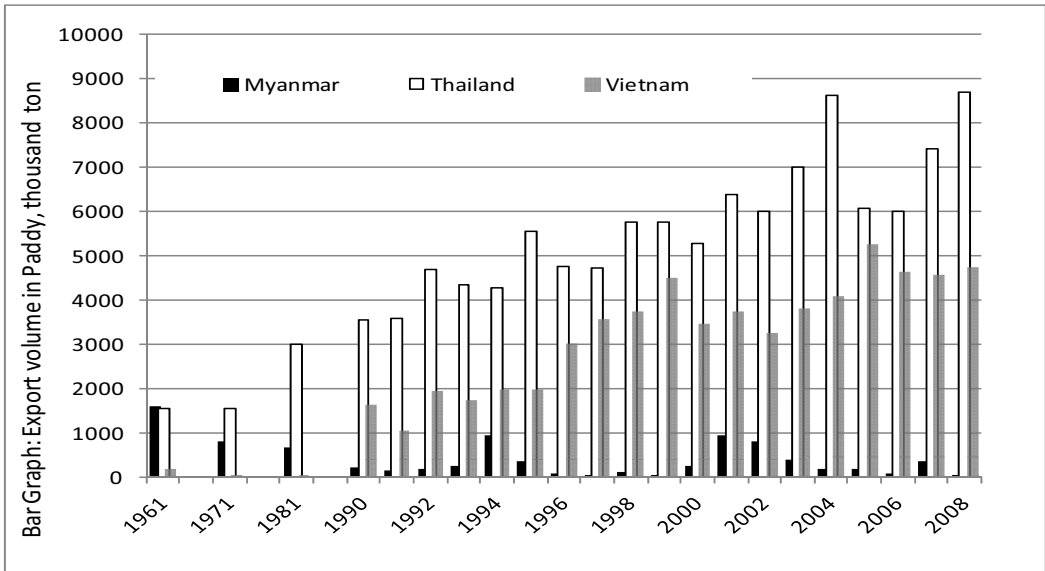
Sources: CSO, *Statistical Yearbook*; World Bank (2000, 2005)

**Table 5: Delegation of Budget from Central to Local Governments in Vietnam;
1999-2002**

	1999	2000	2001	2002
	Unit: VND billions			
Budget for irrigation	3,241	3,620	4,678	4,211
Ministry of Agri. Rural Dev.	1,612	1,364	1,273	920
	50%	38%	27%	22%
Local governments	1,628	2,255	3,404	3,291
	50%	62%	73%	78%

Source: Compiled from World Bank (2005: 91).

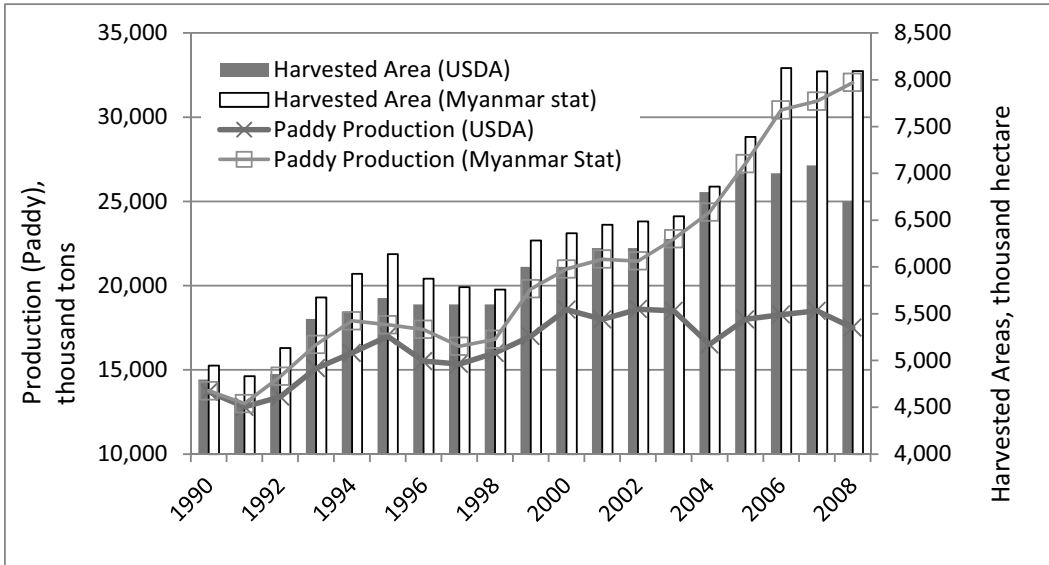
**Figure 1: Milled Rice Export Amounts of Myanmar, Thailand and Vietnam:
1961-2008**



Source: United Nation Food and Agriculture Organization (FAO), *Foodstat online* (accessed on February 29, 2011)

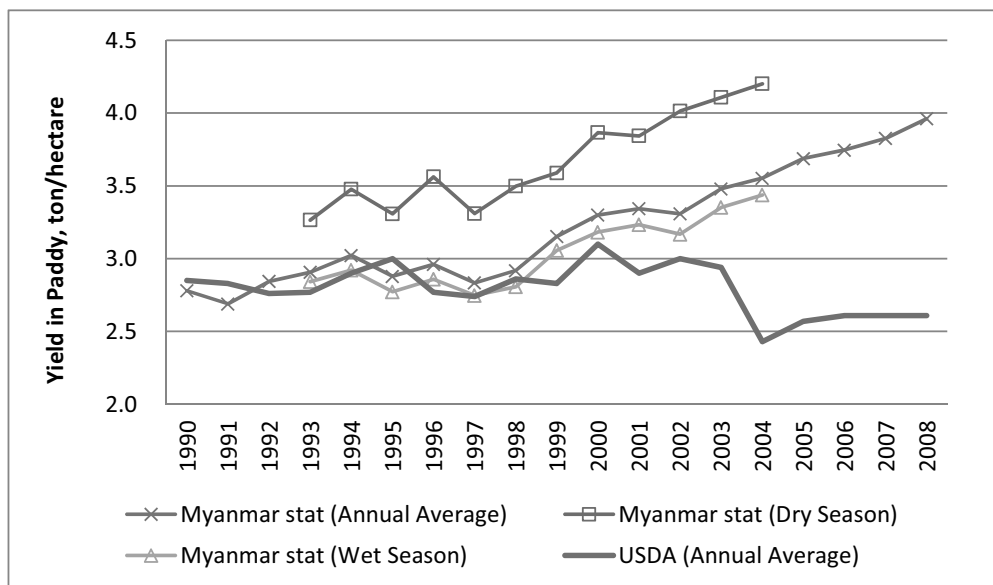
Notes: Export unit prices are calculated by dividing the annual rice export value by the annual export amounts.

Figure 2: Trends of Rice Production (Paddy) and Harvested Areas in Myanmar: 1990-2008



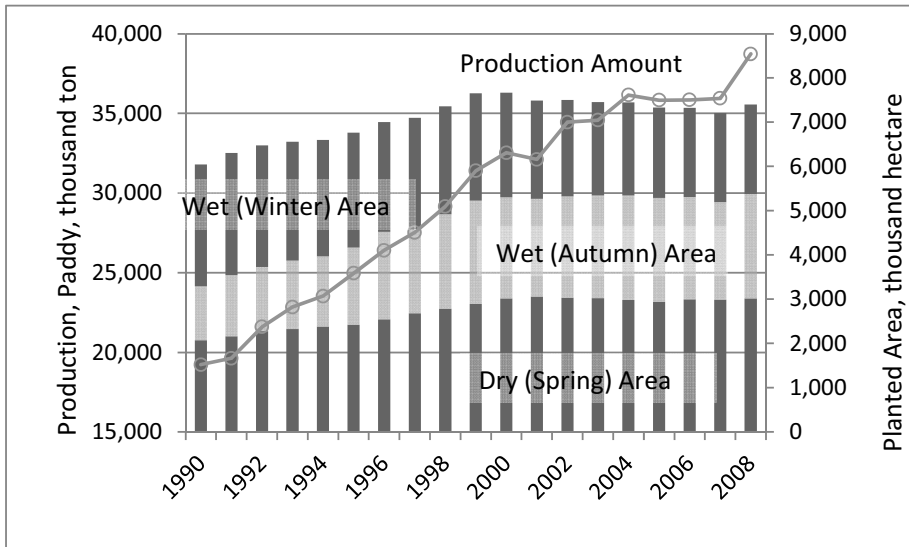
Sources: Central Statistical Organization (CSO) *Statistical Yearbook*; US Department of Agriculture, *Production, Supply, and Distribution (PSD) online* (accessed on March 1, 2011).

Figure 3: Trend of Yield: Myanmar, 1990-2008



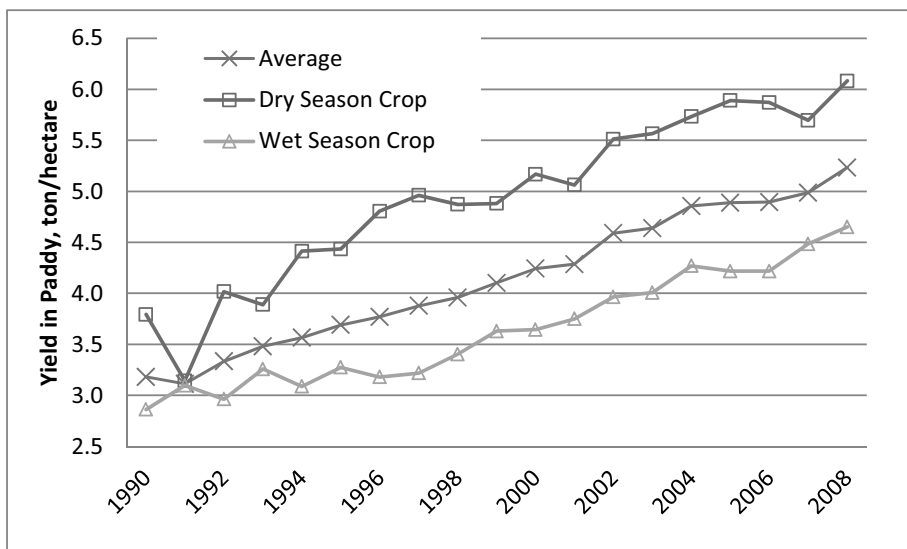
Sources: CSO, *Statistical Yearbook*; US Department of Agriculture, *Production, Supply, and Distribution (PSD)* online (accessed on March 1, 2011).

Figure 4: Trends of Rice Production (Paddy) and Harvested Areas in Vietnam: 1990-2008



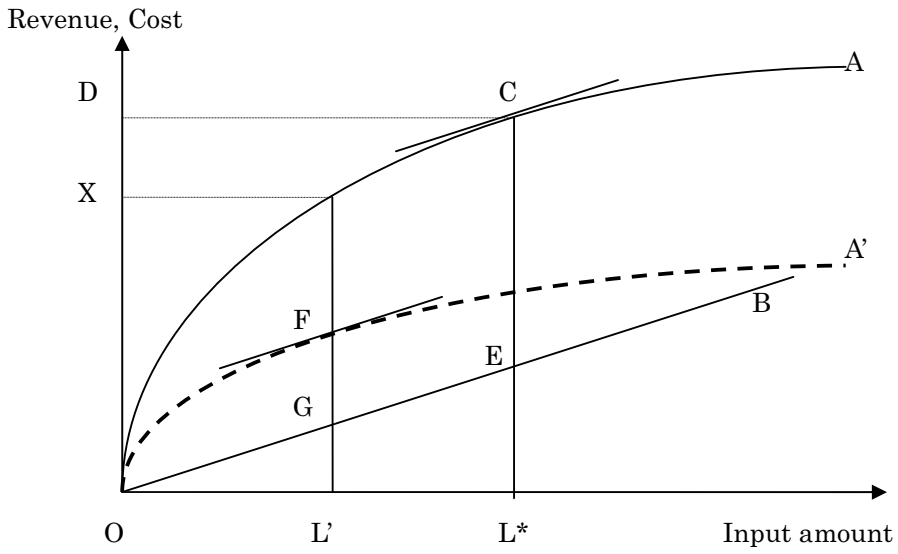
Source: General Statistical Office (GSO), *Statistical Yearbook*.

Figure 5: Trend of Yield: Vietnam, 1990-2008



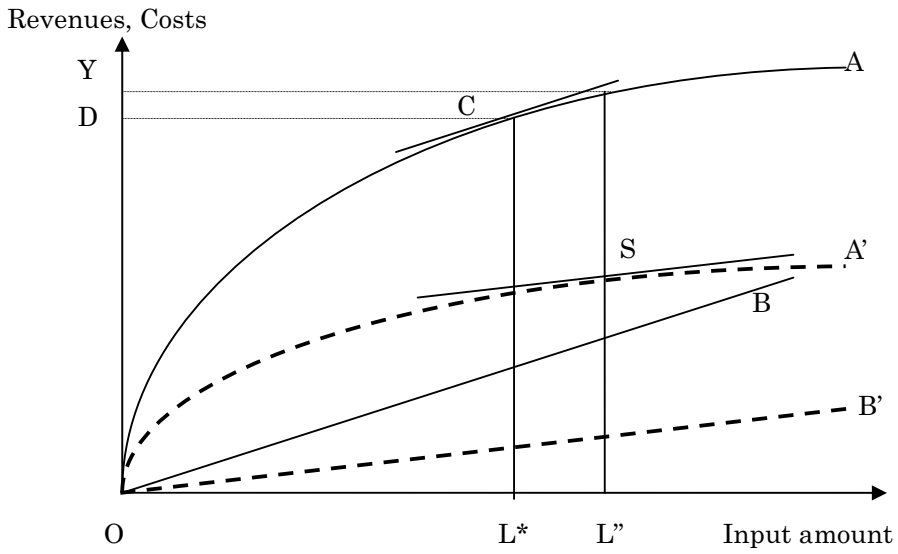
Source: GSO, Statistical Yearbook

Figure 6: Price Policy



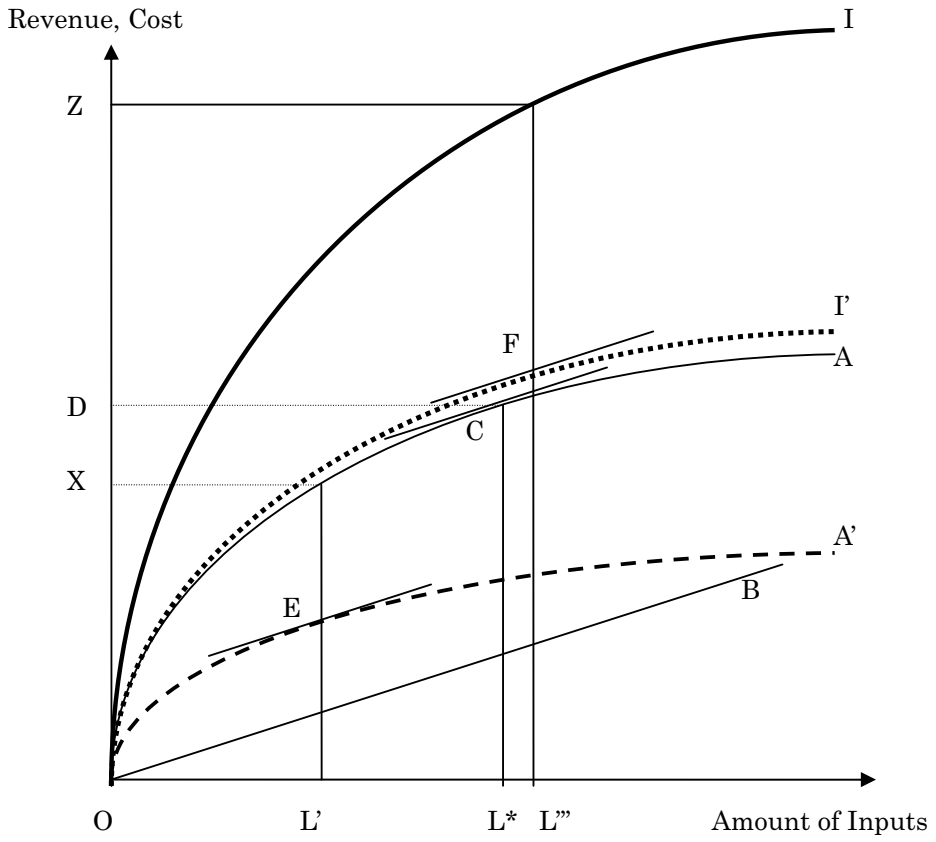
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Figure 7: Subsidies



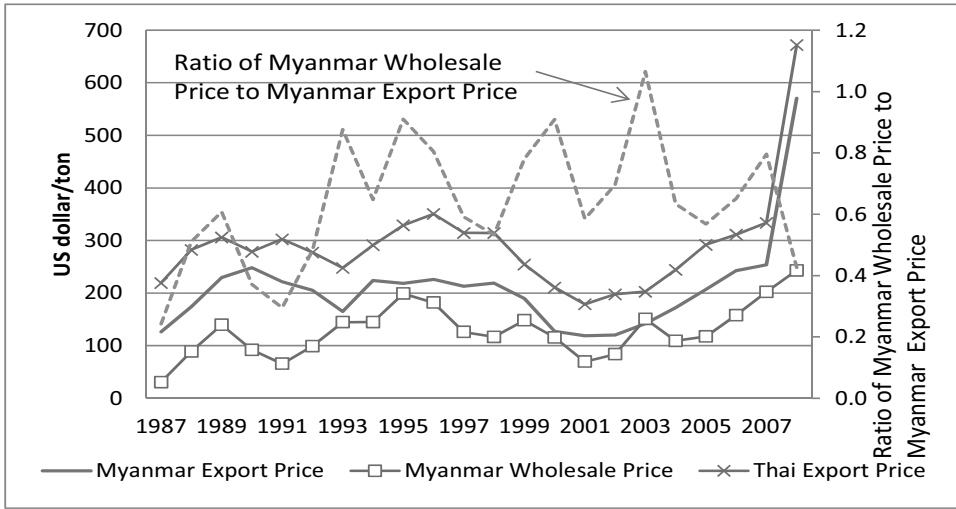
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Figure 8: Technological Change



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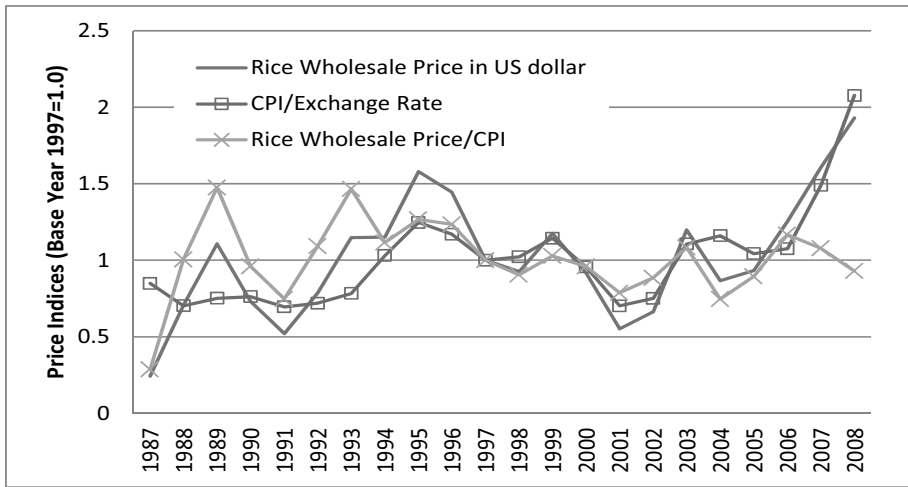
Figure 9: Trends of Wholesale and Export Prices, Myanmar, 1987-2008



Sources: Central Statistical Organization (CSO), *Statistical Yearbook*; Food and Agriculture Organization (FAO), *Foodstat* online; US Department of Agriculture, *Rice Outlook*.

Notes: Myanmar export price is calculated by dividing the total export value by the total export amount. Myanmar wholesale price is *Emata* (middle grade rice) 35 percent broken rice. The wholesale price in 1987 is the one under the direct price control, and the prices after 1988 is the one in the free market. Thai export price is for 100 percent Grade B (no broken rice), FOB Bangkok.

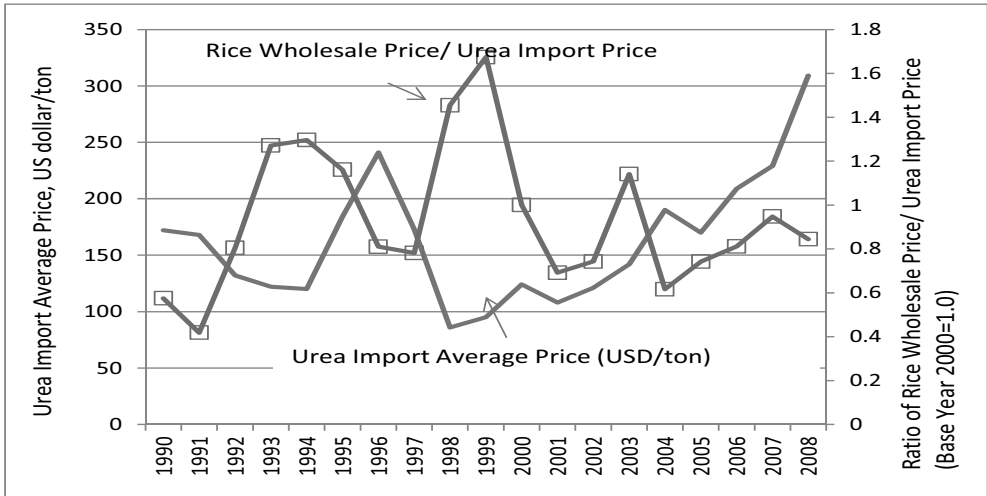
Figure 10: Decomposition of US Dollar Wholesale Rice in Myanmar, 1987-2009



Sources: CSO, *Selected Monthly Economic Indicators*; International Monetary Fund (IMF) *International Financial Statistics* online; Survey on parallel market exchange rate.

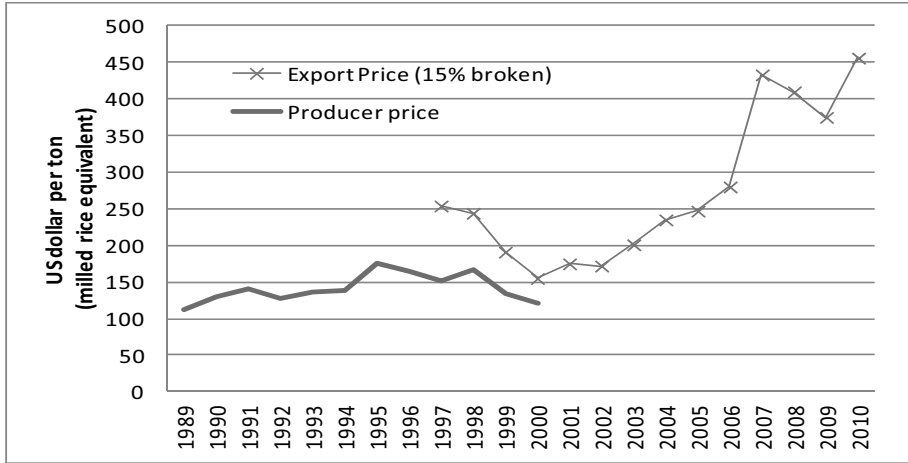
Notes: Wholesale price in US dollar = [Wholesale price in kyat / CPI] x [CPI/ exchange rate of kyat per US dollar].

Figure 11: Trend of Urea Fertilizer Import Price in Myanmar, 1990-2008



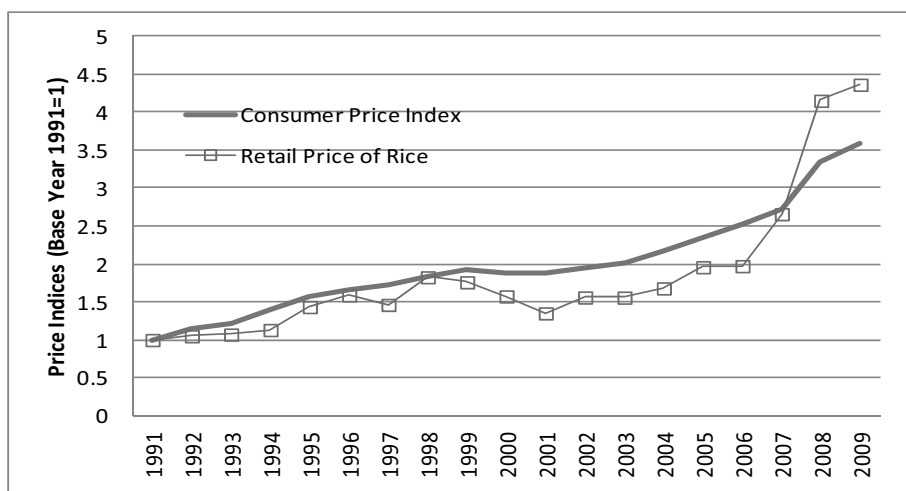
Sources: United Nations, *Commodity Trade database* (UN Comtrade) online; CSO, *Statistical Yearbook*.

Figure 12: Producer Price and Export Price (15 percent broken), Vietnam, 1991-2007



Sources: Luu (2003) Table 6.9; GSO, *Statistical Yearbook*; US Department of Agriculture, *Rice Outlook*.

Figure 13: Retail Rice Price and Consumer Price Index, Vietnam, 1991-2009



Sources: Luu (2003) Table 6.9; GSO, *Statistical Yearbook*.