**Summary:** The major challenges to the rice sector in Thailand is how to maintain its dominance in the world rice trade, increase returns to stakeholders along the marketing chain, lower costs, improve productivity, and increase value added. Part of the challenge is to recognize that innovation and governance along the value chain are key elements of any strategy aimed at maintaining and ultimately increasing the profitability of the rice industry. Given the larger number of farmers involved in glutinous rice production, the development of the glutinous rice sector and creation of value added products has the potential to benefit more farmers in the Northeast of Thailand than the existing non-glutinous (Jasmine) rice sector. Policies which concentrate on increasing farm productivity and reducing marketing margins through strengthening value chains have the greatest benefits in terms of total income and farm household income.

**Introduction**

Thailand made a remarkable progress in poverty reduction over the last decade. The country has already met its national target of reducing poverty to 12 percent during the period of the 9th Plan (2002 to 2006). It has also achieved the Millennium Development Goals (MDG) poverty target of halving the poverty headcount between 1990 to 2015; 13 years ahead of schedule.

The dramatic modernization process, which has transformed the country from a poor rural nation into a fast growing economy, has not benefited all regions equally. Instead, a high-wage, high-income economy in Bangkok and surrounding areas, driven by dynamic industrial and service sectors, coexists with a much less developed and more rural economy in the rest of the country.

The Northeast of Thailand has been historically the poorest region in the country. Poverty rates in the region are double the national average (19 percent versus 9 percent). Almost three out of five poor reside in the Northeast, even though only one in three Thais live in this region.

There are two main types of rice-based ecosystems in Thailand: upland rice, grown predominantly in the North and Northeast; and wet rice, grown in irrigated fields particularly in the Central Plains. In the mid 1980s, about half the production of 19 million tonnes was grown in the central plain and major valleys in the North. Another 40 percent was produced in the Northeast; and about 6 percent came from the South, which was a rice deficient area. Today, the Northeast still produces between 35 and 40 percent of domestic production, with approximately 25 percent of production in the North and Central Plains respectively.

The major challenges to the rice sector in Thailand is how to maintain its dominance in the world rice trade, increase returns to stakeholders along the marketing chain, lower costs, improve productivity, and increase value added. Part of the challenge is to recognize that innovation and governance along the value chain are key elements of any strategy aimed at maintaining and ultimately increasing the profitability of the rice industry. It is not just a matter of trying to reduce costs and increase productivity, but rather to increase the returns to the products being sold - costs are only one half of the profit equation.

**Rice Production in the Northeast of Thailand**

The large majority of the poor farm households in the Northeast (75 percent) are involved in rice farming, particularly glutinous rice. In other words, an improvement of the economic conditions of rice farm households could directly benefit three quarters of the poor households in the Northeast.

Rice production in the Northeast is characterized by a dual production system, where small-scale subsistence farming co-exists with more commercial-orientated production system. Estimates indicate that about 44 percent of rice production is retained by the farm household. The duality extends in two dimensions; variety of rice that is planted (and consumed) and the milling sector which mills that rice.

The type of rice which is planted by the small-scale subsistence sector and the more commercial sector differs substantively. Most households grow glutinous rice (60 percent of households), grown primarily for own consumption as well as localized sales. Smaller numbers of households (30 percent) grow non-glutinous (white rice or jasmine) for the commercial market; intra provincial and regional trade as well as export markets.

The market price is based on the price of white rice (5 percent broken) and as such, changes in the market price only affect the 60 percent of farmers growing glutinous rice in an indirect way. Thus, most farmers in the Northeast who plant glutinous rice do not make planting decisions based on the market price. Changes in the market price will affect those smaller numbers of producers who plant non-glutinous rice and the commercial milling sector.

This duality in production systems extends to production technology usage. In most cases manual transplanting and harvesting is still common, with low levels of fertilizer and pesticide applied. Considering the duality in production systems and changes in market prices not affecting those farmers only growing glutinous rice, only those farmers facing price incentives to increase yields will actually invest in upgraded technology to enhance productivity.
In addition to the duality in rice production systems, the duality is also between, on one hand, a milling sector relatively small scale and in part still oriented to milling farmer’s own production, on the other hand, a milling sector which is to a large part relatively efficient and high tech. These two sectors have very different problems and objectives.

The Value Chain for Rice in the North East Region

In general, farmers can either mill their own rice at the local village mill for own consumption (the husk, bran and broken rice being kept by the mill as payment), sold to primary collectors in the local town, or if the farmer has enough surplus paddy they can sell directly to the central market exchange or to commercial rice mills. Commercial rice mills in turn can receive paddy from primary collectors, the central market exchange, or farmers themselves; see Figure 1.

Milled rice is then distributed from mills back to collectors and traders and to wholesalers in towns and larger markets. From these wholesalers the rice is distributed to consumers through retailers. Mills are involved directly and indirectly in the export trade, shipping milled rice through transporters to wholesalers in Bangkok who then distribute the rice in Bangkok and also overseas. Larger mills are fully integrated into this export chain.

The regional paddy production, about 9.5 million tonnes in 2003, moves along two major channels:

- subsistence production and marketed production. Of the 8.5 million of paddy available after deducting losses, animal feed use and seed uses, survey statistics indicates that about 20 percent of paddy production in the region is retained by the farmers for own consumption. Another 80 percent is marketed commercially. This results in approximately 1.7 million tonnes of paddy (net of post-harvest losses and other non-food uses) to the subsistence channel and 6.8 million tonnes of marketed paddy through commercial channels.

- Paddy for on-farm consumption is taken directly by the farmers to either village mills or small commercial mills. Collectors are typically not involved in this channel. The quantities milled by custom mills at any given time are small and frequent. Given an estimated recovery rate of 65 percent for village mills, approximately 1.1 million tonnes of milled rice is consumed on-farm.

Approximately 6.8 million tonnes of paddy are available for private and cooperative milling. The marketed paddy channel commences with sales to either collectors or mills directly. Key informants estimates suggest that the sales of paddy to primary collectors and through the Central markets in the region are about 20 percent (respectively 15 and 5 percent). Collectors will then sell paddy to commercial mills. Direct sales of farmers to millers amount to about 50 percent of marketed pro-
duction. Cooperative mills generally use own marketing channels and buy from cooperative farmers; approximately 30 percent of the marketed paddy transits through this channel. Using an estimated recovery rate of 65 percent for commercial and cooperative mills this corresponds to 4.4 million tonnes of milled rice.

After the milling stage rice is marketed through different channels with a major distinction between domestic and export channels. The milled rice for the domestic channel is marketed to traders, direct sales to retailers, and wholesalers. The markets for by-products are various. Swine producers use a large quantity of broken rice so they prefer buying from millers.

Of the 4.4 million tonnes of milled rice produced in the Northeast, some 24 percent (1 million tonnes) goes into the regional market for retail sales (90 percent) and for further processing (10 percent). The remainder, 3.4 million tonnes goes through traders and wholesalers to markets outside the region. Approximately 10 percent is shipped to Southern retail markets (0.34 million tonnes) while the remaining 66 percent goes to the Central region. Of the 2.27 million tonnes going to the Central region, there is an approximately equal split in domestic consumption in Bangkok and surrounding areas and for the export market.

In addition to the flows of paddy and milled rice coming out of the Northeast to destinations in other provinces, there is also a substantial flow of paddy and milled rice to neighboring countries like Laos and Cambodia. Details of cross border trade are unknown, but estimates are around 50,000 tonnes of paddy or their equivalent are crossing the border both ways. In 2002 Cambodian exports of paddy into Thailand were around 50,000 tonnes while 134,000 tonnes of milled rice were crossing the border from Thailand and into Cambodia. Added to this is the unknown but presumed substantial amounts of milled rice being shipped through Cambodia and into Vietnam, and the cross-border trade with Laos. The problem with these estimates is that they are estimates of aggregate trade between countries and information on the contribution of the Northeast to this trade is unknown. Since most of the milled rice being transported into Cambodia and Vietnam from Thailand is Thai Jasmine, it is presumed that substantial amounts must come from the Northeast given the region’s dominance of Hom Mali production.

Marketing Margins for Rice in the Northeast Region

Marketing and profit margins of jasmine rice are presented for two price scenarios, 2002 and 2003, and alternative marketing chains for domestic and export markets; see Figures 2 and 3. Under average price conditions (2002 prices) Jasmine farmers have virtually zero profit margins (note that the opportunity cost of labor is included). In terms of profitability, millers have the highest profit margins (12.4 percent), followed by collectors and exporters (4.7 and 3.6 percent respectively). Ignoring the cost of inputs, farmers capture 65 percent of marketing margins, exporters have the second largest marketing margins of 17.3 percent, while millers have an 11.7 percent margin. The average export price for 2002 was US$312 (with a range between US$268 and US$357 monthly average). Under high price conditions (2003 prices), farmers would have a profit margin of 28 percent and a marketing margin of 20 percent after inputs have been accounted for.

For domestic jasmine sales in 2002, wholesaler profit was estimated at 0.35 percent while retailers obtained 6.22 percent; see Figure 3. In 2003 with the higher prices, wholesalers obtained around 0.95 percent profit while retailers obtained 7.23 percent profit. The highest marketing margins were captured by retailers and millers; 17.4 and 16.6 percent respectively in 2002 while in 2003 farmers got 18.4 percent of the marketing margin followed by retailers (15.7 percent) and millers (15.5 percent).

The distribution of benefits along the chain is represented by the shares of total profit. Since these are on a percentage basis of a one tonne lot of paddy moving through the marketing chain, they do not indicate absolute profitability - farmers may produce 1-2 tonnes of rice for sale, but millers may process tens of thousands of tonnes. For export jasmine, millers accrue the largest share of total profit. Exporters and collectors accrue approximately the same share, the size of which depends on the profit shares accruing to farmers. Likewise, the size of the benefits accruing to the millers varies with changes in farmer shares.

For the domestic sales of jasmine, the experience of collectors and retailers is similar to the collectors and exporters involved in export jas-
mine. The difference being that retailers in the domestic market have higher profit shares than collectors—compared with relatively equal shares for collectors and exporters.

The benefits accruing to farmers vary between years. In 2002 farmers actually lost money due to adverse farm gate prices, while in 2003 they made profits approaching 50 percent of the total profits accruing along the marketing chain.

For the domestic marketing chain of glutinous rice farmers have positive profit margins, 21 and 28 percent respectively with 2002 and 2003 prices; see Figure 4. Farm marketing margins (excluding input costs) are 13 and 17 percent for the two years. Retailers and millers maintain the second and third largest marketing margins (between 16 and 17 percent). It should be noted that the estimates yield a retail price which is close to the domestic price recorded by the Department of Internal Trade for the respective years (12.5 baht/kg and 14.1 baht/kg national average price for 2002 and 2003 respectively).

For the domestic marketing chain of non-glutinous rice in the 2002 price scenario farmers have profit margins of around 2.18 percent (note that the cost computation includes the opportunity cost of labor), and marketing margins—excluding input costs—are 1.2 percent; see Figure 5. Since the profit margins of other actors are kept constant, millers and retailers have also in this case the second and third largest profit margins and marketing margins. With the 2003 price scenario, farmers have a profit margin of 12.32 percent, and the marketing margin is around 7 percent.

**Value-Adding Potentials and Prospects for Rice in the North East Region**

The rice industry in Thailand is characterized by the fact that for the vast majority of people rice is consumed as a staple food without any further processing than milling and polishing. However, as incomes increase and consumer preferences change, there is a small but growing market for highly processed products derived from rice. Currently, the most common value added products from rice include rice flour (both glutinous and on-glutinous), rice noodles, rice crackers, and rice wrapping.

Value added products from rice are not restricted to rice flour, biscuits, noodles and rice wrappers. Under the OTOP program some local delicacies are being marketed with a high value added potential such as soap, rice wine, sticky rice confectionary products and nutritive drinks.

Specific types of value adding products depend on the type of rice from which they are derived. One major constraint to this is the fact that while farmers produce paddy, consumers eat rice. Thus the role of milling and processing in the value chain cannot be overstated.

When discussing value added potentials for the rice industry, there needs to be a move away from a general discussion about the poten-
tials for increasing value to rice as a milled grain product, and the poten-
tials for decreasing costs of production and processing. It is worthwhile
to point out that profit is a function of revenues and costs. There is only
so much stakeholders within the value chain can do to reduce costs,
and there is a sharply diminishing marginal return to effort as costs are
reduced. Instead, a focus on in-
creasing revenues has a higher pay-
off function compared with reducing
costs. In focusing on increasing
revenues, the swift conclusion made
is that increasing returns to milled
rice is difficult as milled rice is a sta-
ple good. Instead, a focus should be
on identifying those highly processed
and transformed products derived
from rice which fetch a higher value
in the market place.

For farmers in the Northeast, Hom
Mali is the main commercial variety.
Thus, in terms of efforts to increase
commercialization, it has received
the greatest interest among those
agencies who want to promote rice
as a vehicle to increase farm income.

In contrast glutinous rice is produced
by the majority of farm households,
mainly for own consumption. While
non-glutinous (including Hom Mali)
rice production and processing is
done on a commercial scale, gluti-
nous rice production and processing
does on a local level. Thus, in
terms of reaching a greater number
of the population in the Northeast,
there are more poverty alleviation
potentials in value adding glutinous
rice production and processing than
there is for non-glutinous rice.

Increasingly, consumer preferences
both in Thailand and in export mar-
kets are changing towards rice as a
differentiated product rather than as
a staple good. As such, emphasis is
on developing a branded product
catering to a high quality niche mar-
ket. The development of branded
rice, tied to a particular mill or pro-
duction area, will provide not only a
price premium, but also ensure that
value is retained in the face of in-
creasing competition.

Branding and labeling is an integral
c part of value chains upgrading and
innovation. Firms and value chains
can develop new innovations and
products, but unless barriers to entry
are maintained, competitive forces
will ensure that rents obtained from
the innovation will be eroded.
Brands and labels are forms of barri-
ers to entry; distinguishing a particu-
lar firms’ products from other firms’
products and from other value
chains. However, brands must be
protected otherwise other companies
and other countries will attempt to
capitalize on the quality reputation
of a particular brand. This has al-
ready occurred with Basmati rice,
but there is a real danger that the
Thai Jasmine Brand of rice will be
co-opted by other countries.
Within the global agrifood system, the increasing dominance of supermarket chains heralds changes in which food is produced, processed, marketed and sold. For the rice industry in Thailand this means that there will be a consolidation in the marketing and distribution system for rice, and a decline in the role of collectors and wholesalers. For both farmers and millers this means changes in the way that they have produced and processed paddy and rice, and the development of more formalized, contract based production systems.

Improved breeding of rice in Thailand shows some potential for increasing yields and producing new varieties of rice suitable for both production and consumer conditions. However, the emphasis on yields at the expense of eating quality should be avoided.

It is important that collaboration between research, extension and producers aims towards increasing productivity and returns to the industry as a whole. This will involve an emphasis on objective measurement of yield and productivity increases within a framework designed to identify industry best practices and the movement of producers towards these.

Key Issues for the North East Region Rice Industry

The key issues arising from the analysis of the rice value chain in the Northeast of Thailand are the following. Firstly, there is a duality in the production of rice with coexistence of subsistence oriented farmers with more commercial farmers, not only differentiated by their poverty status but also the type of rice grown (glutinous and non-glutinous). The low yields obtained in this low input system is exacerbated by the lack of irrigation, with irrigation being selectively applied to higher profit crops destined for the market; which results in subsistence farmers growing glutinous rice for own consumption under rain fed conditions and subjected to the risk of crop failure.

Secondly, this duality extends to the milling sector. Village mills provide milling services to farmers producing glutinous rice for their own consumption. Since these mills earn their profits by selling by-products, the more by-products they receive through poor milling technology the better their returns. This results in lower levels of technology upgrading than would be the case with commercial milling operations that make their returns from selling rice. The commercial milling operations have relatively good technology, but suffer from excess milling capacity.

Thirdly, traders face a highly competitive market, and lower margins result. Overall, there are relatively good levels of basic infrastructure including transportation networks, but advanced infrastructure and quality standards still need to be enhanced. These types of infrastructure (standards, certification and quality control) are becoming more relevant as the value chain moves from being supplier driven to increasingly buyer-driven.

Priorities for Action for the North East Region Rice Industry

Although the rice industry in Thailand is arguably efficient and certainly is held up as a world leader, there is still scope for marginal improvements in efficiency in production and processing. It is important to recognize that the duality in production and processing systems reduces efficiency in that there are fewer incentives for non-commercial stakeholders to increase productivity and modernize their production processes. As such, improvements in efficiency are less to do with “hard” investments in research, extension, inputs and machinery than in encouraging stakeholders to improve their own systems through the strengthening of the enabling environment.

A major debate in the establishment of this “enabling environment” involves what role needs to be played by the public sector in the development of the rice sector. The role of the public sector in this case is one of providing an enabling environment, both through the provision of legislation as well as providing services which are not necessarily unique to agriculture. There is a view that the private sector and public sector approaches are somehow incompatible, and that policy choices need to be made between them. However, Thailand is currently, and successfully, following these two approaches simultaneously. As noted, private investment in high-quality rice mills has occurred as a result of the strengthening of export market opportunities. At the same time, investment by the government in regional development is increasing, as evidenced by the development of strategies such as the CEO strategy, Clustering strategy and OTOP. This suggests that underlying this goal of establishing an “enabling environment” is the need to develop synergies between public and private actors. Indeed, from a policy and poverty reduction standpoint, it is argued that these two approaches could be followed simultaneously, and that policy instruments are broad enough to encourage (on the one hand) private investment in rice production and processing, and (on the other hand) allow the majority of poor farmers to share in the benefits from the development of the Thai rice industry.

The role of the government in the development of the private sector should be limited to fostering the environment in which the private sector can operate. The provision of artificially cheap credit and subsidized inputs is not recommended. Rather, the public sector can take steps to help reduce the costs faced in the marketing and export of rice in Thailand. This includes assistance in the improvement of infrastructure and taking steps to facilitate the linkages between each level of the value chain.

It has been suggested that the government play a role in the development of grades and standards to assist in the improvement of quality in Thailand. However, with respect to export-quality rice, international
standards already exist in the market for general varieties of rice based on the existing Thai standards. At the same time, there is a role for the private sector, particularly in the form of milling and farmer associations, to work with the public sector to develop programs, brands and certification schemes that communicate the attainment of such standards. Where niche markets are being targeted, the development of appropriate standards should be the purview of the private sector in conjunction with demands and specifications made by foreign buyers. Indeed, for high-quality and niche products, public standards do not often exist and necessitate the role of the private sector to develop these standards.

In terms of the appropriate strategies (concentration on broad-based exports of non-glutinous rice or the development of the glutinous rice sector and niche markets for high valued products), the critical question is who actually benefits the most from trade? Undoubtedly the actors further upstream will gain more from trade than the farmers, given the greater margins they manage to extract out of the supply chain, but the question remains, how much will farmers gain from each of the alternative (or complementary) approaches?

Given the larger number of farmers involved in glutinous rice production (and the non-rivalrous nature of the development of a value added product niche market on the existing non-glutinous rice export market), the development of the glutinous rice sector and creation of value added products has the potential to benefit more farmers in the Northeast than the existing non-glutinous rice sector. However, it should be noted that both strategies should be followed simultaneously. The private sector should be encouraged to develop high valued niche markets, which will benefit those farmers who are supplying high quality varieties of paddy. Simultaneously there needs to be efforts to encourage an increase in quantity and yield of the bulk of the remaining rice crop. Again, the role of the public sector is an enabling role, rather than to provide subsidized inputs.

However, for the majority of Thai farmers, rice is still cultivated for subsistence reasons. Even with the better cultivars and methods of cultivation, net profit from rice is likely to be only between US$200 and US$300 per hectare. Unless farmers have extensive amount of land, rice cultivation is unlikely to be the main source of poverty reduction in Thailand.

The results indicate that the industry is internationally competitive and relatively undistorted, therefore most efficiency gains are to be realized from reforming the domestic production, processing and trade systems, rather than from reforms at the border. Resulting reductions in transaction costs would benefit both producers and consumers.

However, it should be strongly emphasized that the potential competitiveness of rice be weighed against the competitiveness of other products, such as maize, livestock, or aquaculture, in the development of medium-term agricultural strategies. While improvements in rice productivity will benefit the poor and improve food security, in the end, policies that promote rice production may need to be combined with policies aimed at achieve crop diversification in order to alleviate rural poverty.

On the basis of the key issues and constraints impacting on the rice industry in Thailand, a set of priorities for action can be recommended. These can be grouped into five general areas;

1. Improving efficiency of production and processing,
2. Strengthening linkages between stakeholders,
3. Development of value added products,
4. Support to quality control and standardization, and
5. Support to marketing services and development.

Economic Effects of Investing in the Rice Sector in Thailand

It is of interest to examine what are the economic implications arising from the promotion of the above options. This is carried out by the use of a multimarket model of Thailand’s agricultural sector; the Thailand Agriculture Spatial Equilibrium Model (THAISEM).

Five sets of simulations were conducted. The policy areas that are implied by these simulations can be summarized as follows:

1. Farm productivity enhancing policies, which include a broad range of policies such as irrigation, research and extension that would result in higher yields and consequently an upward shift of the supply curve.

2. Transportation infrastructure policies, which would reduce transportation costs of major transportation corridors connecting the five regions of Thailand.

3. Import control policies, these are policies that lift the explicit or implicit restrictions on international trade (with world and Cambodian market), specifically for jasmine rice from Cambodia.

4. Value chain strengthening policies, these are policies such as the support and development of marketing services, that would affect the marketing margins of a commodity.

5. Standards and quality control policies, which include policies that would regulate the quality standard of rice varieties and/or affect the degree of mixing between rice varieties.

Overall, the results indicate that although there are common elements to each broad area of investment, the effect of a policy will depend on
the specific type of investment that is implemented; see Table 1.

Out of the five policy areas considered, policies which concentrate on increasing farm productivity and reducing marketing margins through strengthening value chains have the greatest benefits in terms of total income and farm household income. Infrastructure improvements will not have that great an impact on income.

In terms of policies impacting on standards and quality, a relaxing of the restrictions against mixing jasmine rice with non-glutinous rice will have significant negative effects in terms of total income, as well as farm household income. Those farmers in the Northeast region, where the majority of jasmine rice is grown, will be significantly affected. In contrast, farmers in the Centre, who grow mainly non-glutinous rice, will benefit. In terms of this policy scenario, it must be recalled that the main lobby group calling for increased mixing of jasmine rice processors will gain significantly from a reduction in the price of their products in the downstream industries that could potentially benefit from such liberalization. The results suggest that the geographical targeting of agricultural intensification is a policy option that should be further explored.

### Table 1 Summary of Selected Income and Trade Indicators (million US$) from THAISEM Model

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Total income Base</th>
<th>Total real income Base</th>
<th>Real farm income Base</th>
<th>Import value</th>
<th>Export value</th>
<th>Intra-regional trade</th>
<th>Inter-regional trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Productivity Policies</td>
<td>139062.26</td>
<td>138979.8</td>
<td>2647.87</td>
<td>5.83</td>
<td>2956.44</td>
<td>2255.48</td>
<td>1274.97</td>
</tr>
<tr>
<td>2% increase in all rice yields nationally</td>
<td>-29.63</td>
<td>16.49</td>
<td>-27.02</td>
<td>33.38</td>
<td>-28.91</td>
<td>-11.26</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>-0.10</td>
<td>0.01</td>
<td>-1.02</td>
<td>1.13</td>
<td>-1.28</td>
<td>-0.88</td>
<td></td>
</tr>
<tr>
<td>5% increase in jasmine rice yields in Northeast</td>
<td>-28.67</td>
<td>15.66</td>
<td>-26.28</td>
<td>29.26</td>
<td>-19.33</td>
<td>-8.69</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>-0.02</td>
<td>0.01</td>
<td>-1.00</td>
<td>0.99</td>
<td>-0.86</td>
<td>-0.68</td>
<td></td>
</tr>
<tr>
<td>Infrastructure Policies</td>
<td>-0.19</td>
<td>2.98</td>
<td>-0.15</td>
<td>-0.56</td>
<td>-0.74</td>
<td>2.59</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-0.02</td>
<td>0.03</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>5% reduction transport costs</td>
<td>-0.19</td>
<td>2.98</td>
<td>-0.15</td>
<td>-0.56</td>
<td>-0.74</td>
<td>2.59</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-0.02</td>
<td>0.03</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>10% reduction NE &gt; Central &amp; East</td>
<td>-0.01</td>
<td>3.23</td>
<td>0.03</td>
<td>-0.88</td>
<td>-0.89</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-0.03</td>
<td>0.04</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Trade Policies</td>
<td>-107.52</td>
<td>-50.37</td>
<td>-104.28</td>
<td>36.29</td>
<td>27.11</td>
<td>-115.00</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>-0.08</td>
<td>-0.04</td>
<td>-3.95</td>
<td>1.23</td>
<td>-1.2</td>
<td>-9.02</td>
<td></td>
</tr>
<tr>
<td>Lifting jasmine trade restriction</td>
<td>23.1</td>
<td>24.76</td>
<td>23.09</td>
<td>2.84</td>
<td>630.14</td>
<td>-583.72</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>0.02</td>
<td>0.02</td>
<td>0.87</td>
<td>0.1</td>
<td>27.94</td>
<td>-45.78</td>
<td></td>
</tr>
<tr>
<td>Reduction of marketing margin in Thailand</td>
<td>43.15</td>
<td>40.8</td>
<td>42.89</td>
<td>6.24</td>
<td>67.42</td>
<td>-58.01</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>0.03</td>
<td>0.03</td>
<td>1.62</td>
<td>0.21</td>
<td>2.99</td>
<td>-4.55</td>
<td></td>
</tr>
<tr>
<td>Reduction of marketing margin in NE</td>
<td>-43.63</td>
<td>-18.18</td>
<td>-41.95</td>
<td>3.76</td>
<td>27.82</td>
<td>-35.17</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-1.59</td>
<td>0.13</td>
<td>1.23</td>
<td>-2.76</td>
<td></td>
</tr>
<tr>
<td>Standards and Quality Policies</td>
<td>71.75</td>
<td>-23.16</td>
<td>-68.66</td>
<td>4.9</td>
<td>74.1</td>
<td>-87.22</td>
<td></td>
</tr>
<tr>
<td>% change</td>
<td>-0.05</td>
<td>-0.02</td>
<td>-2.6</td>
<td>0.17</td>
<td>3.29</td>
<td>-6.84</td>
<td></td>
</tr>
</tbody>
</table>

In terms of trade policies and policies dealing with standards and quality the results are not fully straightforward. Trade policies which liberalize the cross-border trade in rice will have significant negative effects on total income and farm household income; particularly for those farmers in those regions directly competing against imports. However, these results do not take into consideration the downstream industries that could potentially benefit from such liberalization. In the case of the rice industry, as an example, millers and rice processors will gain significantly from a reduction in the price of their main inputs such as paddy. Such effects are not modeled in THAISEM, but need to be taken into consideration when forming government policies.

In terms of policies impacting on standards and quality, a relaxing of the restrictions against mixing jasmine rice with non-glutinous rice will have significant negative effects in terms of total income, as well as farm household income. Those farmers in the Northeast region, where the majority of jasmine rice is grown, will be significantly affected. In contrast, farmers in the Center, who grow mainly non-glutinous rice, will benefit. In terms of this policy scenario, it must be recalled that the main lobby group calling for increased mixing of jasmine rice processors will gain significantly from a reduction in the price of their products in the downstream industries that could potentially benefit from such liberalization. The results suggest that the geographical targeting of agricultural intensification is a policy option that should be further explored.

In terms of trade policies and policies dealing with standards and quality the results are not fully straightforward. Trade policies which liberalize the cross-border trade in rice will have significant negative effects on total income and farm household income; particularly for those farmers in those regions directly competing against imports. However, these results do not take into consideration the downstream industries that could potentially benefit from such liberalization. In the case of the rice industry, as an example, millers and rice processors will gain significantly from a reduction in the price of their main inputs such as paddy. Such effects are not modeled in THAISEM, but need to be taken into consideration when forming government policies.

The results of this analysis quantify the potential regional effect of alternative policy opinions. In particular, the regional results show some significant divide between North East region and the Central and Eastern regions. From a regional perspective, it appears clear that alternative investment options have different effects on each region of the country. If balanced regional growth and reduction of regional disparities are one of the objectives of the Government, then the alternative investment options should also be evaluated in this perspective. The investment mix could become an instrument to achieve these goals. THAISEM provides an explicit and quantitative account of the potential distributional effect of alternative sets of policies for the agricultural sector. The results suggest that the geographical targeting of agricultural intensification is a policy option that should be further explored.