ISSN 1341-710X

JIRCAS Working Report No. 68

Development of Supply and Demand Models of Rice in Lower Mekong River Basin Countries: REMEW-Mekong

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March 2010

Japan International Research Center
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Preface

Severe drought in Australia in 2006, the rapid rise of maize demand for bio-ethanol, and increasing food demand in rapidly developing countries such as China and India, seemingly conter productive policies and other factors led to soaring crop prices from 2007 to mid 2008. These skyrocketing crop prices and rising crude oil prices threaten the livelihoods of people who lives in developing countries.

Production and consumption of rice is widespread in developing countries; however, the ratio of total exports to total production of rice in the world is only an average of 6.35% from 2004 to 2006. The same ratio of wheat is 19.69% over the same period, suggesting that the variance of the world price of rice will be greater than those of other crops.

Thailand is the world biggest exporter, and the country exported 7.43 million metric tons (mMT) of rice in 2006. India, Vietnam, Pakistan, and the U.S. followed, exporting 4.74 mMT, 4.64 mMT, 3.69 mMT, and 3.30 mMT of rice respectively.

Among the lower Mekong River countries, two of four countries are major rice exporter, i.e., Thailand and Vietnam, and the region dominates the world rice market trade. Changes in climate conditions in the contiguous countries in the lower Mekong basin are therefore likely to affect the world grain market through the domestic rice market in the two major rice exporting countries.

Water is an important input factor for rice cultivation and the supply is affected by climate changes. On the other hand, it is anticipated that high economic growth in these countries will reduce the per capita consumption of rice as incomes grow. Thus, there is a need to investigate changes in supply and demand simultaneously with the use of econometric models of rice markets in the lower Mekong countries which water supply changes. Such a tool is a quite important to evaluate policies for price stabilization under climate changes.

This working report describes supply and demand models of rice in Laos, Cambodia, Thailand, and Vietnam. The yield and planted area functions of these models respond to evaporation on cultivated land and transpiration of crops, then, these models can evaluate water supply changes in economic terms.

Chapter two through chapter five describe agricultural policies related to rice production briefly first, then, the structure, the estimation results of functions, and the simulation results of supply and demand models of rice in Laos, Cambodia, Thailand, and Vietnam are discribed. These models are named Rice Econometric Model Edogenous Water (REMEW) in Laos, Cambodia, Thailand, and Vietnam, i.e., REMEW-LAO, REMEW-CAM, REMEW-THAI, and REMEW-VIET.

These models are developed independently; however, impacts of water supply changes on rice production cross borders. To bring the countries together, the four models respond to the world price of rice, i.e., retail price of rice in Thailand, then, one integrated model of the lower Mekong countries is built responding to the world price of rice. The integrated model is named REMEW-MEKONG.

REMEW-LAO and REMEW-CAM are the first supply and demand models of rice in Laos and Cambodia, and these models are extended to stochastic models. The historical fluctuation of water supply is first simulated and then will be increased as a result of global warming. The analyses using stochastic model are necessary for the evaluation of water cycle changes where moments of water distribution beyond the mean may be quite important. Chapter 7 describes the methodology of the stochastic analysis, structure of the model, and results of the simulations.

The budget for model development comes from the project “Assessment of the Impact of Global-Scale Change in Water Cycles on Food Production and Alternative Policy Scenarios” funded by the Agriculture, Forestry, and Fisheries Research Council Secretariat, the Ministry of Agriculture, Forestry, and Fisheries (MAFF). The implementation period of the MAFF project was form 2003 to 2007. In addition to the MAFF project, a project in JIRCAS named “Analysis of impacts of water supply changes in Indochina region” encouraged the development of the models.

Dr. Kageyama and Dr. Jin developed REMEW-THAI and Dr. Meyer developed REMEW-VIET and stochastic model of REMEW-LAO. The reminder of the models are developed by Dr. Furuya. He has responsibility for results of simulations of all models. The procedure of the stochastic analyses is developed at the Food and Agricultural Policy Research Institute at University of Missouri (MU-FAPRI), and Dr. Meyer taught it to other members who developed these four models. The analyses using these models are shown in Furuya and Meyer (2006), Furuya and Meyer (2008), and Furuya *et al* (2008).

Ms. Nagaki and Ms. Ohta who are JIRCAS staff members entered data for yield, planted area, harvested area, and production of rice for each province in the

four countries. The data were obtained by visiting agricultural statistics offices in each of the four countries in 2004, and some data were added later.

The data related to rice production in Laos were provided by the Department of Planning, the Ministry of Agriculture and Forestry of the Lao PDR. Mr. Takashima, who was an expert of the Japan International Cooperation Agency (JICA) for agricultural policy, and Mr. Sakudo, an assistant resident representative of Laos JICA office, assisted in gathering the information about agricultural policies in Laos. Furthermore, librarians and officers of the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO), and the United Nations World Food Programme (WFP) in Vientiane provided us historical data for rice production and marketing.

The data related to rice production in Cambodia were provided by the Department of Planning, Statistics and International Cooperation, Ministry of Agriculture, Forestry, and Fisheries in Cambodia. Furthermore, the Department of Meteolology, the Ministry of Water Resources and Meteorology in Cambodia provided the climate data for the main provinces in Cambodia. Mr. Takeichi, who was a project formation advisor of JICA Cambodia Office, provided us information about ongoing projects and introduced the authoros to officers of JICA in Laos and Vietnam.

The data related to rice production in Thailand were provided by the Center for Agricultural Information, Office of Agricultural Economics of Thailand. The data were in electronic format and Mr. Kawasaki, Mr. Jinguji, and Mr. Yokobori, who were statistical experts at JICA, assisted in obtaining the data. Furthermore, Mr. Konuma, a dupty regional representative of FAO Regional Office for Asia and the Pacific, provided us general information about the four countries.

The data related to rice production in Vietnam were from statistics of the General Statistics Office of Vietnam. Mr. Nakasone, who was a deputy resident representative of the JICA Vietnam office, and Mr. Naito, who was a JICA expert on irrigation and rural infrastructure, provided information related to rice production and policies in Vietnam. Furthermore, librarians at UNDP, FAO, and the World Bank at Hanoi assisted in obtaining historical data on rice production and previous analyses of rice policy in Vietnam.

Farm surveys were conducted in Savannakhet province of Laos in 2005 and 2006 and in Takeo province of Cambodia in 2007. The purpose of these farm surveys was to collect data on rice production costs from producers. It is these data which are used to evaluate impacts of water supply changes on individual or average farms. The analyses of the survey are ongoing and the complete results are not included in this working report; however, the information about rice cultivation obtained by the farm survey are used in the analytical part of each chapter.

Dr. Bouahom, Director General of the National Agriculture and Forestry Research Institute (NAFRI) of the Ministry of Agriculture and Forestry of LaoPDR assisted the farm surveys in Laos. The farm surveys in Laos were conducted by Dr. Furuya along with Mr. Sayxomephou, an assistant researcher of NAFRI, Mr. Malaikham, officer of Champong district in Savannakhet province, and Mr. Phomphakdy, an interpreter and guide.

Assistance in the conducting of farm surveys in Cambodia was provided by Dr. Sarom, Director General of the Cambodian Agricultural Research and Development Institute (CARDI), and Dr. Vang, Director of CARDI. Furthermore, Mr. Tsukamoto, Mr. Moriyama, and Mr. Araki, who are chief advisors at JICA provided information about ongoing JICA projects in Cambodia. The farm surveys were conducted by Dr. Sothea, who was a researcher of JIRCAS and is currently a staff of the Mekong River Commission (MRC), and Dr. Furuya with Mr. Veasna, a researcher at CARDI, Mr. Sok, an officer of Takeo province, and Mr. Heam, an interpreter and guide.
Without their assistance, our models which are described in this working report would not have been possible. The authors of this working report hope that our models contribute to economic progress for the people in Laos, Cambodia, Thailand ,and Vietnam.

Chapter 1
Introduction

Water is an indispensable input for agricultural production and the supply is highly influenced by hydrological cycle changes. The hydrological cycle is the water movement among atmosphere, land surface, subsurface, and the ocean, and it is summarized as follows: first, precipitation is formed in the condensation process of water vapor and it falls reaching the ocean and land surfaces. Second, precipitation brings about moistness, infiltration, storage, and flowage on the land surface depending on soil conditions. The surface water evaporates, and the water,which is absorbed by roots of plants, is traspirated through stomas. The residual water pools or flows out and reaches the ocean through rivers and estuaries. Evaporated water from the ocean surface becomes water vapor in the atmosphere. This is a repeating hydrological cycle and the scale for analysis is selected from the city, river basin, province, nation, and the globe depending on the purpose of the research.

Climatic changes caused by global warming leads to the activation of the water cycle and are anticipated to expand water supply fluctuations. Clearing problems caused by changes of water accounting, researchers of hydrology and climatology have analyzed changes in the global water cycle. The changes will affect the supply and demand of crops, therefore, econometric analyses related to the cycle changes are important to aid the design of agricultural policies and plans.

There are two approaches for production or economic analyses of water supply changes; i.e., production and yield function approaches. The production function approach uses a production function per area and it includes a water variable. Hexem and Heady (1978) obtained optimum water and fertilizer input quantity by estimating production functions, which are specified as quadratic forms, for maize, wheat, and other crops. On the other hand, the yield function approach uses a crop physiological model and optimum water allocations are obtained. The water stress model such as the models of Dinar and Letey (1996) and the dry matter production model such as the model of Horie *et al.* (1997) take the yield function approach. These yield functions can then be used in supply and demand models to determine production.

The "production function approach" directly estimates a production function which represents technological relationships among inputs and outputs. On the other hand, the "yield function approach" indirectly estimates a supply function of which water is a fixed factor. The relationship between the two approaches corresponds to the relationship between a production function and a profit function which are linked through dual approach in micro economic theory.

It is assumed that there are supply response functions for crops in supply and demand models, and these functions are divided into planted area functions which respond to the farm price and yield functions which respond to a technological progress. This study introduces water variables in yield and area functions, then, supply responses of rice to water supply changes are analyzed. Hexem and Heady (1978) and Hazlewood and Livingstone (1982) analyzed supply and demand of water using actual irrigation water, however, obtaining data for irrigation water flow or stock is difficult in a large area. Thus, evapotranspiration (ET), which is approximated from climatic data and the summation of transpiration from crops and evaporation from the surface, is used as a water variable in yield and planted area functions in the supply and demand models which are developed in this study.

Many water stress models are based on the following function in relation to a relative decrease of yield and shortage of ET; $(1 - Ya/Ym) = ky(1 - ETa/ETm)$ where Ya is the actual yield, Ym is the yield under optimal growth environment, ETa is the actual ET, ETm is the ET which coincides with the water demand of a crop, and ky is the yield response factor. IMPACT-WATER, which is a world food model including a water accounting sector and developed by Rosegrant, Cai, and Cline (2002), introduces the ET ratio into intercepts of yield and area functions, and if there is water stress, yield and area will be negatively affected. This type of model is effective for upland crops; however, in the case of rice which is cultivated in wet land, the differences between ETa and ETm are quite small. In addition to the condition of the paddy field, a yield response factor including regional differences, in the form of regional monthly actual ET (ETa), is used as a key water variable in our model.

Farmers, who are in developing countries where the share of irrigated fields is low, are at risk of severe damage by global hydrological changes. Simulation results of the supply and demand model considering water cycle changes for each region will provide important information for the formation of policies to offset or mitigate the negative consequences of climate changes. Given these conditions, the developing countries of Southeast Asia are the target subjects for this study.

Climate conditions of the four countries of Southeast Asia are investigated in the following section. Figure 1-1 through Figure 1-4 show national averages from 1961 to 1990 of temperature, rainfall, and solar radiation for Laos, Cambodia, Thailand, and Vietnam. Laos, Thailand, and southern Vietnam belong to the Savanna climate and Cambodia and northern Vietnam belong to the Tropical monsoon climate.

There are two seasons in the four countries, the wet season from May to Ocober and the dry season from November to April. The annual rainfalls of the countries range from 1700mm to 2000mm, and the rainiest month is August and the driest month is January. Alternatively, the profiles of temperature are quite different in the four countries. The difference of maximum and minimum temperature in Cambodia is 4.1 degrees Celsius; however, those in Laos and Vietnam are 7.2 degrees Celsius. The low temperatures in the later two countries sometimes lead to crop damage from cold weather.

Next, trends and variations of ET, which represent the water supply for crops, for each region of the countries are investigated. Data on ET are the numbers of Ishigooka et al. (2005) and are monthly data. The regressed function is as follows:

$$ET^i = a_0 + b_1T + b_2D_{FEB} + \dots + b_{12}D_{DEC} \quad (1\text{-}1)$$

where ET^i is the ET of i^{th} region, T is the time trend, D_{FEB} through D_{DEC} are monthly dummies. The function (1-1) is estimated for two terms; January 1981 through December 1990 and January 1991 through December 2000. Table 1-1 shows parameters of the time trend and coefficients of variation of the estimates. Positive parameters of the time trend are significant and those of later period are greater than those of former period for all regions. On the other hand, the variances are increasing for almost all regions.

It is anticipated that floods and droughts will occur with greater frequency in the lower Mekong basin as a result of global warming. Arora and Boer (2001) report that the rainfall from 2070 to 2100 will decrease 16.4% from current levels due to global warming, and the rate of decline is anticipated to be the highest in large river basins. Furthermore, they also show that the probability of flooding will increase during the simulation period.

Impacts of hydrological cycle changes on rice productions in various ecosystems, such as lowland,

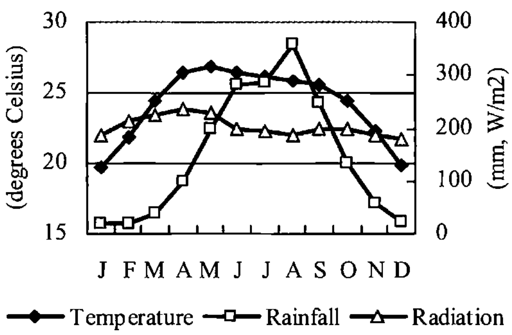

Fig. 1-1. Temperature, rainfall, radiation in Laos

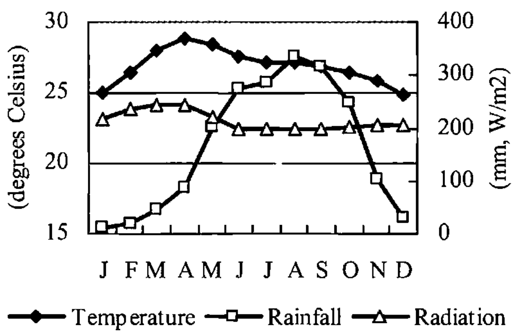

Fig. 1-2. Temperature, rainfall, radiation in Cambodia

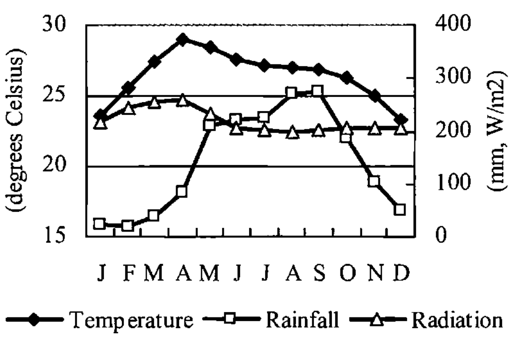

Fig. 1-3. Temperature, rainfall, radiation in Thailand

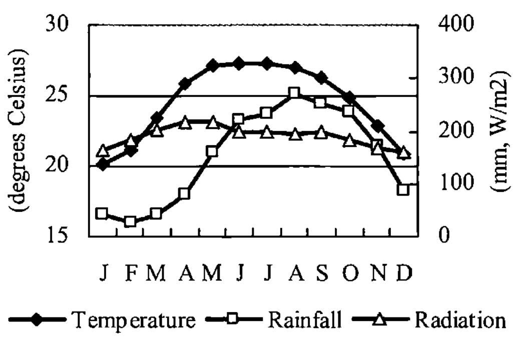

Fig. 1-4. Temperature, rainfall, radiation in Vietnam

Table 1-1 Parameter of time trend and coefficient of variation

Country	Region	Trend		CV	
		81-90	91-00	81-90	91-00
Laos	North	-0.003	0.054	12.54	14.80
Laos	Central	0.011	0.099	12.65	16.11
Laos	South	0.017	0.087	13.53	12.25
Cambodia	Plain	0.024	0.066	8.01	10.71
Cambodia	Tonle Sup Lake	0.056	0.063	11.58	11.74
Cambodia	Coastal	0.041	0.077	15.79	17.20
Cambodia	Plateau&Mountain	0.023	0.068	9.27	9.56
Thailand	Central	0.024	0.094	14.27	14.65
Thailand	North	0.035	0.071	12.41	16.18
Thailand	North East	0.025	0.085	11.51	13.76
Thailand	South	-0.004	0.046	14.68	17.20
Vietnam	Red River Delta	0.025	0.045	10.15	13.35
Vietnam	North East	0.002	0.031	11.69	14.04
Vietnam	North West	-0.006	0.048	12.44	14.93
Vietnam	North Central Coast	0.019	0.109	12.72	14.52
Vietnam	South Central Coast	0.018	0.062	9.86	10.02
Vietnam	Central Highlands	0.010	0.044	10.07	9.66
Vietnam	South East	-0.011	0.068	6.98	8.32
Vietnam	Mekong River Delta	0.013	0.048	8.74	11.28

CV: Coefficient of variation for estimates

irrigated field, upland, recessional fields, and deep water region, are quite different in lower Mekong countries. The share of planted area of lowland or wet season rice is about 66% of the total planted area of rice in these countries and the rain-fed cultivation is sometimes damaged by drought and inundation. Furthermore, there are some cases when rice cultivation in the dry season is impossible due to delayed wet season cultivation. Therefore, an analysis of how hydrological cycle changes will affect agricultural productions in each region is important to aid in the formation of counteracting policy measures in these countries.

This study tries to clarify impacts of water supply changes on producers and consumers of rice using a supply and demand model of rice considering hydrological cycle changes to aid in making agricultural policies and plans. The developed model is extended to a stochastic model and fluctuations of water supplies are analyzed.

Chapter 2
Development of the Rice Econometric Model with Endogenous Water in Lao PDR (REMEW-LAO)

2-1. Introduction

Laos is a rice producing country in Southeast Asia where 64% of total food supply came from the staple crop in 2003. However, seasonal production is highly variable due to the low share of irrigated fields, i.e., about 10% in 2004. Laos covers 236,800 square kilometers and had a population of only 5.87 million in 2007, so the country is relatively land abundant. However, upland areas in Laos are experiencing population growth pressure and the productivity of shifting cultivation is declining. Stable water supply for wet season and upland rice cultivation is necessary for food security and farm management stabilization. The evaluation of water supply changes on rice yields and the resulting market responses from fluctuations in production are an essential theme of agricultural development in Laos. This chapter describes the supply and demand of rice in Laos, which is named Rice Econometric Model Edogenous Water in Lao (REMEW-LAO), focusing on the impacts of fluctuations of water supply on rice production.

2-2. SEDP and policies related to rice production

Following three-year socio-economic development plan from 1978 to 1980, 1st five-year socio-economic development plan (SEDP) was put into action in 1981. Under the economic plan, farmers' incomes were reduced by the following three policies; (1) High inflation rate. The inflation rate was over 50%. The inflation led to an increase in the real exchange rate and it was hard to export agricultural products. (2) High trade protectionism. Terms of trade of agricultural products got weaker against industrial products due to the high tariff rates and import quota placed on agricultural products. (3) Low government procurement price. The government price of rice and coffee were significantly lower than the prices in the black market.

The Lao government introduced the New Economic Mechanism (NEM; *Rabop Mai*) on the issue in the first SEDP. The NEM was one part of the liberalization policy of culture, politics, and economy (New Thinking; *Chintanakan mai*) modeled after Perestroika. The main policies are as follows; (1) introduction of a self-support accounting system for national and public cooporations, (2) abolishment of the government procurement price of rice, (3) abolishment of the multiple exchange rate system, (4) liberalization of entry of private companies in production and marketing sectors, (5) streamlining of finance sector, (6) centralization of power for management of national assets and budget implementation, (7) trade liberalization except mineral products and timber.

In the agricultural sector, the government attempted to shrink the difference between the government price and the market price in 1984 and the government marketing board and distribution system of the government were abolished in 1987. Furthermore, the land tax rate was changed from a uniform rate to a variable rate depending on yields of agricultural products.

A committee consisted of Ministers and representatives of the party decided to make the transition from a strictly socialist economic system to one which includes faces of a market economy and to reform the land owner system in 1988. The reform guarantees farmers longterm use, alienation, and inheritance of land. Thus, farmers have defacto land ownership under state regulations. The independence of each farmer put an end to the favorable terms for cooperatives and state-owned farms. Participation in cooperatives became voluntary and the state-own farms were partly privatized.

The NEM reformed macro economic conditions and trade policies as follows; (1) sharp devaluation of the currency (kip) in September 1987 and abolishment of the multiple exchange rate system in July 1988, (2) moving the central bank interest closer to that of real rate, (3) abatement of printing money. These economic reforms and changes in agricultural policies increased the terms of trade by 40% from 1985 to 1989.

The 6th five-year SEDP is now in operation. The world economy is recovering and official development assistance (ODA) and foreign direct investment (FDI) are increasing. However, the high oil price had led to further hardship among the low income population. Following the situation, the SEDP set the following directions: (1) producing high value added goods, (2) increasing competitiveness and exploiting comparative advantages under the frameworks of ASEAN and WTO, (3) strengthen the linkage between economic development and social development such as poverty reduction, (4) advancing a market economy under the socialism system.

The government also has outlined a strategic vision from 2000 to 2020. The main target is to increase per capita GDP and it will reach up to US$885 and stepping out the category of least developing country. The main targets of agricultural sector are as follows; (1) increasing the self-sufficiency rate of food and confirmation for food security, (2) export promotion of commercial agricultural products, (3) stabilizing slash-and-burn agriculture.

In the strategic vision, agricultural land is divided into the Mekong river basin advanced market economy and the sloping region with a more closed economy. In the Mekong river basin, diversification and intensification of agriculture will be advanced and high value-added products will be promoted. In the sloping region, slush-and-burn methods are to be traded for fixed agriculture systems to increase the stability of producer livelihoods, increase of productivity, improve the socio-economic conditions, and protection of natural resources will be accomplished.

Organizations related to irrigation are important for this study. There are two types organizations. The Water Use Association (WUA) is a formal famers' association, and it manages irrigation plans and maintains irrigation facilities. Furthermore, the association purchases materials, provides finance, and works in marketing. Public assets such as pump, head works, canals, and constructions were devolved from the government.

The Water Use Group (WUG) is organized in locations where irrigation project supported by the Department of Irrigation (DOI) and Provincial Agriculture and Forestry Service (PAFS) exists. Irrigation facilities are maintained and managed by farmers' group while facility ownership is maintained by the government.

Distribution of rice and meats was restricted before 2002 and prices were controlled by the government. Previously, certificates issued by the local government were necessary for movements of these products. Now, there are no restrictions of the distributions.

Crop selection had been restricted and farmers had to follow instructions of the provincial government such as requiring farmers to cultivate rice in irrigated fields. The restriction on crop selection was also abolished in 2002.

2-3. Model

A supply and demand model for rice which includes a water supply variable affecting regional yields is developed. Planted area, yield, and production for each province, areas of province close to a small river basin, can be analyzed with the model.

The supply and demand model for rice in Laos consists of yield functions, planted area functions, production identities, supply identities, a consumption function, an import function, and a price linkage function. The yield and area functions for wet season are estimated for all provinces and monthly evapotranspiration (ET) is used as an explanatory variable which is a proxy for available water supplies. The generalized forms of these functions are as follows:

Yield function of wet season rice:

$$YL^i = f_{YL}\,(T, ET_{MAY}{}^i, \ldots, ET_{NOV}{}^i), \qquad (2\text{-}1)$$

Area function of wet season rice:

$$AL^i{}_t = f_{AL}\,(AL^i{}_{t-1}, FP_{t-1}, ET_{MAY}{}^i{}_{t-1}, \ldots, ET_{NOV}{}^i{}_{t-1}), \qquad (2\text{-}2)$$

Production of wet season rice:

$$QL^i = YL^i AL^i\,,\ QL = \Sigma_i YL^i AL^i \qquad (2\text{-}3)$$

Yield function of dry season rice:

$$YI^i = f_{YI}\,(T, ET_{NOV}{}^i{}_{t-1}, \ldots, ET_{MAY}{}^i{}_t), \qquad (2\text{-}4)$$

Area function of dry season rice:

$$AI^i{}_t = f_{AI}\,(AI^i{}_{t-1}, FP_{t-1}, ET_{NOV}{}^i{}_{t-2}, \ldots, ET_{MAY}{}^i{}_{t-1}), \qquad (2\text{-}5)$$

Production of dry season rice:

$$QI^i = YIiAIi\,,\ QI = \Sigma_i YI^i AI^i \qquad (2\text{-}6)$$

Yield function of upland rice:

$$YU^i = f_{YU}\,(T, ET_{MAY}{}^i, \ldots, ET_{NOV}{}^i), \qquad (2\text{-}7)$$

Area function of upland rice:

$$AU^i{}_t = f_{AU}\,(AU^i{}_{t-1}, FP_{t-1}, ET_{MAY}{}^i{}_{t-1},\ , ET_{NOV}{}^i{}_{t-1}), \qquad (2\text{-}8)$$

Production of upland rice:

$$QU^i = YU^i AU^i\,,\ QU = \Sigma_i YU^i AU^i \qquad (2\text{-}9)$$

Total production:

$$Q = QL + QI + QU, \qquad (2\text{-}10)$$

Total supply:

$$QS = Q + IMP - STC, \qquad (2\text{-}11)$$

Demand function:

$$QS/POP = f_{QS}\,(RP, GDP/POP), \qquad (2\text{-}12)$$

Imports function:

$$IMP = f_{IMP}\,(WP \cdot EXR, Q), \qquad (2\text{-}13)$$

Price linkage function:

$$FP = f_{FP}\,(RP), \qquad (2\text{-}14)$$

where T is time trend, ET_May through ET_Nov are evapotranspiration values for May through November, YL, AL, and QL are yield, planted area, and production of wet season rice, i is the number of provinces, YI, AI, and QI are yield, planted area, and production of dry season rice, YU, AU, and QU are yield, planted area, and production of upland rice, Q is total production, IMP is imports, STC is the annual change in stocks, POP is population, GDP is gross domestic products, WP is the world price of rice (Thailand, 5% broken, FOB), EXR is the exchange rate, FP is the producer price of rice, and RP is the retail price of rice. All are specified as linear functions.

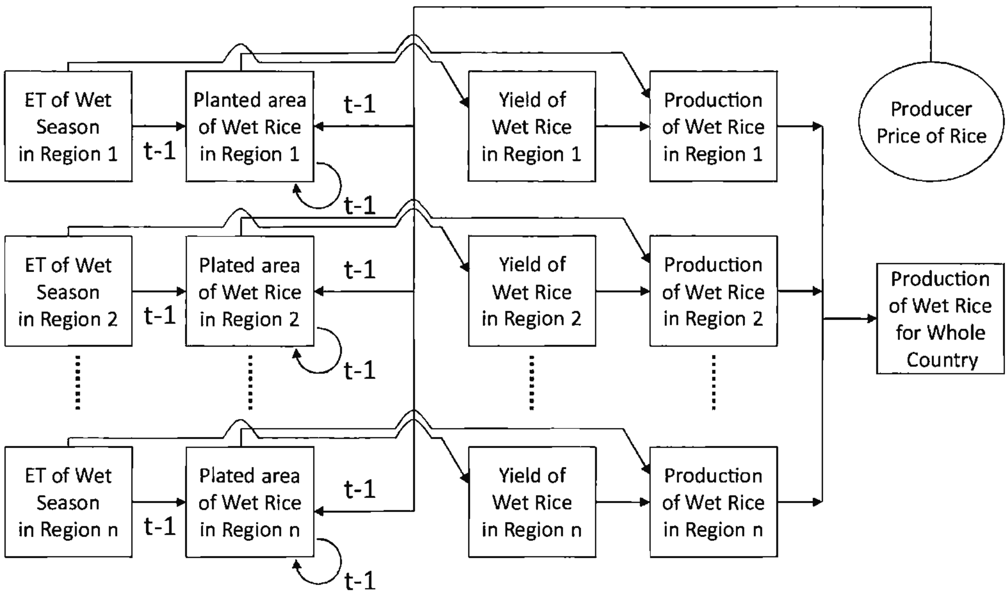

Fig. 2-1. Flowchart of wet season rice production sector

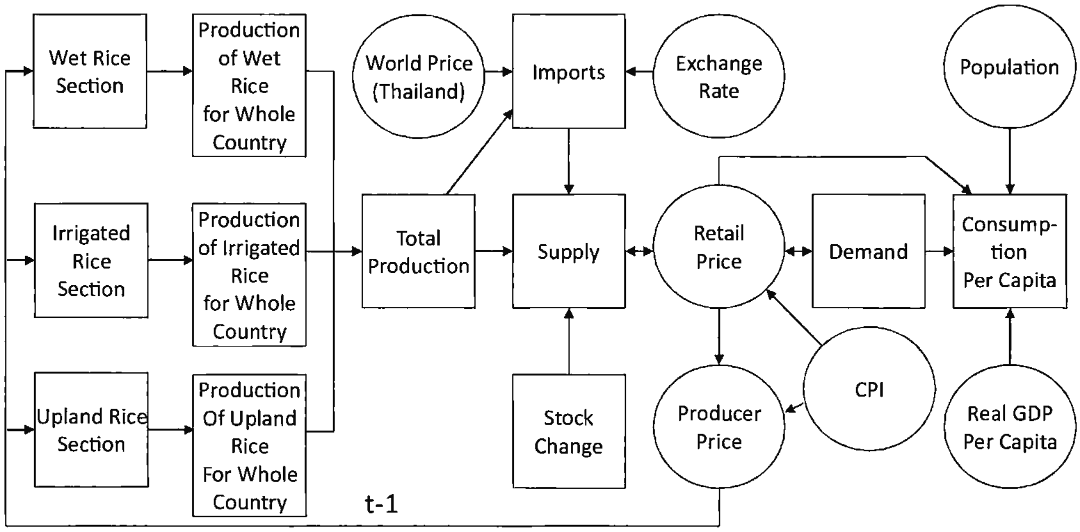

Fig. 2-2. Flowchart of supply and demand sector

Figure 2-1 and Figure 2-2 represent models for the wet season rice production sector and the overall supply and demand sector respectively. The model structures for irrigated and upland rice production sectors are same as those of the wet season rice production sector.

2-4. Data

The time series data for production and planted area for each province was provided by the Department of Planning in the Ministry of Agriculture and Forestry of Laos. The farm price for rice was obtained from FAO-STAT and the retail price of rice was obtained from the National Statistics Center of the Committee for Planning and Cooperation of Laos. The prices used represent a national average price for Laos. CPI, GDP, and population are from the Asian Development Bank and the exchange rate and the world price of rice are data from the IMF. The estimation period for functions (1) through (14) is from 1980 to 2000 which starts in the earliest available year for CPI and ends in the last year of available ET values. The estimation period includes the turning point of the Laotian economy because the trend of rice production in the statistics showed that the shock of the economic liberalization on the rice production was small.

The historical ET values are calculated by Ishigooka et al., 2005 and the calculation method is based on the Penman-Monteith equation (Allen et al., 1998). The climatic data for the calculation are 0.5 degree grid data and these are averaged for each province.

2-5. Estimation results of all functions

There are 17 provinces in Lao, and yield and planted area functions of wet season rice are estimated for all provinces.

Irrigated area is a small share of the total rice area in Laos, therefore, yield and area functions are estimated for only two provinces, Vientiane municipality and Savannakhet province. Yield and area of the other provinces are averaged and aggregated to the north region, central region excluding the two provinces, and south region.

These functions of upland rice are estimated for 15 provinces. There are no data of upland rice for Vientiane municiparity and Champasak province.

The estimated method is ordinary least square method (OLS) and time trends and some dummy variables are used for extreme climate or economic events.

2-5-1. Yield functions

2-5-1-1. Yield function of wet season rice (lowland rice)

2-5-1-1-1. Yield Function of Lowland Rice in Vientiane Mun.

YLH01=	+ 1.41350	
	(0.64)	
	+ 0.15216*TREND	
	(12.71)	
	- 0.09906*T90	
	(-5.28)	
	+ 0.76697*ET01MAY	
	(3.54)	[0.599]
	- 1.67357*ET01OCT	
	(-3.86)	[-1.223]
	+ 0.94395*ET01NOV	
	(3.16)	[0.648]

$AdjR^2$=0.9504 D.W.=1.728

YLH01	Yield of Lowland Rice in Vientiane Mun.
TREND	Time Trend from 1980 to 2000
T90	Time Trend from 1990 to 2000, 0 otherwise
ET01MAY	Evapotranspiration of May in Vientiane Mun.
ET01OCT	Evapotranspiration of October in Vientiane Mun.
ET01NOV	Evapotranspiration of November in Vientiane Mun.

2-5-1-1-2. Yield Function of Lowland Rice in Phongsaly

YLH02=	+ 2.38594	
	(1.19)	
	+ 0.14034*TREND	
	(26.60)	
	- 0.11489*T93	
	(-10.06)	
	+ 0.28520*ET02MAY	
	(3.05)	[0.221]
	+ 0.66032*ET02JUN	
	(3.12)	[0.510]
	- 0.55528*ET02JLY	
	(-2.14)	[-0.424]
	- 0.66466*ET02OCT	
	(-3.32)	[-0.502]
	+ 0.43447*D845	
	(8.60)	
	- 0.92268*D93	
	(-10.66)	
	- 0.70954*D956	
	(-13.33)	

$AdjR^2$=0.9876 D.W.=2.505

YLH02	Yield of Lowland Rice in Phongsaly
TREND	Time Trend from 1980 to 2000
T93	Time Trend from 1993 to 2000, 0 otherwise
ET02MAY	Evapotranspiration of May in Phongsaly
ET02JUN	Evapotranspiration of June in Phongsaly
ET02JLY	Evapotranspiration of July in Phongsaly
ET02OCT	Evapotranspiration of October in Phongsaly
D845	Dummy Variable, 1 in 1984 to 1985, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D956	Dummy Variable, 1 in 1995 to 1996, 0 otherwise

2-5-1-1-3. Yield Function of Lowland Rice in Luangnamtha

YLH03=	+ 5.66198	
	(3.56)	
	+ 0.21550*TREND	
	(12.31)	
	- 0.22559*T90	
	(-7.92)	
	- 0.70205*ET03MAR	
	(-3.95)	[-0.392]
	+ 0.33729*ET03APR	
	(2.30)	[0.204]
	- 0.72535*ET03MAY	
	(-2.29)	[-0.503]
	- 1.22712*D91	
	(-6.22)	

$AdjR^2$=0.9276 D.W.=2.366

YLH03	Yield of Lowland Rice in Luangnamtha
TREND	Time Trend from 1980 to 2000
T90	Time Trend from 1990 to 2000, 0 otherwise
ET03MAR	Evapotranspiration of March in Luangnamtha
ET03APR	Evapotranspiration of April in Luangnamtha
ET03MAY	Evapotranspiration of May in Luangnamtha
D91	Dummy Variable, 1 in 1991, 0 otherwise

2-5-1-1-4. Yield Function of Lowland Rice in Oudomxay

YLH04= - 7.63351
(-3.04)
+ 0.22887*TREND
(25.53)
- 0.24624*T90
(-17.80)
- 0.38784*ET04AUG
(-2.12) [-0.254]
+ 1.33188*ET04SEP
(2.87) [0.886]
+ 1.04487*ET04OCT
(3.41) [0.690]
- 0.46867*D924
(-7.80)
$AdjR^2$=0.9828 D.W.=1.822

YLH04	Yield of Lowland Rice in Oudomxay
TREND	Time Trend from 1980 to 2000
T90	Time Trend from 1990 to 2000, 0 otherwise
ET04AUG	Evapotranspiration of August in Oudomxay
ET04SEP	Evapotranspiration of September in Oudomxay
ET04OCT	Evapotranspiration of October in Oudomxay
D924	Dummy Variable, 1 in 1992 to 1994, 0 otherwise

2-5-1-1-5. Yield Function of Lowland Rice in Bokea

YLH05= + 0.11707
(14.52)
+ 0.73508*ET05MAY
(2.18) [0.499]
- 1.52907*ET05JUN
(-3.33) [-1.023]
+ 2.80079*ET05JLY
(3.47) [1.837]
+ 1.41703*ET05AUG
(3.53) [0.934]
- 0.87729*D92
(-3.47)
- 1.26539*SHIFT00
(-5.61)
$AdjR^2$=1.822 D.W.=2.155

YLH05	Yield of Lowland Rice in Bokea
ET05MAY	Evapotranspiration of May in Bokea
ET05JUN	Evapotranspiration of June in Bokea
ET05JLY	Evapotranspiration of July in Bokea
ET05AUG	Evapotranspiration of August in Bokea
D92	Dummy Variable, 1 in 1992, 0 otherwise
SHIFT00	Dummy Variable, 1 after 2000, 0 otherwise

2-5-1-1-6. Yield Function of Lowland Rice in Luangprabang

YLH06= - 6.55499
(-2.15)
+ 0.24501*TREND
(9.63)
- 0.20084*T86
(-6.67)
+ 0.33312*ET06ARP
(3.89) [0.221]
+ 1.40548*ET06SEP
(2.07) [1.024]
$AdjR^2$=0.9375 D.W.=2.394

YLH06	Yield of Lowland Rice in Luangprabang
TREND	Time Trend from 1980 to 2000
T86	Time Trend from 1986 to 2000, 0 otherwise
ET06ARP	Evapotranspiration of April in Luangprabang
ET06SEP	Evapotranspiration of September in Luangprabang

2-5-1-1-7. Yield Function of Lowland Rice in Huaphanh

YLH07= + 9.51059
(2.39)
+ 0.61266*TREND
(8.26)
- 0.55814*T84
(-6.95)
+ 0.79665*ET08MAY
(2.63) [0.564]
- 2.82517*ET08JLY
(-3.35) [1.992]
+ 0.62473*D89
(2.76)
$AdjR^2$=0.9226 D.W.=2.075

YLH07	Yield of Lowland Rice in Huaphanh
TREND	Time Trend from 1980 to 2000
T84	Time Trend from 1984 to 2000
ET07MAY	Evapotranspiration of May in Huaphanh
ET07JLY	Evapotranspiration of July in Huaphanh
D89	Dummy Variable, 1 in 1989, 0 otherwise

2-5-1-1-8. Yield Function of Lowland Rice in Xayabury

YLH08= - 31.07729
(-4.61)
+ 0.07559*TREND
(9.03)
- 0.41746*ET08MAR
(-2.56) [-0.230]
+ 1.23084*ET08JUN
(2.43) [0.880]
+ 2.00308*ET08SEP
(2.10) [1.411]
+ 4.74911*ET08NOV
(5.09) [3.221]
$AdjR^2$=0.8762 D.W.=2.622

YLH08	Yield of Lowland Rice in Xayabury
TREND	Time Trend from 1980 to 2000
ET08MAR	Evapotranspiration of March in Xayabury
ET08JUN	Evapotranspiration of June in Xayabury
ET08SEP	Evapotranspiration of September in Xayabury
ET08NOV	Evapotranspiration of November in Xayabury

2-5-1-1-9. Yield Function of Lowland Rice in Xiengkhuang

YLH09= + 4.37166
(1.16)
+ 0.38932*TREND
(7.41)
- 0.33745*T84
(-6.09)
+ 1.22831*ET09MAR
(4.86) [0.741]
- 1.94472*ET09JUN
(-3.80) [-1.438]
+ 1.32462*ET09SEP
(2.13) [0.982]
- 1.42360*ET09OCT
(-2.83) [-1.064]
AdjR^2=0.9121 D.W.=2.473

YLH09 Yield of Lowland Rice in Xiengkhuang
TREND Time Trend from 1980 to 2000
T84 Time Trend from 1984 to 2000, 0 otherwise
ET09MAR Evapotranspiration of March in Xiengkhuang
ET09JUN Evapotranspiration of June in Xiengkhuang
ET09SEP Evapotranspiration of September in Xiengkhuang
ET09OTC Evapotranspiration of October in Xiengkhuang

2-5-1-1-10. Yield Function of Lowland Rice in Vientiane

YLH10= + 0.12911
(0.03)
+ 0.43839*TREND
(8.24)
- 0.38372*T84
(-6.85)
+ 1.48876*ET10MAY
(5.80) [0.984]
- 2.21065*ET10JUN
(-4.56) [-1.435]
+ 2.08830*ET10SEP
(3.41) [1.355]
- 1.19108*ET10OCT
(-2.28) [-0.781]
- 0.53829*SHIFT00
(-2.99)
AdjR^2=0.9205 D.W.=1.824

YLH10 Yield of Lowland Rice in Vientiane
TREND Time Trend from 1980 to 2000
T84 Time Trend from 1984 to 2000, 0 otherwise
ET10MAY Evapotranspiration of May in Vientiane
ET10JUN Evapotranspiration of Junc in Vientiane
ET10SEP Evapotranspiration of September in Vientiane
ET10OCT Evapotranspiration of October in Vientiane
SHIFT00 Dummy Variable, 1 after 2000, 0 otherwise

2-5-1-1-11. Yield Function of Lowland Rice in Borikhamxay

YLH11= - 4.10774
(-1.64)
+ 0.49191*TREND
(2.46)
- 0.40897*T82
(-2.02)
- 0.29632*ET11MAR
(-2.68) [-0.228]
+ 0.39164*ET11APR
(4.58) [0.328]
- 1.43455*ET11JUN
(-2.68) [-1.343]
+ 1.24675*ET11JLY
(2.01) [1.167]
+ 1.10256*ET11AUG
(3.08) [1.017]
- 0.50009*D93
(-3.29)
AdjR^2=0.9394 D.W.=1.862

YLH11 Yield of Lowland Rice in Borikhamxay
TREND Time Trend from 1980 to 2000
T82 Time Trend from 1982 to 2000, 0 otherwise
ET11MAR Evapotranspiration of March in Borikhamxay
ET11APR Evapotranspiration of April in Borikhamxay
ET11JUN Evapotranspiration of June in Borikhamxay
ET11JLY Evapotranspiration of July in Borikhamxay
ET11AUG Evapotranspiration of August in Borikhamxay
D93 Dummy Variable, 1 in 1993, 0 otherwise

2-5-1-1-12. Yield Function of Lowland Rice in Khammuane

YLH12= + 14.51833
(3.66)
+ 0.50015*TREND
(6.09)
- 0.45942*T84
(-5.32)
- 0.40583*ET12MAR
(-2.81) [-0.271]
+ 1.02754*ET12MAY
(5.45) [0.851]
- 2.37920*ET12JUN
(-4.47) [-1.974]
- 1.41696*ET12OCT
(-2.19) [-1.207]
- 1.51262*D88
(-5.99)
- 0.79501*D93
(-3.76)
AdjR^2=0.8804 D.W.=2.593

YLH12 Yield of Lowland Rice in Khammuane
TREND Time Trend from 1980 to 2000
T84 Time Trend from 1984 to 2000, 0 otherwise
ET12MAR Evapotranspiration of March in Khammuane
ET12MAY Evapotranspiration of May in Khammuane
ET12JUN Evapotranspiration of June in Khammuane
ET12OCT Evapotranspiration of October in Khammuane
D88 Dummy Variable, 1 in 1988, 0 otherwise
D93 Dummy Variable, 1 in 1993, 0 otherwise

2-5-1-1-13. Yield Function of Lowland Rice in Savannakhet

YLH13= + 4.27109
(1.88)
+ 0.35008*TREND
(5.94)
- 0.30109*T84
(-4.66)
+ 0.76054*ET13MAY
(3.56) [0.573]
- 1.45541*ET13JLY
(-2.77) [-1.118]
- 1.71606*D88
(-9.70)
- 0.46290*D93
(-2.79)
$AdjR^2$= 0.9437 D.W.=2.052

YLH13	Yield of Lowland Rice in Savannakhet
TREND	Time Trend from 1980 to 2000
T84	Time Trend from 1984 to 2000, 0 otherwise
ET13MAY	Evapotranspiration of May in Savannakhet
ET13JLY	Evapotranspiration of July in Savannakhet
D88	Dummy Variable, 1 in 1988, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise

2-5-1-1-14. Yield Function of Lowland Rice in Saravane

YLH14= + 18.84528
(4.34)]
+ 0.51017*TREND
(5.96)
- 0.47213*T84
(-5.09)
- 2.90249*ET14JLY
(-3.70) [-2.202]
- 1.13524*ET14SEP
(-2.15) [-0.850]
- 1.10894*D98
(-4.60)
$AdjR^2$=0.8636 D.W.=1.495

YLH14	Yield of Lowland Rice in Saravane
TREND	Time Trend from 1980 to 2000
T84	Time Trend from 1984 to 2000, 0 otherwise
ET14JLY	Evapotranspiration of July in Saravane
ET14SEP	Evapotranspiration of September in Saravane
D98	Dummy Variable, 1 in 1982, 0 otherwise

2-5-1-1-15. Yield Function of Lowland Rice in Sekong

YLH15= - 6.57882
(-2.06)
+ 0.03889*TREND
(4.17)
+ 0.39730*T9294
(8.73)
+ 0.40307*ET15MAR
(2.76) [0.284]
+ 1.41744*ET15JUN
(2.84) [1.165]
- 1.28748*ET15JLY
(-2.63) [-1.061]
+ 1.21379*ET15AUG
(2.56) [1.004]
+ 1.57427*ET15OCT
(4.53) [1.289]
- 1.43919*ET15NOV
(-3.46) [-1.178]
+ 0.87315*D846
(8.72)
+ 0.75926*SHIFT00
(4.37)
$AdjR^2$=0.958 D.W.=2.585

YLH15	Yield of Lowland Rice in Sekong
TREND	Time Trend from 1980 to 2000
T9294	Time Trend from 1992 to 1994, 0 otherwise
ET15MAR	Evapotranspiration of March in Sekong
ET15JUN	Evapotranspiration of June in Sekong
ET15JLY	Evapotranspiration of July in Sekong
ET15AUG	Evapotranspiration of August in Sekong
ET15OCT	Evapotranspiration of October in Sekong
ET15NOV	Evapotranspiration of November in Sekong
D846	Dummy Variable, 1 in 1984 to 1986, 0 otherwise
SHIFT00	Dummy Variable, 1 after 2000, 0 otherwise

2-5-1-1-16. Yield Function of Lowland Rice in Champasack

YLH16= - 7.46465
(-2.49)
+ 0.02978*TREND
(3.63)
- 0.71741*ET16MAR
(-5.16) [-0.389]
- 1.96447*ET16JUN
(-5.06) [-1.532]
+ 1.46027*ET16SEP
(3.54) [1.129]
+ 3.06727*ET16OCT
(7.06) [2.441]
- 0.66619*D812
(-4.66)
+ 0.58777*D846
(5.65)
+ 0.71947*SHIFT00
(4.14)
$AdjR^2$=0.9199 D.W.=2.768

YLH16	Yield of Lowland Rice in Champasack
TREND	Time Trend from 1980 to 2000
ET16MAR	Evapotranspiration of March in Champasack
ET16JUN	Evapotranspiration of June in Champasack
ET16SEP	Evapotranspiration of September in Champasack
ET16OCT	Evapotranspiration of October in Champasack
D812	Dummy Variable, 1 in 1981 to 1982, 0 otherwise
D846	Dummy Variable, 1 in 1984 to 1986, 0 otherwise
SHIFT00	Dummy Variable, 1 after 2000, 0 otherwise

2-5-1-1-17. Yield Function of Lowland Rice in Attapeu

YLH17= - 3.21988

(-0.90)
+ 0.01754*TREND
(2.29)
- 0.91118*ET17JUN
(-3.10) [-0.725]
+ 1.30282*ET17AUG
(2.68) [1.041]
+ 0.92477*ET17SEP
(3.06) [0.726]
- 0.98006*ET17OCT
(-2.50) [-0.782]
+ 0.93113*ET17NOV
(2.42) [0.745]
- 0.70824*D803
(-6.46)
- 1.17524*D88
(-6.73)
- 0.89641*D98
(-6.39)

AdjR^2=0.922 D.W.=2.521

YLH17	Yield of Lowland Rice in Attapeu
TREND	Time Trend from 1980 to 2000
ET17JUN	Evapotranspiration of June in Attapeu
ET17AUG	Evapotranspiration of August in Attapeu
ET17SEP	Evapotranspiration of September in Attapeu
ET17OCT	Evapotranspiration of October in Attapeu
ET17NOV	Evapotranspiration of November in Attapeu
D803	Dummy Variable, 1 in 1980 to 1983, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-1-2. Yield function of irrigated rice (dry season rice)

2-5-1-2-1. Yield Function of Irrigated Rice in Vientiane Municiparity.

YIH01= + 5.11881
(3.65)
+ 0.12231*T82
(22.78)
- 1.55728*ET01NOV(t-1)
(-3.22) [-0.898]
+ 0.95342*ET01DEC(t-1)
(4.29) [0.488]
+ 0.31563*ET01FEB
(2.75) [0.131]
- 0.23937*ET01MAR
(-2.57) [-0.112]
+ 1.94770*D801
(13.23)
+ 0.27719*D867
(3.02)
+ 0.73267*D90
(4.72)

AdjR^2=0.9914 D.W.=2.414

YIH01	Yield of Irrigated Rice in Vientiane Mun.
T82	Time Trend from 1982 to 2000, 0 otherwise
ET01NOV	Evapotranspiration of November in Vientiane Mun.
ET01DEC	Evapotranspiration of December in Vientiane Mun.
ET01FEB	Evapotranspiration of February in Vientiane Mun.
ET01MAR	Evapotranspiration of March in Vientiane Mun.
D801	Dummy Variable, 1 in 1980 to 1981, 0 otherwise
D867	Dummy Variable, 1 in 1986 to 1987, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise

2-5-1-2-2. Yield Function of Irrigated Rice in Savannakhet

YIH13= - 0.95591
(-1.31)
+ 0.14845*T82
(14.04)
- 0.67468*ET13DEC(t-1)
(3.40) [-0.412]
- 0.85887*D81
(3.02)
- 0.62802*D857
(3.63)

AdjR^2=0.9190 D.W.=1.894

YIH13	Yield of Irrigated Rice in Savannakhet
T82	Time Trend from 1982 to 2000, 0 otherwise
ET13DEC	Evapotranspiration of December in Savannakhet
D81	Dummy Variable, 1 in 1981, 0 otherwise
D857	Dummy Variable, 1 in 1985 to 1987, 0 otherwise

2-5-1-2-3. Yield Function of Irrigated Rice in North Region

YIHN= + 7.66036
(2.43)
+ 0.10050*TREND
(14.01)
- 2.34302*ETNNOV(t-1)
(-2.67) [-1.648]
+ 0.93688*ETNDEC(t-1)
(3.64) [0.619]
+ 0.55173*D98
(2.62)

AdjR^2=0.9276 D.W.=2.541

YIHN	Yield of Irrigated Rice in North Region
TREND	Time Trend from 1980 to 2000
ETNNOV	Evapotranspiration of November in North Region
ETNDEC	Evapotranspiration of December in North Region
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-1-2-4a. Yield Function of Irrigated Rice in Central Region

(including 01 and 13)

YIHC= - 10.94278
(-4.31)
+ 0.13108*TREND
(24.38)
+ 2.78103*ETCNOV(t-1)
(4.26) [1.618]
- 0.72572*ETCDEC(t-1)
(-2.45) [-0.385]
- 0.32143*ETCAPR

(-3.01) [-0.171]
+ 1.07729*ETCMAY
(3.80) [0.647]
- 0.59786*D98
(-3.14)
$AdjR^2$=0.9728 D.W.=1.990

YIHC	Yield of Irrigated Rice in Central Region
TREND	Time Trend from 1980 to 2000
ETCNOV	Evapotranspiration of November in Central Region
ETCDEC	Evapotranspiration of December in Central Region
ETCAPR	Evapotranspiration of April in Central Region
ETCMAY	Evapotranspiration of May in Central Region
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-1-2-4b. Yield Function of Irrigated Rice in Other Central Region (Excluding 01 and 13)

YIHOC= - 37.82907
(-2.77)
+ 0.56928*TREND
(14.82)
+ 9.56978*ETOCNOV(t-1)
(3.19) [1.979]
- 7.87553*ETOCDEC(t-1)
(-4.32) [-1.482]
+ 3.92656*ETOCJAN
(2.91) [0.649]
- 1.92335*ETOCFEB
(-2.48) [-0.301]
+ 5.02468*ETOCMAY
(3.25) [1.081]
+ 2.17725*D857
(3.03)
- 3.69845*D89
(-3.35)
$AdjR^2$=0.9401 D.W.=2.149

YIHOC	Yield of Irrigated Rice in Other Central Region
TREND	Time Trend from 1980 to 2000
ETOCNOV	Evapotranspiration of November in Other Central Region
ETOCDEC	Evapotranspiration of December in Other Central Region
ETOCJAN	Evapotranspiration of January in Other Central Region
ETOCFEB	Evapotranspiration of February in Other Central Region
ETOCMAY	Evapotranspiration of May in Other Central Region
D857	Dummy Variable, 1 in 1985 to 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise

2-5-1-2-5. Yield Function of Irrigated Rice in South Region

YIHS= + 4.36084
(1.32)
+ 0.11238*TREND
(13.23)
+ 0.89710*ETSJAN
(3.29) [0.552]
- 0.96686*ETSAPR
(-4.04) [-0.549]
+ 0.92542*ETSMAY
(2.20) [0.526]
- 1.49482*ETSJUN
(-2.57) [-1.000]
- 0.62043*D801
(-3.94)
- 1.32285*D94
(-6.24)
+ 0.97119*D97
(4.42)
$AdjR^2$=0.9647 D.W.=2.510

YIHS	Yield of Irrigated Rice in South Region
TREND	Time Trend from 1980 to 2000
ETSJAN	Evapotranspiration of January in South Region
ETSAPR	Evapotranspiration of April in South Region
ETSMAY	Evapotranspiration of May in South Region
ETSJUN	Evapotranspiration of June in South Region
D801	Dummy Variable, 1 in 1980 to 1981, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise
D97	Dummy Variable, I in 1997, 0 otherwise

2-5-1-3. Yield function of upland rice

2-5-1-3-1. Yield Function of Upland Rice in Phongsaly

YUH02= + 2.97859
(1.52)
+ 0.03296*TREND
(10.54)
+ 0.21401*ET02APR
(3.90) [0.300]
+ 0.72465*ET02JUN
(3.14) [1.129]
- 0.93818*ET02SEP
(-2.94) [-1.456]
- 0.45164*ET02OCT
(-1.97) [-0.688]
- 0.50637*D93
(5.18)
$AdjR^2$=0.8681 D.W.=2.382

YUH02	Yield of Upland Rice in Phongsaly
TREND	Time Trend from 1980 to 2000
ET02APR	Evapotranspiration of April in Phongsaly
ET02JUN	Evapotranspiration of June in Phongsaly
ET02SEP	Evapotranspiration of September in Phongsaly
ET02OCT	Evapotranspiration of October in Phongsaly
D93	Dummy Variable, 1 in 1993, 0 otherwise

2-5-1-3-2. Yield Function of Upland Rice in Luangnamtha

YUH03= + 5.78085
(4.01)
+ 0.03275*TREND
(12.04)
- 0.46538*ET03JUN
(-2.76) [-0.633]
- 0.60473*ET03OCT

(-2.66) [-0.813]
+ 0.32814*D80
(4.26)
- 0.35044*D912
(-6.14)
+ 0.18857*D935
(4.47)
AdjR^2=0.9299 D.W.=1.902

YUH03	Yield of Upland Rice in Luangnamtha
TREND	Time Trend from 1980 to 2000
ET03JUN	Evapotranspiration of June in Luangnamtha
ET03OCT	Evapotranspiration of October in Luangnamtha
D80	Dummy Variable, 1 in 1980, 0 otherwise
D912	Dummy Variable, 1 in 1991 to 1992, 0 otherwise
D935	Dummy Variable, 1 in 1993 to 1995, 0 otherwise

2-5-1-3-3. Yield Function of Upland Rice in Oudomxay

YUH04= - 5.62900
(-2.01)
+ 0.23653*T8087
(26.62)
- 0.21243*ET04APR
(-3.05) [-0.256]
- 1.33144*ET04JUN
(-4.57) [-1.778]
+ 1.94699*ET04SEP
(3.70) [2.595]
+ 1.23437*ET04OCT
(3.62) [1.632]
- 0.68520*D92
(-5.56)
- 0.45059*D94
(-4.41)
AdjR^2=0.9807 D.W.=1.675

YUH04	Yield of Upland Rice in Oudomxay
T8087	Time Trend from 1980 to 1987, 0 otherwise
ET04APR	Evapotranspiration of April in Oudomxay
ET04JUN	Evapotranspiration of June in Oudomxay
ET04SEP	Evapotranspiration of September in Oudomxay
ET04OCT	Evapotranspiration of October in Oudomxay
D92	Dummy Variable, 1 in 1992, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

2-5-1-3-4. Yield Function of Upland Rice in Bokea

YUH05= - 17.01209
(-5.51)
+ 0.03385*T8087
(7.33)
+ 0.10269*ET05APR
(2.51) [0.103]
+ 0.46675*ET05JUN
(3.05) [0.540]
+ 1.26308*ET05JLY
(4.40) [1.433]
- 0.67638*ET05AUG
(-5.45) [-0.771]
+ 1.25383*ET05SEP
(4.37) [1.446]
+ 1.86612*ET05NOV
(6.28) [2.037]
+ 0.35449*D901
(7.36)
- 0.32928*D96
(-5.18)
AdjR^2=0.9064 D.W.=2.270

YUH05	Yield of Upland Rice in Bokea
T8087	Time Trend from 1980 to 1987, 0 otherwise
ET05APR	Evapotranspiration of April in Bokea
ET05JUN	Evapotranspiration of June in Bokea
ET05JLY	Evapotranspiration of July in Bokea
ET05AUG	Evapotranspiration of August in Bokea
ET05SEP	Evapotranspiration of September in Bokea
ET05NOV	Evapotranspiration of November in Bokea
D901	Dummy Variable, 1 in 1990 to 1991, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

2-5-1-3-5. Yield Function of Upland Rice in Luangprabang

YUH06= + 18.20088
(3.12)
+ 0.02692*TREND
(7.82)
+ 0.17182*ET06MAR
(2.49) [0.193]
- 0.90024*ET06JLY
(-2.60) [-1.233]
- 1.37345*ET06SEP
(-2.17) [-1.905]
- 0.96070*ET06OCT
(-2.49) [-1.326]
- 0.76463*ET06NOV
(-2.10) [-1.005]
+ 0.36720*D95
(4.10)
+ 0.29710*D98
(2.55)
AdjR^2=0.8474 D.W.=2.422

YUH06	Yield of Upland Rice in Luangprabang
TREND	Time Trend from 1980 to 2000
ET06MAR	Evapotranspiration of March in Luangprabang
ET06JLY	Evapotranspiration of July in Luangprabang
ET06SEP	Evapotranspiration of September in Luangprabang
ET06OCT	Evapotranspiration of October in Luangprabang
ET06NOV	Evapotranspiration of November in Luangprabang
D95	Dummy Variable, 1 in 1995, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-1-3-6. Yield Function of Upland Rice in Huaphanh

YUH07= - 17.34615
(-4.34)
+ 0.03664*TREND
(5.03)
+ 2.82176*ET08JUN

(5.18) [3.808]
+ 1.52572*ET08OCT
(3.05) [2.026]
- 1.06600*D803
(-10.34)
+ 0.59251*D94
(3.74)
$AdjR^2$=0.9648 D.W.=2.075

YUH07	Yield of Upland Rice in Huaphanh
TREND	Time Trend from 1980 to 2000
ET07JUN	Evapotranspiration of June in Huaphanh
ET07OCT	Evapotranspiration of October in Huaphanh
D803	Dummy Variable, 1 in1980 to 1983, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

2-5-1-3-7. Yield Function of Upland Rice in Xayabury

YUH08= + 8.44733
(5.79)
+ 0.04492*TREND
(10.38)
- 0.98298*ET08JUN
(-4.48) [-1.271]
- 0.70610*ET08AUG
(-3.13) [-0.892]
- 0.31016*D87
(-3.01)
+ 0.49883*D89
(4.87)
- 0.36290 *SHIFT99
(-4.06)
$AdjR^2$=0.8858 D.W.=2.464

YUH08	Yield of Upland Rice in Xayabury
TREND	Time Trend from 1980 to 2000
ET08JUN	Evapotranspiration of June in Xayabury
ET08AUG	Evapotranspiration of August in Xayabury
D87	Dummy Variable, 1 in 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
SHIFT99	Dummy Variable, 1 after 1999, 0 otherwise

2-5-1-3-8. Yield Function of Upland Rice in Xiengkhuang

YUH09= - 15.73220
(-5.65)
+ 0.02125*TREND
(8.44)
+ 0.58315*ET09MAY
(4.90) [0.758]
+ 1.22050*ET09JLY
(4.14) [1.549]
- 0.65885*ET09AUG
(-3.64) [-0.826]
+ 1.59956*ET09SEP
(5.71) [2.048]
+ 0.49705*ET09OCT
(2.19) [0.641]
+ 0.57695*ET09NOV
(3.52) [0.706]
- 0.25746*D83
(-3.06)
+ 0.16736*D90
(2.26)
+ 0.37711*D92
(4.91)
$AdjR^2$=0.8959 D.W.=2.409

YUH09	Yield of Upland Rice in Xiengkhuang
TREND	Time Trend from 1980 to 2000
ET09MAY	Evapotranspiration of May in Xiengkhuang
ET09JLY	Evapotranspiration of July in Xiengkhuang
ET09AUG	Evapotranspiration of August in Xiengkhuang
ET09SEP	Evapotranspiration of September in Xiengkhuang
ET09OTC	Evapotranspiration of October in Xiengkhuang
ET09NOV	Evapotranspiration of November in Xiengkhuang
D83	Dummy Variable, 1 in 1983, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-1-3-9. Yield Function of Upland Rice in Vientiane

YUH10= - 14.14342
(-7.84)
+ 0.02490*TREND
(11.60)
+ 0.20732*ET10MAR
(5.14) [0.228]
+ 0.07054*ET10APR
(2.04) [0.089]
+ 1.68969*ET10JLY
(6.48) [2.339]
+ 1.54062*ET10SEP
(6.85) [2.146]
- 0.42415*D83
(-6.25)
- 0.20204*D93
(-3.23)
- 0.17020*D97
(-2.85)
$AdjR^2$=0.9394 D.W.=2.182

YUH10	Yield of Upland Rice in Vientiane
TREND	Time Trend from 1980 to 2000
ET10MAR	Evapotranspiration of March in Vientiane
ET10APR	Evapotranspiration of April in Vientiane
ET10JLY	Evapotranspiration of July in Vientiane
ET10SEP	Evapotranspiration of September in Vientiane
D83	Dummy Variable, 1 in 1983, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

2-5-1-3-10. Yield Function of Upland Rice in Borikhamxay

YUH11= - 1.35070
(-0.87)
+ 0.09258*TREND
(28.61)
+ 0.27683*ET11MAY
(2.67) [0.365]

+ 0.92119*ET11AUG
(4.36) [1.188]
- 1.38712*ET11OCT
(-5.00) [-1.861]
+ 0.78808*ET11NOV
(5.22) [1.009]
+ 0.42805*D845
(5.97)
- 0.29626*D93
(-3.28)
- 0.31136*D95
(-3.20)
$AdjR^2$=0.9779 D.W.=1.827

YUH11	Yield of Upland Rice in Borikhamxay
TREND	Time Trend from 1980 to 2000
ET11MAY	Evapotranspiration of May in Borikhamxay
ET11AUG	Evapotranspiration of August in Borikhamxay
ET11OCT	Evapotranspiration of October in Borikhamxay
ET11NOV	Evapotranspiration of November in Borikhamxay
D845	Dummy Variable, 1 in 1984 to 1985, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise

2-5-1-3-11. Yield Function of Upland Rice in Khammuane

YUH12= + 1.37801
(1.03)
+ 0.01286*TREND
(4.59)
+ 0.20949*ET12MAR
(5.23) [0.247]
+ 0.57628*ET12JLY
(3.64) [0.843]
+ 0.40961*ET12AUG
(3.00) [0.593]
- 1.15021*ET12OCT
(-5.65) [-1.734]
- 0.26565*D812
(-5.14)
- 0.34834*D83
(-4.53)
+ 0.34027*D87
(4.50)
$AdjR^2$=0.9126 D.W.=2.065

YUH12	Yield of Upland Rice in Khammuane
TREND	Time Trend from 1980 to 2000
ET12MAR	Evapotranspiration of March in Khammuane
ET12JLY	Evapotranspiration of July in Khammuane
ET12AUG	Evapotranspiration of August in Khammuane
ET12OCT	Evapotranspiration of October in Khammuane
D812	Dummy Variable, 1 in 1981 to 1982, 0 otherwise
D83	Dummy Variable, 1 in 1983, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise

2-5-1-3-12. Yield Function of Upland Rice in Savannakhet

YUH13= - 3.56596
(-2.95)
+ 0.04120*TREND
(16.76)
- 0.16700*ET13APR
(-2.53) [-0.209]
+ 0.44068*ET13MAY
(3.22) [0.628]
- 0.72157*ET13AUG
(-4.24) [-1.041]
+ 0.93468*ET13SEP
(5.97) [1.349]
+ 0.47253*ET13OCT
(2.79) [0.697]
+ 0.17427*D90
(2.81)
- 0.20587*D99
(-3.16)
$AdjR^2$=0.9532 D.W.=1.839

YUH13	Yield of Upland Rice in Savannakhet
TREND	Time Trend from 1980 to 2000
ET13APR	Evapotranspiration of April in Savannakhet
ET13MAY	Evapotranspiration of May in Savannakhet
ET13AUG	Evapotranspiration of August in Savannakhet
ET13SEP	Evapotranspiration of September in Savannakhet
ET13OCT	Evapotranspiration of October in Savannakhet
D90	Dummy Variable, 1 in 1990, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

2-5-1-3-13. Yield Function of Upland Rice in Saravane

YUH14= + 2.59027
(1.11)
+ 0.02284*TREND
(3.41)
- 1.56756*ET14JUN
(-3.57) [-2.110]
+ 1.28597*ET14JLY
(2.27) [1.738]
- 0.32862*D812
(-2.72)
- 0.77331*D88
(-5.08)
- 1.16783*D98
(-7.68)
$AdjR^2$=0.8382 D.W.=1.679

YUH14	Yield of Upland Rice in Saravane
TREND	Time Trend from 1980 to 2000
ET14JUN	Evapotranspiration of June in Saravane
ET14JLY	Evapotranspiration of July in Saravane
D812	Dummy Variable, 1 in 1981 to 1982, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-1-3-14. Yield Function of Upland Rice in Sekong

YUH15= + 5.54098
(2.75)
+ 0.04253*TREND

(7.08)
- 0.31172*ET15MAR
(-3.22) [-0.416]
- 0.97624*ET15JUN
(-2.90) [-1.520]
+ 0.89644*ET15JLY
(2.56) [1.399]
- 0.70735*ET15AUG
(-2.34) [-1.109]
+ 0.19795*D847
(3.30)
- 0.69819*D88
(-6.83)
+ 0.25297*D934
(3.43)
$AdjR^2$=0.8811 D.W.=2.403

YUH15 Yield of Upland Rice in Sekong
TREND Time Trend from 1980 to 2000
ET15MAR Evapotranspiration of March in Sekong
ET15JUN Evapotranspiration of June in Sekong
ET15JLY Evapotranspiration of July in Sekong
ET15AUG Evapotranspiration of August in Sekong
D847 Dummy Variable, 1 in 1984 to 1987, 0 otherwise
D88 Dummy Variable, 1 in 1988, 0 otherwise
D934 Dummy Variable, 1 in 1993 to 1994, 0 otherwise

2-5-1-3-15. Yield Function of Upland Rice in Attapeu

YUH17= - 5.55920
(-2.63)
+ 0.03612*TREND
(8.74)
- 0.32121*ET17MAR
(-2.99) [-0.410]
- 0.93452*ET17JUN
(-3.21) [-1.480]
+ 1.05715*ET17JLY
(2.91) [1.673]
+ 0.90497*ET17SEP
(4.19) [1.415]
+ 0.67149*ET17OCT
(2.92) [1.067]
- 0.26188*D873
(-6.52)
+ 0.50360*D89
(5.51)
- 0.53853*D98
(-5.86)
$AdjR^2$=0.8782 D.W.=2.178

YUH17 Yield of Upland Rice in Attapeu
TREND Time Trend from 1980 to 2000
ET17MAR Evapotranspiration of March in Attapeu
ET17JUN Evapotranspiration of June in Attapeu
ET17JLY Evapotranspiration of July in Attapeu
ET17SEP Evapotranspiration of September in Attapeu
ET17OCT Evapotranspiration of October in Attapeu
D873 Dummy Variable, 1 in 1987 to 1993, 0 otherwise
D89 Dummy Variable, 1 in 1989, 0 otherwise
D98 Dummy Variable, 1 in 1998, 0 otherwise

2-5-2. Planted area functions

2-5-2-1. Area function of wet season rice (lowland rice)

2-5-2-1-1. Area Function of Lowland Rice in Vientiane Municipality

APL01= + 48.09605
(9.43)
+ 0.07999*APL01(t-1)
(0.98)
+ 7.66162*[FPR(t-1)/CPI(t-1)/100]
(2.01) [0.048]
+ 1.01097*T87
(8.67)
- 0.12314*ET01JUN(t-1)
(-2.55) [-0.263]
- 0.09390*ET01AUG(t-1)
(-2.32) [-0.189]
- 18.76004*D95
(-11.55)
$AdjR^2$=0.9303 D.W.=2.179

APL01 Planted Area of Lowland Rice in Vientiane Mun.
FPR Farm Price of Laos Rice (thousand kip per kg)
CPI Consumer Price Index (1995=100)
T87 Time Trend from 1987 to 2000, 0 otherwise
ET01JUN Evapotranspiration of June in Vientiane Mun.
ET01AUG Evapotranspiration of August in Vientiane Mun.
D95 Dummy Variable, 1 in 1995, 0 otherwise

2-5-2-1-2. Area Function of Lowland Rice in Phongsaly

APL02= - 0.92726
(-1.25)
+ 0.10490*APL02(t-1)
(1.79)
+ 1.46287*[FPR(t-1)/CPI(t-1)/100]
(2.82) [0.074]
+ 0.07483*T83
(6.69)
- 0.01077*ET02APR(t-1)
(-5.47) [-0.129]
+ 0.01071*ET02MAY(t-1)
(4.82) [0.206]
+ 0.01852*ET02SEP(t-1)
(3.54) [0.334]
+ 0.01779*ET02OCT(t-1)
(4.41) [0.297]
+ 0.01335*ET02NOV(t-1)
(2.39) [0.181]
- 0.35942*D83
(-2.58)
$AdjR^2$=0.9546 D.W.=2.438

APL02 Planted Area of Lowland Rice in Phongsaly
FPR Farm Price of Laos Rice (thousand kip per kg)
CPI Consumer Price Index (1995=100)

T83	Time Trend from 1983 to 2000, 0 otherwise
ET02APR	Evapotranspiration of April in Phongsaly
ET02MAY	Evapotranspiration of May in Phongsaly
ET02SEP	Evapotranspiration of September in Phongsaly
ET02OCT	Evapotranspiration of October in Phongsaly
ET02NOV	Evapotranspiration of November in Phongsaly
D83	Dummy Variable, 1 in 1983, 0 otherwise

2-5-2-1-3. Area Function of Lowland Rice in Luangnamtha

APL03= + 12.29642
(5.08)
+ 0.58906*APL03(t-1)
(6.54)
+ 2.03624*[FPR(t-1)/CPI(t-1)/100]
(0.96) [0.084]
- 0.05309*ET03MAR(t-1)
(-3.42) [-0.328]
- 0.04042*ET03MAY(t-1)
(-3.01) [-0.599]
- 0.05092*ET03JUN(t-1)
(-2.39) [-0.726]
- 3.06307*D845
(-4.08)
- 1.91123*D912
(-2.85)
$AdjR^2$=0.9105 D.W.=2.151

APL03	Planted Area of Lowland Rice in Luangnamtha
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET03MAY	Evapotranspiration of May in Luangnamtha
ET03JUN	Evapotranspiration of June in Luangnamtha
D845	Dummy Variable, 1 in 1984 to 1985, 0 otherwise
D912	Dummy Variable, 1 in 1991 to 1992, 0 otherwise

2-5-2-1-4. Area Function of Lowland Rice in Oudomxay

APL04= + 6.86317
(3.64)
+ 0.14939*APL04(t-1)
(1.31)
+ 3.40601*[FPR(t-1)/CPI(t-1)/100]
(2.02) [0.102]
+ 1.22566*T8791
(7.09)
+ 0.32116*T92
(4.31)
- 0.03774*ET04MAR(t-1)
(-2.86) [-0.170]
- 0.03446*ET04JUN(t-1)
(-1.87) [-0.367]
+ 0.02644*ET04AUG(t-1)
(1.93) [0.256]
+ 4.27495*D86
(7.94)
- 3.05029*D92
(-3.44)
$AdjR^2$=0.9337 D.W.=2.431

APL04	Planted Area of Lowland Rice in Oudomxay
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T8791	Time Trend from 1987 to 1991, 0 otherwise
T92	Time Trend from 1992 to 2000, 0 otherwise
ET04MAR	Evapotranspiration of March in Oudomxay
ET04JUN	Evapotranspiration of June in Oudomxay
ET04AUG	Evapotranspiration of August in Oudomxay
D86	Dummy Variable, 1 in 1986, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-2-1-5. Area Function of Lowland Rice in Bokea

APL05= - 1.28032
(-1.19)
+ 0.04186*APL05(t-1)
(0.29)
+ 3.13786*[FPR(t-1)/CPI(t-1)/100]
(3.41) [0.149]
- 0.38599*T8083
(-4.73)
+ 0.33410*T8492
(6.45)
+ 0.66956*T93
(6.68)
+ 0.01554*ET05MAY(t-1)
(4.40) [0.273]
+ 0.03721*ET05NOV(t-1)
(2.86) [0.471]
+ 1.23056*D93
(5.27)
$AdjR^2$=0.9951 D.W.=2.591

APL05	Planted Area of Lowland Rice in Bokea
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T8083	Time Trend from 1980 to 1983, 0 otherwise
T8492	Time Trend from 1984 to 1992, 0 otherwise
T93	Time Trend from 1993 to 2000, 0 otherwise
ET05MAY	Evapotranspiration of May in Bokea
ET05NOV	Evapotranspiration of November in Bokea
D93	Dummy Variable, 1 in 1993, 0 otherwise

2-5-2-1-6. Area Function of Lowland Rice in Luangprabang

APL06= + 5.97910
(7.70)
+ 0.02512*APL06(t-1)
(0.26)
+ 0.79977*[FPR(t-1)/CPI(t-1)/100]
(1.37) [0.024]
- 0.01411*ET06MAR(t-1)
(-3.46) [-0.068]
+ 0.00577*ET06APR(t-1)
(2.16) [0.042]
+ 0.01207*ET06JUN(t-1)
(2.03) [0.131]
- 1.85857*D87
(-9.76)
- 0.90359*D92

(-4.96)
- 0.46781*D945
(-3.67)
AdjR^2=0.9632 D.W.=1.926

APL06	Planted Area of Lowland Rice in Luangprabang
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET06MAR	Evapotranspiration of March in Luangprabang
ET06APR	Evapotranspiration of April in Luangprabang
ET06JUN	Evapotranspiration of June in Luangprabang
D87	Dummy Variable, 1 in 1987, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise
D945	Dummy Variable, 1 in 1994 to 1995, 0 otherwise

2-5-2-1-7. Area Function of Lowland Rice in Huaphanh

APL07= + 4.39814
(1.68)
+ 0.03812*APL07(t-1)
(0.33)
+ 3.55263*[FPR(t-1)/CPI(t-1)/100]
(3.86) [0.106]
- 0.86662*T8083
(-2.79)
+ 0.56311*T93
(7.97)
- 0.03679*ET08JUN(t-1)
(-2.71) [-0.452]
+ 0.04704*ET08JLY(t-1)
(3.25) [0.586]
+ 0.03810*ET08SEP(t-1)
(2.92) [0.461]
- 1.29900*D84
(-2.91)
+ 1.09874*D97
(3.12)
AdjR^2=0.9629 D.W.=2.325

APL07	Planted Area of Lowland Rice in Huaphanh
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T8083	Time Trend from 1980 to 1983, 0 otherwise
T93	Time Trend from 1993 to 2000, 0 otherwise
ET07JUN	Evapotranspiration of June in Huaphanh
ET07JLY	Evapotranspiration of July in Huaphanh
ET07SEP	Evapotranspiration of September in Huaphanh
D84	Dummy Variable, 1 in 1984, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

2-5-2-1-8. Area Function of Lowland Rice in Xayabury

APL08= + 31.23140
(3.87)
+ 0.64936*APL08(t-1)
(6.90)
+ 9.70013*[FPR(t-1)/CPI(t-1)/100]
(2.47) [0.155]
- 0.13111*ET08APR(t-1)
(-4.32) [-0.497]
- 0.8058*ET08MAY(t-1)
(-2.59) [-4.697]
+ 0.11764*ET08JUN(t-1)
(2.79) [0.648]
- 0.28414*ET08JLY(t-1)
(-3.65) [-1.460]
- 0.24766*ET08AUG(t-1)
(-5.90) [-1.226]
+ 0.22685*ET08OCT(t-1)
(3.79) [1.224]
- 8.62696*D83
(-3.72)
- 9.24236*D96
(-4.11)
+ 4.41419*D98
(2.72)
AdjR^2=0.8941 D.W.=2.545

APL08	Planted Area of Lowland Rice in Xayabury
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET08APR	Evapotranspiration of April in Xayabury
ET08MAY	Evapotranspiration of May in Xayabury
ET08JUN	Evapotranspiration of June in Xayabury
ET08JLY	Evapotranspiration of July in Xayabury
ET08AUG	Evapotranspiration of August in Xayabury
ET08OCT	Evapotranspiration of October in Xayabury
D83	Dummy Variable, 1 in 1983, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-2-1-9. Area Function of Lowland Rice in Xiengkhuang

APL09= + 13.86744
(6.43)
+ 0.07501*APL09(t-1)
(0.48)
+ 9.59941*[FPR(t-1)/CPI(t-1)/100]
(3.90) [0.163]
- 0.37718*T8088
(-4.40)
- 0.44761*T9298
(-4.39)
- 0.03997*ET09MAR(t-1)
(-2.70) [-0.109]
+ 3.10659*D86
(3.10)
AdjR^2=0.7559 D.W.=2.416

APL09	Planted Area of Lowland Rice in Xiengkhuang
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T8088	Time Trend from 1980 to 1988, 0 otherwise
T9298	Time Trend from 1992 to 1998, 0 otherwise
ET09MAR	Evapotranspiration of March in Xiengkhuang
D86	Dummy Variable, 1 in 1986, 0 otherwise

2-5-2-1-10. Area Function of Lowland Rice in Vientiane

APL10= - 1.07586

(-0.08)
+ 0.26853*APL10(t-1)
(1.19)
+ 16.19934*[FPR(t-1)/CPI(t-1)/100]
(2.00) [0.129]
- 1.55871*TREND
(-2.42)
+ 2.17728*T87
(2.96)
+ 0.08592*ET10MAR(t-1)
(1.97) [0.096]
- 0.23190*ET10AUG(t-1)
(-2.78) [-0.581]
+ 0.48446*ET10SEP(t-1)
(3.63) [1.317]
- 5.44443*D82
(-1.83)
+ 5.99169*D86
(2.17)
+ 7.11313*D90
(3.01)

$AdjR^2$=0.6615 D.W.=1.741

APL10	Planted Area of Lowland Rice in Vientiane
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
TREND	Time Trend from 1980 to 2000
T87	Time Trend from 1987 to 2000, 0 otherwise
ET10MAR	Evapotranspiration of March in Vientiane
ET10AUG	Evapotranspiration of August in Vientiane
ET10SEP	Evapotranspiration of September in Vientiane
D82	Dummy Variable, 1 in 1982, 0 otherwise
D86	Dummy Variable, 1 in 1986, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise

2-5-2-1-11. Area Function of Lowland Rice in Borikhamxay

APL11= + 9.58894
(3.90)
+ 0.21849*APL11(t-1)
(1.02)
+ 7.77065*[FPR(t-1)/CPI(t-1)/100]
(2.44) [0.150]
+ 2.33176*T95
(4.40)
+ 0.03180*ET11ARP(t-1)
(2.42) [0.145]
- 0.07875*ET11NOV(t-1)
(-3.46) [0.483]
+ 2.28459*D892
(2.95)
+ 4.42793*D96
(2.53)

$AdjR^2$=0.9527 D.W.=2.357

APL11	Planted Area of Lowland Rice in Borikhamxay
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T95	Time Trend from 1995 to 2000, 0 otherwise
ET11APR	Evapotranspiration of April in Borikhamxay
ET11NOV	Evapotranspiration of November in Borikhamxay
D892	Dummy Variable, 1 in 1989 to 1992, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-1-12. Area Function of Lowland Rice in Khammuane

APL12= + 92.89300
(3.46)
+ 0.17637*APL12(t-1)
(0.89)
+ 24.31869*[FPR(t-1)/CPI(t-1)/100]
(2.03) [0.173]
+ 0.18230*ET12MAY(t-1)
(2.24) [0.497]
- 0.35250*ET12SEP(t-1)
(-2.01) [-0.969]
- 0.53165*ET12OCT(t-1)
(-3.00) [-1.625]
+ 25.52013*D92
(3.00)
+ 16.40433*D99
(2.76)

$AdjR^2$=0.4343 D.W.=2.544

APL12	Planted Area of Lowland Rice in Khammuane
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET12MAY	Evapotranspiration of May in Khammuane
ET12SEP	Evapotranspiration of September in Khammuane
ET12OCT	Evapotranspiration of October in Khammuane
D92	Dummy Variable, 1 in 1992, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

2-5-2-1-13. Area Function of Lowland Rice in Savannakhet

APL13= + 132.12505
(5.14)
+ 0.09167*APL13(t-1)
(0.59)
+ 19.26489*[FPR(t-1)/CPI(t-1)/100]
(1.06) [0.057]
- 0.42012*ET13MAR(t-1)
(-3.34) [-0.201]
- 0.48011*ET13SEP(t-1)
(-2.21) [-0.541]
- 17.80456*D83
(-1.94)
- 19.82763*D96
(-2.54)
+ 24.79941*SHIFT99
(3.97)

$AdjR^2$=0.6002 D.W.=2.005

APL13	Planted Area of Lowland Rice in Savannakhet
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET13MAR	Evapotranspiration of March in Savannakhet
ET13SEP	Evapotranspiration of September in Savannakhet

D83 Dummy Variable, 1 in 1983, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise
SHIFT99 Dummy Variable, 1 from 1999, 0 otherwise

2-5-2-1-14. Area Function of Lowland Rice in Saravane

APL14= + 13.56709
(1.96)
+ 0.09541*APL14(t-1)
(0.93)
+ 4.35941*[FPR(t-1)/CPI(t-1)/100]
(0.94) [0.032]
+ 0.013913*ET14AUG(t-1)
(2.65) [0.039]
- 0.07664*ET14SEP(t-1)
(-1.81) [-0.208]
+ 0.10499*ET14OCT(t-1)
(2.78) [0.322]
- 4.49593*D834
(-2.70)
- 4.53109*D868
(-4.29)
- 13.67612*D93
(-8.61)
+ 11.86392*SHIFT00
(6.45)

AdjR^2=0.9098 D.W.=2.660

APL14 Planted Area of Lowland Rice in Saravane
FPR Farm Price of Laos Rice (thousand kip per kg)
CPI Consumer Price Index (1995=100)
ET14AUG Evapotranspiration of August in Saravane
ET14SEP Evapotranspiration of September in Saravane
ET14OCT Evapotranspiration of October in Saravane
D834 Dummy Variable, 1 in 1983 to 1984, 0 otherwise
D868 Dummy Variable, 1 in 1986 to 1988, 0 otherwise
D93 Dummy Variable, 1 in 1993, 0 otherwise
SHIFT00 Dummy Variable, 1 from 2000, 0 otherwise

2-5-2-1-15. Area Function of Lowland Rice in Sekong

APL15= + 1.74756
(1.64)
+ 0.44438*APL15(t-1)
(3.06)
+ 1.72531*[FPR(t-1)/CPI(t-1)/100]
(2.70) [0.314]
+ 0.14857*T84
(7.03)
- 0.02016*ET15MAR(t-1)
(-4.80) [-0.734]
+ 0.02153*ET15APR(t-1)
(6.08) [0.828]
- 0.02584*ET15AUG(t-1)
(-3.09) [-1.802]
- 0.01330*ET15SEP(t-1)
(-2.49) [-0.842]
+ 0.01187*ET15OCT(t-1)
(2.60) [0.807]
- 0.88795*D94
(-4.48)
- 1.09821*D96
(-5.22)

AdjR^2=0.9619 D.W.=2.592

APL15 Planted Area of Lowland Rice in Sekong
FPR Farm Price of Laos Rice (thousand kip per kg)
CPI Consumer Price Index (1995=100)
T84 Time Trend from 1984 to 2000, 0 otherwise
ET15MAR Evapotranspiration of March in Sekong
ET15APR Evapotranspiration of April in Sekong
ET15AUG Evapotranspiration of August in Sekong
ET15SEP Evapotranspiration of September in Sekong
ET15OCT Evapotranspiration of October in Sekong
D94 Dummy Variable, 1 in 1994, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-1-16. Area Function of Lowland Rice in Champasack

APL16= + 107.91658
(3.90)
+ 0.10362*APL16(t-1)
(0.71)
+ 55.42169*[FPR(t-1)/CPI(t-1)/100]
(3.88) [0.186]
- 0.36446*ET16APR(t-1)
(-2.16) [-0.201]
+ 0.57532*ET16MAY(t-1)
(3.39) [0.728]
+ 0.43942*ET16JUN(t-1)
(2.70) [0.563]
- 0.39015*ET16JLY(t-1)
(-2.23) [-0.501]
- 0.42904*ET16SEP(t-1)
(-3.07) [-0.533]
- 0.54152*ET16NOV(t-1)
(-3.06) [-0.777]
- 43.70553*D88
(-5.99)
- 27.03471*D96
(-4.51)

AdjR^2=0.7500 D.W.=2.615

APL16 Planted Area of Lowland Rice in Champasack
FPR Farm Price of Laos Rice (thousand kip per kg)
CPI Consumer Price Index (1995=100)
ET16APR Evapotranspiration of April in Champasack
ET16MAY Evapotranspiration of May in Champasack
ET16JUN Evapotranspiration of June in Champasack
ET16JLY Evapotranspiration of July in Champasack
ET16SEP Evapotranspiration of September in Champasack
ET16NOV Evapotranspiration of November in Champasack
D88 Dummy Variable, 1 in 1988, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-1-17. Area Function of Lowland Rice in Attapeu

APL17= + 2.71396
(0.9)
+ 0.81582*APL17(t-1)

(3.77)
+ 9.65993*[FPR(t-1)/CPI(t-1)/100]
(4.83) [0.253]
- 0.10026*ET17MAR(t-1)
(-4.99) [-0.417]
- 0.11401*ET17SEP(t-1)
(-3.75) [-1.078]
- 0.07938*ET17OCT(t-1)
(-3.96) [-0.818]
+ 0.18449*ET17NOV(t-1)
(4.66) [1.905]
- 4.79054*D83
(-3.92)
+ 2.61644*D88
(3.24)
+ 2.77569*D97
(4.24)
+ 6.53772*SHIFT99
(9.09)

$AdjR^2$=0.8405 D.W.=1.803

APL17	Planted Area of Lowland Rice in Attapeu
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET17MAR	Evapotranspiration of March in Attapeu
ET17SEP	Evapotranspiration of September in Attapeu
ET17OCT	Evapotranspiration of October in Attapeu
ET17NOV	Evapotranspiration of November in Attapeu
D83	Dummy Variable, 1 in 1983, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise
SHIFT99	Dummy Variable, 1 from 1999, 0 otherwise

2-5-2-2. Area function of irrigated rice (dry season rice)

2-5-2-2-1. Area Function of Irrigated Rice in Vientiane Municipality

API01= - 4.15829
(-1.92)
+ 0.66562*T95
(5.94)
+ 0.91504*API01(t-1)
(12.75)
+ 5.87563*[FPR(t-1)/CPI(t-1)/100]
(3.72) [0.206]
- 0.02510*ET01MAY(t-1)
(-2.71) [-0.320]
+ 0.07931*ET01JUN(t-1)
(5.11) [0.946]
- 0.06424*ET01JLY(t-1)
(-3.60) [-0.771]
+ 0.05304*ET01OCT(t-1)
(3.32) [0.682]
- 1.84317*D83
(-3.54)
- 1.73775*D87
(-3.87)
- 2.54397 *D98
(-5.05)

$AdjR^2$=0.9929 D.W.=2.126

API01	Planted Area of Irrigated Rice in Vientiane Mun.
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T95	Time Trend from 1995 to 2000, 0 otherwise
ET01MAY	Evapotranspiration of May in Vientiane Mun.
ET01JUN	Evapotranspiration of June in Vientiane Mun.
ET01JLY	Evapotranspiration of July in Vientiane Mun.
ET01OCT	Evapotranspiration of October in Vientiane Mun.
D83	Dummy Variable, 1 in 1983, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-2-2-2. Area Function of Irrigated Rice in Savannakhet

API13= - 17.02137
(-3.54)
+ 1.33120*T94
(5.46)
+ 0.66973*API13(t-1)
(6.29)
+ 7.06345*[FPR(t-1)/CPI(t-1)/100]
(2.21) [0.432]
+ 0.09520*ET13MAR(t-1)
(3.75) [0.940]
+ 0.08641*ET13JLY(t-1)
(2.47) [2.089]
+ 0.12318*ET13AUG(t-1)
(3.43) [2.838]
- 0.07771*ET13OCT(t-1)
(-1.94) [-2.022]
- 5.61707*D84
(-3.02)
+ 4.34852*D92
(2.97)

$AdjR^2$=0.9629 D.W.=2.641

AIH13	Planted Area of Irrigated Rice in Savannakhet
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T94	Time Trend from 1994 to 2000, 0 otherwise
ET13MAR	Evapotranspiration of March in Savannakhet
ET13JLY	Evapotranspiration of July in Savannakhet
ET13AUG	Evapotranspiration of August in Savannakhet
ET13OCT	Evapotranspiration of October in Savannakhet
D84	Dummy Variable, 1 in 1984, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-2-2-3. Area Function of Irrigated Rice in North Region

AIHN= - 21.03793
(-7.55)
+ 1.57140*T98
(8.25)
+ 0.21623*AIHN(t-1)
(2.32)
+ 1.98217*[FPR(t-1)/CPI(t-1)/100]

(2.99) [0.181]
+ 0.02820*ETNMAY(t-1)
(3.77) [0.981]
- 0.07016*ETNJUN(t-1)
(-6.63) [-2.317]
+ 0.04534*ETNJLY(t-1)
(3.08) [1.410]
+ 0.20926*ETNSEP(t-1)
(9.91) [6.783]
+ 0.04481*ETNOCT(t-1)
(3.93) [1.405]
- 2.03450*D82
(-5.03)
- 0.63629*D93
(-2.00)
+ 0.93235*D96
(2.62)

$AdjR^2$=0.9818 D.W.=2.156

AIHN	Planted Area of Irrigated Rice in North Region
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T98	Time Trend from 1998 to 2000, 0 otherwise
ETNMAY	Evapotranspiration of May in North Region
ETNJUN	Evapotranspiration of June in North Region
ETNJLY	Evapotranspiration of July in North Region
ETNSEP	Evapotranspiration of September in North Region
ETNOCT	Evapotranspiration of October in North Region
D82	Dummy Variable, 1 in 1982, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-2-4a. Area Function of Irrigated Rice in Central Region
(including 01 and 13)

AIHC= - 16.41978
(-5.46)
+ 8.28752*T97
(11.74)
+ 0.82161*AIHC(t-1)
(9.16)
+ 3.61403*[FPR(t-1)/CPI(t-1)/100]
(1.86) [0.060]
+ 0.08471*ETCMAR(t-1)
(6.17) [0.219]
- 0.06301*ETCAPR(t-1)
(-5.48) [-0.238]
- 0.13703*ETCAUG(t-1)
(-7.00) [-0.766]
+ 0.14443*ETCSEP(t-1)
(5.68) [0.871]
+ 0.08505*ETCOCT(t-1)
(4.69) [0.554]
+ 0.10360*ETCNOV(t-1)
(6.66) [0.543]
- 1.63112*D82
(-2.82)
- 2.57317*D83
(-3.18)
- 20.42364*SHIFT00
(-12.42)

$AdjR^2$=0.9992 D.W.=2.156

AIHC	Planted Area of Irrigated Rice in Central Region
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T97	Time Trend from 1997 to 2000, 0 otherwise
ETCMAR	Evapotranspiration of March in Central Region
ETCAPR	Evapotranspiration of April in Central Region
ETCAUG	Evapotranspiration of August in Central Region
ETCSEP	Evapotranspiration of September in Central Region
ETCOCT	Evapotranspiration of October in Central Region
ETCNOV	Evapotranspiration of November in Central Region
D82	Dummy Variable, 1 in 1982, 0 otherwise
D83	Dummy Variable, 1 in 1983, 0 otherwise
SHIFT00	Dummy Variable, 1 from 2000, 0 otherwise

2-5-2-2-4b. Area Function of Irrigated Rice in Other Central Region
(Excluding 01 and 13)

AIHOC= - 19.65243
(-5.52)
+ 0.66063*AIHOC(t-1)
(8.51)
+ 5.44282*[FPR(t-1)/CPI(t-1)/100]
(2.77) [0.375]
+ 1.67572*T95
(8.67)
+ 0.06448*ETOCMAR(t-1)
(4.52) [0.710]
- 0.03920*ETOCAPR(t-1)
(-3.20) [-0.640]
+ 0.08427*ETOCMAY(t-1)
(4.92) [2.194]
+ 0.11465*ETOCSEP(t-1)
(3.73) [2.861]
- 2.26245*D82
(-2.49)
+3.57380*D92
(3.51)

$AdjR^2$=0.9832 D.W.=2.348

AIHOC	Planted Area of Irrigated Rice in Other Central Region
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T95	Time Trend from 1995 to 2000, 0 otherwise
ETOCMAR	Evapotranspiration of March in Other Central Region
ETOCAPR	Evapotranspiration of April in Other Central Region
ETOCMAR	Evapotranspiration of May in Other Central Region
ETOCSEP	Evapotranspiration of September in Other Central Region
D82	Dummy Variable, 1 in 1982, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-2-2-5. Area Function of Irrigated Rice in South Region

AIHS= + 0.70014
(0.63)
+ 0.82899*AIHS(t-1)
(15.40)
+ 5.13662*[FPR(t-1)/CPI(t-1)/100]
(5.03) [0.366]
+ 4.50486*T97
(23.84)
+ 0.04694*ETSMAY(t-1)
(6.11) [1.215]
- 0.08671*ETSJLY(t-1)
(-5.40) [-2.373]
+ 0.02525*ETSSEP(t-1)
(2.87) [0.650]
- 3.10834*D82
(-5.40)
- 1.38559*D88
(-3.57)
- 12.52035*SHIFT00
(-18.22)
$AdjR^2$=0.9988 D.W.=1.845

AIHS	Planted Area of Irrigated Rice in South Region
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
T97	Time Trend from 1997 to 2000, 0 otherwise
ETSMAY	Evapotranspiration of May in South Region
ETSJLY	Evapotranspiration of July in South Region
ETSSEP	Evapotranspiration of September in South Region
D82	Dummy Variable, 1 in 1982, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
SHIFT00	Dummy Variable, 1 from 2000, 0 otherwise

2-5-2-3. Area function of upland rice

2-5-2-3-1. Area Function of Upland Rice in Phongsaly

APU02= + 89.13560
(4.56)
+ 0.28997*APM01(t-1)
(2.29)
+ 12.32442*[FPR(t-1)/CPI(t-1)/100]
(3.02) [0.156]
- 0.38040*ET01JLY(t-1)
(-3.01) [-1.671]
+ 0.15637*ET01AUG(t-1)
(3.46) [0.680]
- 0.42462*ET01SEP(t-1)
(-4.32) [-1.910]
- 0.25368*ET01OCT(t-1)
(-3.44) [-1.057]
- 19.98778*D87
(-9.21)
- 5.58592*D92
(-2.54)
$AdjR^2$=0.8473 D.W.=1.556

APL02	Planted Area of Upland Rice in Phongsaly
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET01JLY	Evapotranspiration of July in Phongsaly
ET01AUG	Evapotranspiration of August in Phongsaly
ET01SEP	Evapotranspiration of September in Phongsaly
ET01OCT	Evapotranspiration of October in Phongsaly
D87	Dummy Variable, 1 in 1987, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-2-3-2. Area Function of Upland Rice in Luangnamtha

APU03= + 33.03050
(4.70)
+ 0.39093*APM03(t-1)
(3.32)
+ 13.82765*[FPR(t-1)/CPI(t-1)/100]
(3.15) [0.232]
- 0.12240*ET03APR(t-1)
(-5.86) [-0.427]
+ 0.10406*ET03MAY(t-1)
(4.79) [0.631]
- 0.21968*ET03JUN(t-1)
(-6.33) [-1.282]
- 0.14945*ET03JLY(t-1)
(-2.72) [-0.789]
+ 0.08226*ET03AUG(t-1)
(3.07) [0.440]
- 0.07780*ET03OCT(t-1)
(-2.03) [-0.430]
+ 3.72811*D81
(3.14)
- 9.64960*D92
(-8.85)
- 3.05912*D97
(-2.71)
$AdjR^2$=0.9620 D.W.=2.461

APU03	Planted Area of Upland Rice in Luangnamtha
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET03APR	Evapotranspiration of April in Luangnamtha
ET03MAY	Evapotranspiration of May in Luangnamtha
ET03JUN	Evapotranspiration of June in Luangnamtha
ET03JLY	Evapotranspiration of July in Luangnamtha
ET03AUG	Evapotranspiration of August in Luangnamtha
ET03OCT	Evapotranspiration of October in Luangnamtha
D81	Dummy Variable, 1 in 1981, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

2-5-2-3-3. Area Function of Upland Rice in Oudomxay

APU04= + 136.23768
(4.72)
+ 0.32724*APM04(t-1)
(2.32)
+ 31.03572*[FPR(t-1)/CPI(t-1)/100]
(3.05) [0.244]
+ 0.26452*ET04APR(t-1)
(4.05) [0.492]
- 0.29712*ET04MAY(t-1)
(-3.34) [-0.877]

+ 0.63946*ET04JUN(t-1)
(3.94) [1.786]
+ 0.40639*ET04AUG(t-1)
(3.96) [1.035]
- 1.09198*ET04SEP(t-1)
(-4.06) [-3.019]
- 1.53653*ET04NOV(t-1)
(-5.01) [-3.342]
+ 12.25215*D81
(3.39)
- 25.32420*D84
(-4.08)
+ 12.79532*D95
(3.01)
AdjR^2=0.9382 D.W.=1.981

APU04	Planted Area of Upland Rice in Oudomxay
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET04APR	Evapotranspiration of April in Oudomxay
ET04MAY	Evapotranspiration of May in Oudomxay
ET04JUN	Evapotranspiration of June in Oudomxay
ET04AUG	Evapotranspiration of August in Oudomxay
ET04SEP	Evapotranspiration of September in Oudomxay
ET04NOV	Evapotranspiration of November in Oudomxay
D81	Dummy Variable, 1 in 1981, 0 otherwise
D84	Dummy Variable, 1 in 1984, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise

2-5-2-3-4. Area Function of Upland Rice in Bokea

APU05= - 0.27824
(-0.09)
+ 0.87132*APM05(t-1)
(3.98)
+ 5.78557*[FPR(t-1)/CPI(t-1)/100]
(3.01) [0.250]
- 0.10363*ET05JUN(t-1)
(-3.71) [-1.550]
+ 0.09949*ET05AUG(t-1)
(4.14) [1.379]
+ 2.50772*D90
(1.95)
+ 4.58270*D94
(4.15)
+ 1.83388*D96
(1.79)
AdjR^2=0.7177 D.W.=1.998

APU05	Planted Area of Upland Rice in Bokea
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET05JUN	Evapotranspiration of June in Bokea
ET05AUG	Evapotranspiration of August in Bokea
D90	Dummy Variable, 1 in 1990, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-3-5. Area Function of Upland Rice in Luangprabang

APU06= + 5.03777
(0.85)
+ 0.48308*APM06(t-1)
(3.96)
+ 27.94326*[FPR(t-1)/CPI(t-1)/100]
(2.78) [0.160]
+ 0.17557*ET06MAR(t-1)
(2.04) [0.163]
+ 13.22756*D81
(2.65)
+ 27.35075*D90
(5.36)
+ 23.18269*D94
(4.52)
AdjR^2=0.7769 D.W.=2.046

APU06	Planted Area of Upland Rice in Luangprabang
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET06MAR	Evapotranspiration of March in Luangprabang
D90	Dummy Variable, 1 in 1990, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

2-5-2-3-6. Area Function of Upland Rice in Huaphanh

APU07= - 11.21992
(-1.14)
+ 0.73682*APM07(t-1)
(6.46)
+ 30.61079*[FPR(t-1)/CPI(t-1)/100]
(3.30) [0.318]
- 0.12271*ET08MAR(t-1)
(-1.94) [-0.248]
+ 0.31127*ET08AUG(t-1)
(3.26) [1.246]
- 0.18905*ET08NOV(t-1)
(-2.25) [-0.567]
- 8.78325*D82
(-2.17)
- 9.45343*D93
(-2.29)
AdjR^2=0.8711 D.W.=2.257

APU07	Planted Area of Upland Rice in Huaphanh
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET07MAY	Evapotranspiration of May in Huaphanh
ET07AUG	Evapotranspiration of August in Huaphanh
ET07NOV	Evapotranspiration of November in Huaphanh
D82	Dummy Variable, 1 in 1982, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise

2-5-2-3-7. Area Function of Upland Rice in Xayabury

APU08= + 49.99883
(4.08)
+ 0.40417*APM08(t-1)
(2.44)
+ 14.58704*[FPR(t-1)/CPI(t-1)/100]

(2.36) [0.222]
- 0.12723*ET08MAR(t-1)
(-3.34) [-0.254]
- 0.19508*ET08SEP(t-1)
(-1.96) [-0.980]
- 0.16067*ET08OCT(t-1)
(-2.57) [-0.822]
- 0.15800*ET08NOV(t-1)
(-1.94) [-0.667]
+ 5.08602*D99
(2.22)
AdjR^2=0.8651 D.W.=2.092

APU08	Planted Area of Upland Rice in Xayabury
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET08MAR	Evapotranspiration of March in Xayabury
ET08JUN	Evapotranspiration of June in Xayabury
ET08SEP	Evapotranspiration of September in Xayabury
ET08NOV	Evapotranspiration of November in Xayabury
D99	Dummy Variable, 1 in 1999, 0 otherwise

2-5-2-3-8. Area Function of Upland Rice in Xiengkhuang

APU09= + 24.95975
(6.16)
+ 0.87700*APM09(t-1)
(7.85)
+ 13.25962*[FPR(t-1)/CPI(t-1)/100]
(4.23) [0.237]
- 0.03858*ET09APR(t-1)
(-5.91) [-0.165]
- 0.32318*ET09AUG(t-1)
(-2.20) [-1.844]
+ 5.25945*D901
(3.91)
+ 13.34335*D99
(6.05)
AdjR^2=0.8739 D.W.=1.895

APU09	Planted Area of Upland Rice in Xiengkhuang
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET09APR	Evapotranspiration of April in Xiengkhuang
ET09AUG	Evapotranspiration of August in Xiengkhuang
D901	Dummy Variable, 1 in 1990 to 1991, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

2-5-2-3-9. Area Function of Upland Rice in Vientiane

APU10= - 6.08877
(-1.80)
+ 0.87499*APM10(t-1)
(8.82)
+ 8.19291*[FPR(t-1)/CPI(t-1)/100]
(3.74) [0.238]
+ 0.06845*ET10MAY(t-1)
(3.59) [0.751]
+ 0.09089*ET10JUN(t-1)
(2.48) [0.907]
- 0.12403*ET10AUG(t-1)
(-3.68) [-1.140]
+ 2.50864*D89
(2.29)
+ 2.45418*D91
(2.20)
+ 4.06620*D92
(3.47)
AdjR^2=0.9247 D.W.=1.898

APU10	Planted Area of Upland Rice in Vientiane
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET10MAY	Evapotranspiration of May in Vientiane
ET10JUN	Evapotranspiration of June in Vientiane
ET10AUG	Evapotranspiration of August in Vientiane
D89	Dummy Variable, 1 in 1989, 0 otherwise
D91	Dummy Variable, 1 in 1991, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

2-5-2-3-10. Area Function of Upland Rice in Borikhamxay

APU11= + 7.62728
(1.41)
+ 0.45513*APM11(t-1)
(3.49)
+ 5.62442*[FPR(t-1)/CPI(t-1)/100]
(2.19) [0.166]
- 0.08872*ET11JUN(t-1)
(-2.17) [-0.928]
+ 0.09023*ET11JLY(t-1)
(2.03) [0.954]
- 0.10883*ET11AUG(t-1)
(-3.80) [-1.066]
+ 0.05134*ET11NOV(t-1)
(2.24) [0.560]
+ 1.78976*D902
(2.29)
- 3.45526*D95
(-2.50)
+ 3.98765*SHIFT00
(3.09)
AdjR^2=0.8363 D.W.=1.927

APU11	Planted Area of Upland Rice in Borikhamxay
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET11JUN	Evapotranspiration of June in Borikhamxay
ET11JLY	Evapotranspiration of July in Borikhamxay
ET11AUG	Evapotranspiration of August in Borikhamxay
ET11NOV	Evapotranspiration of November in Borikhamxay
D902	Dummy Variable, 1 in 1990 to 1992, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise
SHIFT00	Dummy Variable, 1 from 2000, 0 otherwise

2-5-2-3-11. Area Function of Upland Rice in Khammuane

APU12= + 7.19583
(3.80)
+ 0.72274*APM12(t-1)

(10.64)
+ 1.72720*[FPR(t-1)/CPI(t-1)/100]
(0.64) [0.109]
- 0.03275*ET12MAR(t-1)
(-3.12) [-0.337]
+ 0.01783*ET12APR(t-1)
(2.36) [0.274]
- 0.07627*ET12JLY(t-1)
(-3.31) [-1.835]
+ 8.17571*D80
(9.19)
AdjR^2=0.9812 D.W.=2.640

APU12	Planted Area of Upland Rice in Khammuane
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET12MAR	Evapotranspiration of March in Khammuane
ET12APR	Evapotranspiration of April in Khammuane
ET12JLY	Evapotranspiration of July in Khammuane
D80	Dummy Variable, 1 in 1980, 0 otherwise

2-5-2-3-12. Area Function of Upland Rice in Savannakhet

APU13= - 4.84468
(-3.06)
+ 0.67045*APM13(t-1)
(8.37)
+ 8.78030*[FPR(t-1)/CPI(t-1)/100]
(2.39) [0.247]
- 0.04793*ET13APR(t-1)
(-2.58) [-0.286]
+ 0.07984*ET13MAY(t-1)
(3.59) [0.812]
+ 2.63453*D81
(2.59)
+ 2.64344*D912
(3.74)
AdjR^2=0.9678 D.W.=2.040

APU13	Planted Area of Upland Rice in Savannakhet
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET13APR	Evapotranspiration of April in Savannakhet
ET13MAY	Evapotranspiration of May in Savannakhet
D81	Dummy Variable, 1 in 1981, 0 otherwise
D912	Dummy Variable, 1 in 1991 to 1992, 0 otherwise

2-5-2-3-13. Area Function of Upland Rice in Saravane

APU14= - 2.69791
(-0.83)
+ 0.25820*APM14(t-1)
(2.22)
+ 0.93255*[FPR(t-1)/CPI(t-1)/100]
(0.47) [0.034]
+ 0.08602*ET14JLY(t-1)
(2.69) [1.222]
+ 2.10905*D847
(1.97938)
- 3.68058*D88
(-3.65)
- 5.94413*D98
(-6.10)
AdjR^2=0.7665 D.W.=1.772

APU14	Planted Area of Upland Rice in Saravane
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET14JLY	Evapotranspiration of July in Saravane
D847	Dummy Variable, 1 in 1984 to 1987, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-2-3-14. Area Function of Upland Rice in Sekong

APU15= + 5.54303
(2.57)
+ 0.45412*APM15(t-1)
(3.75)
+ 4.11123*[FPR(t-1)/CPI(t-1)/100]
(2.47) [0.184]
- 0.04131*ET15AUG(t-1)
(-1.93) [-0.710]
+ 2.54847*D80
(3.22)
+ 1.10703*D867
(2.05)
AdjR^2=0.8488 D.W.=1.595

APU15	Planted Area of Upland Rice in Sekong
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET15AUG	Evapotranspiration of August in Sekong
D80	Dummy Variable, 1 in 1980, 0 otherwise
D867	Dummy Variable, 1 in 1986 to 1987, 0 otherwise

2-5-2-3-15. Area Function of Upland Rice in Attapeu

APU17= - 3.42351
(-2.19)
+ 0.23298*APM17(t-1)
(2.04)
+ 2.58664*[FPR(t-1)/CPI(t-1)/100]
(2.23) [0.184]
- 0.02779*ET17APR(t-1)
(-3.32) [-0.368]
+ 0.07055*ET17JLY(t-1)
(4.09) [1.921]
- 2.18113*D84
(-3.41)
+ 1.58899*D86
(2.98)
+ 1.56754*SHIFT00
(2.94)
AdjR^2=0.7121 D.W.=2.483

APU17	Planted Area of Upland Rice in Attapeu
FPR	Farm Price of Laos Rice (thousand kip per kg)
CPI	Consumer Price Index (1995=100)
ET17APR	Evapotranspiration of April in Attapeu

ET17JLY	Evapotranspiration of July in Attapeu
D84	Dummy Variable, 1 in 1984, 0 otherwise
D86	Dummy Variable, 1 in 1986, 0 otherwise
SHIFT00	Dummy Variable, 1 from 2000, 0 otherwise

2-5-3. Demand function of rice

QC=	+ 681.30015	
	(7.63)	
	+ 6.67679*T8086	
	(5.01)	
	+ 13.41221*T8688	
	(2.38)	
	+ 15.68680*T9499	
	(3.87)	
	- 282.61797*RP/(CPI/100)	
	(-4.19)	[-0.419]
	- 1.66306*RGDP/POP	
	(-3.75)	[-0.796]
	+ 127.26798*D813	
	(3.71)	
	+ 34.70990*D84	
	(2.37)	
	- 117.82337*D88	
	(-5.15)	
	- 30.99935*D9193	
	(-3.80)	
$AdjR^2$=0.8776		D.W.=3.051

QC	Consumption of Rice per capita
T8086	Time Trend from 1980 to 1986, 0 after 1986
T8688	Time Trend from 1986 to 1988, 0 before 1986, 0 after 1988
T9599	Time Trend from 1995 to 1999, 0 before 1996, 5 after 1999
RP	Retail Price of Rice (Non-glutinous)
CPI	Consumer Price Index
RGDP	Realized Gross Domestic Products
POP	Population
D813	Dummy Variable, 1 in 1981 to 1983, 0 otherwise
D84	Dummy Variable, 1 in 1984, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D890	Dummy Variable, 1 in 1989 and 1990, 0 otherwise
D9193	Dummy Variable, 1 in 1991 and 1993, 0 otherwise
D978	Dummy Variable, 1 in 1997 and 1998, 0 otherwise

2-5-4. Import function of rice

IMP=	70.08878	
	(5.16)	
	- 42.11725*WP*EXR/(CPI/100)*1000000	
	(-2.25)	[-0.737]
	- 0.02268*Q	
	(-3.49)	[-1.787]
	- 30.15445*D80	
	(-3.75)	
	+ 39.71473*D81	
	(4.08)	
	- 28.38935*D858	
	(-5.32)	
	- 15.39497*D893	
	(-3.73)	
	+ 28.89936*D98	
	(3.74)	
$AdjR^2$=0.7928		D.W.=2.440

WP	World Price (Thailand: US$/MT)
EXR	Exchange Rate (Kip/US$)
Q	Total Production
D80	Dummy Variable, 1 in 1980, 0 otherwise
D81	Dummy Variable, 1 in 1981, 0 otherwise
D858	Dummy Variable, 1 in 1985 to 1988, 0 otherwise
D893	Dummy Variable, 1 in 1989 to 1993, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

2-5-5. Price linkage function of rice

FPR=	- 0.00270	
	(-1.19)	
	+ 0.49901*RP	
	(137.06)	
$AdjR^2$=0.9989		D.W.=2.217

FPR	Farm Price of Rice
RP	Retail Price of Rice (Non-glutinous)

Table 2-1 through Table 2-3 show elasticities of yield of wet season rice, irrigated rice, and upland rice with respect to a time trend and evpotranspirations. Table 2-4 through Table 2-6 show elasticities of planted area of the three types of rice with respect to last yearís planted area, last yearís farm price, and last yearís evapotranspirations.

Table 2-1. Elasticities of yield of wet season rice for evapotranspiration and trend

Province	Trend	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Vientiane Mun.	0.152			0.599					-1.223	0.648
Phongsaly	0.025			0.221	0.510	-0.424			-0.502	
Luangnamtha	0.216	-0.392	0.204	-0.503						
Oudomxay	-0.017						-0.254	0.889	0.690	
Bokea				0.499	-1.023	1.837	0.934			
Luangprabang	0.044		0.221					1.024		
Huaphanh	0.055			0.564		1.992				
Xayabury	0.076	-0.230			0.880			1.411		3.221
Xiengkhuang	0.052	0.741			-1.438			0.982	-1.064	
Vientiane	0.055			0.984	-1.435			1.355	-0.781	
Borikhamxay	0.083	-0.228	0.328		-1.343	1.167	1.017			
Khammuane	0.041	-0.271		0.851	-1.974				-1.207	
Savannakhet	0.049			0.573		-1.118				
Saravan	0.038					-2.202		-0.850		
Sekong	0.039	0.284			1.165	-1.061	1.004		1.289	-1.178
Champasack	0.030	-0.389			-1.532			1.129	2.441	
Attapeu	0.018				-0.725		1.041	0.726	-0.782	0.745

Note) Trend is for after 2000

Table 2-2. Elasticities of yield of irrigated rice for evapotranspiration and trend

Province	Trend	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May.	Jun.
Vientiane Mun.	0.122	-0.898	0.488		0.131	-0.112			
Savannakhet	0.148		-0.412						
North region	0.101	-1.648	0.619						
Central region	0.131	1.618	-0.385				-0.171	0.647	
Central region[2)]	0.569	1.979	-1.482	0.649	-0.301			1.081	
South region	0.112			0.552			-0.549	0.526	-1.000

Note) Trend is for after 2000, Central region[2)] excludes Vientiane municipality and Savannakhet province

Table 2-3. Elasticities of yield of upland rice for evapotranspirationand trend

Province	Trend	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Phongsaly	0.033		0.300		1.129			-1.456	-0.688	
Luangnamtha	0.033				-0.633				-0.813	
Oudomxay			-0.256		-1.778			2.595	1.632	
Bokea			0.103		0.540	1.433	-0.771	1.446		2.037
Luangprabang	0.027	0.193				-1.233		-1.905	-1.326	-1.005
Huaphanh	0.037				3.808				2.026	
Xayabury	0.045				-1.271		-0.892			
Xiengkhuang	0.021			0.758		1.549	-0.826	2.048	0.641	0.706
Vientiane	0.025	0.228	0.089			2.339		2.146		
Borikhamxay	0.093			0.365			1.188		-1.861	1.009
Khammuane	0.013	0.247				0.843	0.593		-1.734	
Savannakhet	0.041		-0.209	0.628			-1.041	1.349	0.697	
Saravan	0.023				-2.110	1.738				
Sekong	0.043	-0.416			-1.520	1.399	-1.109			
Attapeu	0.036	-0.410			-1.480	1.673		1.415	1.067	

Note) Trend is for after 2000

Table 2-4. Elasticities of planted area of wet season rice

Province	Area (t-1)	Price (t-1)	Evapotranspiration (t-1) Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Vientiane Mun.	0.080	0.048				-0.263		-0.189			
Phongsaly	0.105	0.074		-0.129	0.206				0.334	0.297	0.181
Luangnamtha	0.589	0.084	-0.328		-0.599	-0.726					
Oudomxay	0.149	0.102	-0.170			-0.367		0.256			
Bokea	0.042	0.149			0.273						0.471
Luangprabang	0.025	0.024	-0.068	0.042		0.131					
Huaphanh	0.038	0.106				-0.452	0.586		0.461		
Xayabury	0.649	0.155		-0.497	-4.697	0.648	-1.460	-1.226		1.224	
Xiengkhuang	0.075	0.163	-0.109								
Vientiane	0.269	0.129	0.096					-0.581	1.317		
Borikhamxay	0.218	0.150		0.145							0.483
Khammuane	0.176	0.173			0.497				-0.969	-1.625	
Savannakhet	0.092	0.057	-0.201						-0.541		
Saravan	0.095	0.032						0.039	-0.208	0.322	
Sekong	0.444	0.314	-0.734	0.828				-1.802	-0.842	0.807	
Champasack	0.104	0.186		-0.201	0.728	0.563	-0.501		-0.533		-0.777
Attapeu	0.816	0.253	-0.417						-1.078	-0.818	1.905

Table 2-5. Elasticities of planted area of irrigated rice

Province	Area (t-1)	Price (t-1)	Evapotranspiration (t-1) Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Vientiane Mun.	0.915	0.206			-0.320	0.946	-0.771			0.682	
Savannakhet	0.670	0.432	0.940				2.089	2.838		-2.022	
North region	0.216	0.181			0.981	-2.317	1.410		6.783	1.405	
Central region	0.822	0.060	0.219	-0.238				-0.766	0.871	0.554	0.543
Central region[2)]	0.661	0.375	0.710	-0.640	2.194				2.861		
South region	0.829	0.366			1.215		-2.373		0.650		

Note) Central region[2)] excludes Vientiane municipality and Savannakhet province

Table 2-6. Elasticities of planted area of upland rice

Province	Area (t-1)	Price (t-1)	Evapotranspiration (t-1) Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Phongsaly	0.290	0.156					-1.671	0.680	-1.910	-1.057	
Luangnamtha	0.391	0.232		-0.427	0.631	-1.282	-0.789	0.440		-0.430	
Oudomxay	0.327	0.244		0.492	-0.877	1.786		1.035	-3.019		-3.342
Bokea	0.871	0.250				-1.550		1.379			
Luangprabang	0.483	0.160	0.163								
Huaphanh	0.737	0.318	-0.248					1.246			-0.567
Xayabury	0.404	0.222	-0.254						-0.980	-0.822	-0.667
Xiengkhuang	0.877	0.237		-0.165				-1.844			
Vientiane	0.875	0.238			0.751	0.907		-1.140			
Borikhamxay	0.455	0.166				-0.928	0.954	-1.066			0.560
Khammuane	0.723	0.109	-0.337	0.274			-1.835				
Savannakhet	0.670	0.247		-0.286	0.812						
Saravan	0.258	0.034					1.222				
Sekong	0.454	0.184						-0.710			
Attapeu	0.233	0.184		-0.368			1.921				

2-6. Simulation results

2-6-1. Results of estimation of yield functions

Table 2-1 shows the elasticities of yield of wet season rice with respect to evapotranspiration (ET) evaluated at the average value for yield and ET. The results indicate that if the ET value for May or September increases, the resulting yield will increase, and if the ET value for June increase, the yield will decrease in many provinces. The results suggest that the water supply during the planting and flowering season greatly impacts production.

Table 2-2 shows the elasticities of yield of irrigated rice with respect to ET. If water supply in December increases, yield of irrigated rice in the north region will increase, and if the water supply in January increases, the yield in the south region will increase.

Table 2-3 shows the elasticities of yield of upland rice with respect to ET. The results are similar to those of wet season rice. If the water supply in May increases, yields will increase, and if water supply increases in June, yields will decrease. These results are consistent with the relationship between yield and planting time. If transplanting is delayed by the shift of the rainy season, the growth period will be shortened.

2-6-2. Results of estimation of planted area functions

Table 2-4 shows the elasticities of planted area of wet season rice with respect to farm price and ET. The equation is based on an adaptive expectation model in the case that ET is an expected value. The elasticities of area with respect to farm price are equivalent to the supply elasticities of price. The results indicate that if the water supply increases in September, farmers will decrease planting area. This could be a result of flood damage during the cultivation season which leads to a decrease in farmers' income. In this case, the low income will make preparation for planting difficult.

Table 2-5 and Table 2-6 show the elasticities of planted area for irrigated rice and upland rice with respect to farm price and ET. The results suggest that if the water supply increases in September, farmers will expand planting area in the dry season, because of the abundant water stock. The results also indicate that if the water supply increases in August in the north region, farmers cultivating upland rice will expand their planting area. The water supply probably induces much plant production in forest region and it will prepare suitable plant area for upland rice cultivation.

2-6-3. Simulation results of supply and demand model

The simulation term is from 2001 to 2015. The assumptions of the simulation are as follows; (1) the forecast growth rate of CPI is the average between 1995 and 2002, (2) the growth rate of real GDP is the average between 1980 and 2002, (3) the growth rate of exchange rate is the average between 1993 and 2002, (4) the growth rate of the population is the average between 1980 and 2002, (5) the linear trend of the yield functions are continued, (6) The trend of area functions are flat except for upland rice which is in decline.

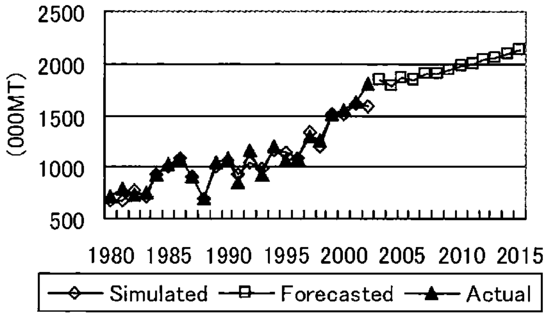

Fig. 2-3. Production of wet season rice

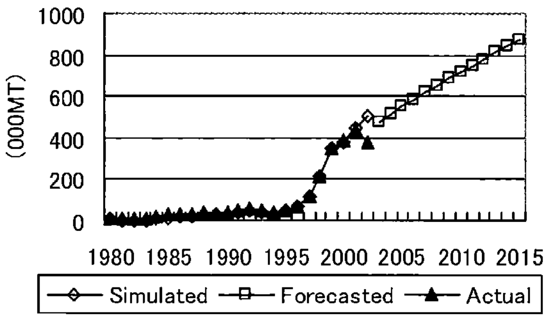

Fig. 2-4. Production of irrigated rice

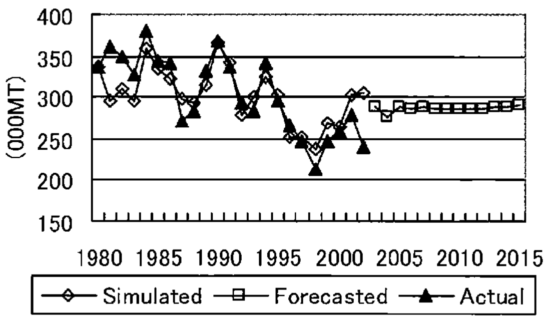

Fig. 2-5. Production of upland rice

Figure 2-3 through Figure 2-5 show the simulation results for the production of wet season rice, irrigated rice, and upland rice. The production of the wet season rice will increase 273,000 MT (metric tons) from 2005 to 2015. The dry season rice will also increase 326,000 MT during the period. However, the production of upland rice will be stable at around 290,000 MT during the period.

Figure 2-6 shows the simulation result of the market clearing realized farm price. The realized farm price will increase from 410 kip per MT to 610 kip per MT during the period. The realized farm prices are deflated by CPI with a base year of 1995.

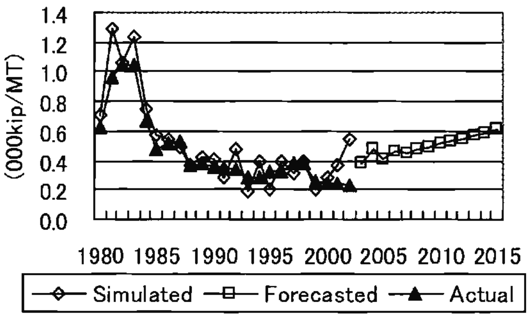

Fig. 2-6. Farm price

2-7. Conclusion

A supply and demand model of rice in Laos which can analyze production and water supply impacts for each province is developed. The results of the baseline analyses indicate that production of wet and dry season rice steadily increases and that of upland rice remains stable at the current production level. If the cycle of shifting cultivation changes by population growth, the production of upland rice will decrease due to the reduction in the fertility of the upland crop (Evenson, 1994).

The impacts of water supply changes on rice production and market in Lao are analyzed in Chapter 6 along with the other three countries.

Chapter 3
Development of the Rice Econometric Model with Endogenous Water in Cambodia (REMEW-CAM)

3-1. Introduction

Cambodia is one of the world's poorest countries, and the percentage of population with income below US$1.35 a day, at purchasing power parity was 36.9% in 2004. It ranks above only Nepal, Laos, Bangladesh and India in Asia. The contribution of production of agriculture, forestry, and fisheries to GDP was 29.7% in 2007; rice was the largest share among agricultural products. Rice consists of 68.5% of food consumption in calorie and the industry associated with the supply of rice is quite important for the economic development of this country.

Impacts of hydrological cycle changes on rice productions in various ecosystems, such as lowland, irrigated fields, recessional fields, and deep water region, are quite different in Cambodia. Lowlands comprise 85% of total rice planted area and there are some simple irrigation facilities, such as embankments, however, they are sometimes inundated and destroyed by flooding. Furthermore, there are some cases when rice cultivation in the dry season is impossible due to delayed wet season cultivation. Therefore, an analysis of how hydrological cycle changes will effect agricultural production and which region will be affected the most is important to aid in the formation of counteracting policy measures in the country.

This chapter describes the supply and demand of rice in Cambodia, which is named Rice Econometric Model Endogenous Water in Cambodia (REMEW-CAM), focusing on the impacts of fluctuations of water supply on rice production.

3-2. NSDP and Policies related to rice production

Cambodia had been an agricultural country based on rice cultivation and this primary industry employed 90% of the nation's worker until the 1980's. The turning point was in the early 1990's, and the Paris Peace Agreement in October 1991 which drew the curtains on an era of civil war. The planned economic system was replaced by capitalistic economic system after the election which was under the monitor of the United Nations Transitional Authority in Cambodia (UNTAC) in May 1993 and establishment of the constitutional law in September 1993.

The economic condition of Cambodia was dramatically changed by the rapid growth of the garment industry with foreign capital, Asian currency crisis and a membership of ASEAN. Following the two five-year Socio Economic Plans, the government started the National Strategic Development Plan (NSDP) focusing on reducing poverty. Increasing the yield of rice, enhancement of micro-finance availability, and improvement of food security are the goals of the plan in relation to agriculture.

Under the market economic system, marketing of paddy and milled rice have been liberalized. National enterprises managed by the Ministry of Commerce controlled the rice distribution in the era of the planned economy; however, the government no longer intervenes in the domestic market.

Many farmers sell a part of their paddy immediately in order to pay debt, and retain the remaining paddy. About 70% of farmers sell their paddy to middlemen and about 20% of farmers sell their paddy directly to rice millers. The rice millers provide finance to farmers and hold paddy in storage. The rice millers also collect specific type of rice using the middlemen.

There is no subsidy for producing rice. Provision of subsidies for fertilizer, research, dissemination of technologies, and finance has just begun under the aids of foreign countries.

Production and dissemination of seed of high yield varieties feature high on the government list of priorities. The Cambodian Research and Development Institute (CARDI) is addressing the challenge under the assistance of the government of Australia; however, the production of seeds is limited.

The government has plans to organize farmers; however, it remains a blueprint in the Ministry of Agriculture Forestry and Fisheries. NGOs and various banks provide finance to farmers, middlemen, and rice millers; the interest rates are very high because the risk is high and there are no policies related to finance. However, there is a system in which the central bank evaluates the fiscal health of the NGOs.

3-3. Model

The supply and demand model for rice in Cambodia consists of sixty-five structural equations and five identities and these are specified as follows. The planted area functions are specified based on the adaptive expectation model where the exogenous variable is ET. The ET variables in yield and area functions are specified in logarithms, because the coefficients of determination of logarithmic functions are higher than those of linear functions.

Provincial yield function of wet season rice (nineteen functions):

$YW^i_t = a_{YWi} + b_{YW1i}T + b_{YW2i}\ln ET^i_{MAR\,t} + \ldots$
$+ b_{YW6i}\ln ET^i_{JLY\,t}$ (3-1)

Provincial planted area function of wet season rice (nineteen functions):

$APW^i_t = a_{APWi} + b_{APW1i}T + b_{APW2i}APW^i_{t-1}$
$+ b_{APW3i}FPR_{t-1}/(CPI_{t-1}/100)$
$+ b_{APW4i}\ln ET^i_{MAY\,t} + b_{APW5i}\ln ET^i_{MAY\,t-1}$
$+ b_{APW6i}\ln ET^i_{JUN\,t} + b_{APW7i}\ln ET^i_{JUN\,t-1}$ (3-2)

Provincial yield function of dry season rice (twelve functions):

$YD^i_t = a_{YDi} + b_{YD1i}T + b_{YD2i}\ln ET^i_{JAN\,t} + \ldots$
$+ b_{YD6i}\ln ET^i_{MAY\,t}$ (3-3)

Provincial planted area function of dry season rice (twelve functions):

$APD^i_t = a_{APDi} + b_{APD1i}T + b_{APD2i}APD^i_{t-1}$
$+ b_{APD3i}FPR_{t-1}/(CPI_{t-1}/100)$
$+ b_{APD4i}\ln ET^i_{DEC\,t-1} + b_{APD5i}\ln ET^i_{DEC\,t-2}$
$+ b_{APW6i}\ln ET^i_{JAN\,t} + b_{APW7i}\ln ET^i_{JAN\,t-1}$ (3-4)

Provincial harvested area identity of wet season rice:

$AHW^i_t = APW^i_t - ABW^i_t = APW^i_t(1-RABW^i_t)$ (3-5)

Provincial harvested area identity of dry season rice:

$AHD^i_t = APD^i_t - ABD^i_t = APD^i_t(1-RABD^i_t)$ (3-6)

Country level production identity of wet season rice:

$QW_t = \Sigma_i YW^i_t AHW^i_t$ (3-7)

Country level production identity of dry season rice:

$QDt = \Sigma_i YD^i_t AHD^i_t$ (3-8)

Production identity of all seasons in milled equivalent:

$Qt = 0.667(QW_t + QD_t)$ (3-9)

Import function:

$IMP_t = a_{IM} + b_{IM1}WPR_t{*}EXR_t/FPR_t$ (3-10)

Stock change function:

$STC_t = a_{ST} + b_{ST1}[FPR_t/(CPI_t/100)$
$- FPR_{t-1}/(CPI_{t-1}/100)] + b_{ST2}(Q^t - Q_{t-1})$ (3-11)

Supply identity:

$QS_t = Q_t + IMP_t - EXP_t - STC_t$ (3-12)

Demand function:

$QS_t/POP_t = a_D + b_{D1}FPR_t/(CPI_t/100)$
$+ b_{D2}GDP_t/POP_t$ (3-13)

where i is the number of province, t denotes that the data are measured at time t, T is a time trend, ET^i_{JAN} through ET^i_{DEC} are evapotranspiration values for January through December, YW, APW, AHW, ABW, $RABW$, and QW are yield, planted area, harvested area, abandoned area, abandoned area ratio, and production of wet season rice, YD, APD, AHD, ABD, $RABD$, and QD are yield, planted area, harvested area, abandoned area, abandoned area ratio, and production of dry season rice, Q is total production, IMP is imports, EXP is exports, STC is the annual change of stocks, i.e., ending stock minus beginning stock, QS is total supply, POP is population, GDP is gross domestic products, EXR is exchange rate, WP is the world price of rice (Thailand, 5% broken, FOB), FP is the producer price. Figure 3-1 and Figure 3-2 represent

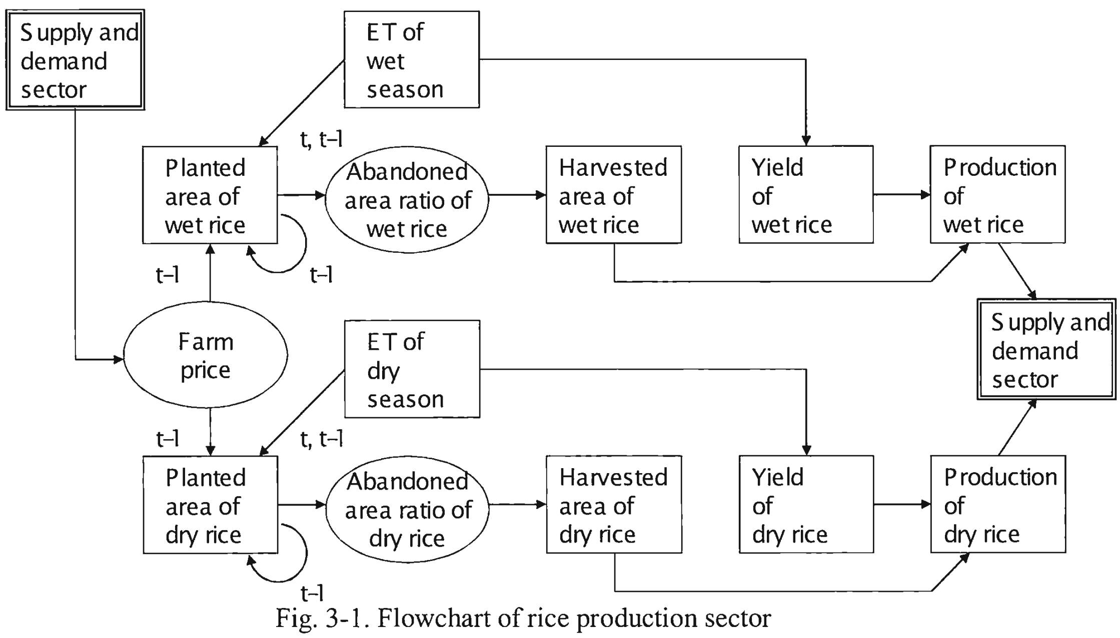

Fig. 3-1. Flowchart of rice production sector

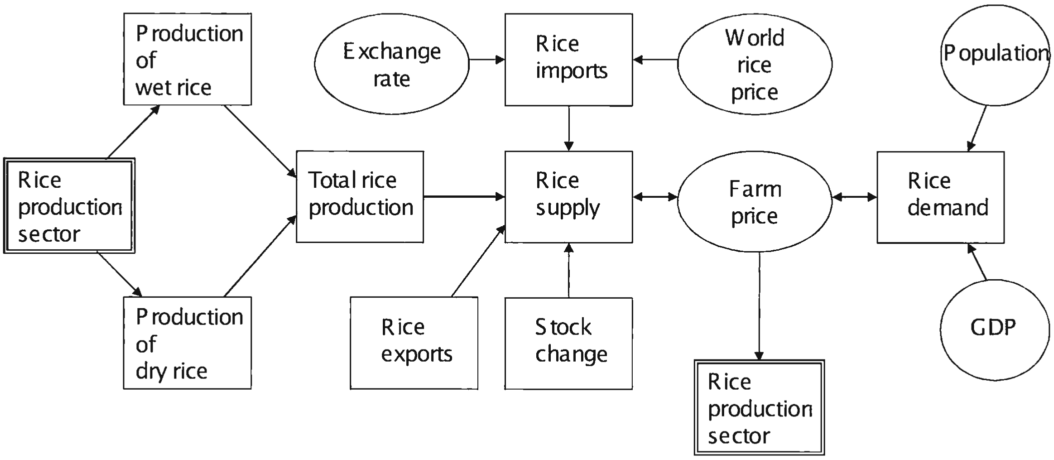

Fig. 3-2. Flowchart of supply and demand sector

models for the production sector and the overall supply and demand sector respectively.

3-4. Data

Evapotranspiration is used as a water supply variable for crops. The ET in a basin is obtained from the following identity:

ET = Irrigation + Rainfall + Capillary rise
+ Subsurface flow in – Runoff – Deep percolation
– Subsurface flow out.

The equation suggests that ET is equivalent to the available water for crops, therefore, it is used as a water supply variable in the model of this study. However, if the target region is large such as a whole country, the cost of a survey to determine the water supply components will be very high. Therefore, many methods in which the ET value is approximated from climatologic data have been presented for these fifty years. The actual ET *(ETa)* is equal to the reference ET (*ETo*) times the crop coefficient (*Kc*) and the stress coefficient (*Ks*). The estimation method of ETo of IMPACT-WATER, as applied in the IFPRI world food model which was the first world food model to consider water accounting, is the Penman method (Doorenbos and Kassam (1979)). The Penman-Monteith method (Allen et al. (1998)), an extension which considers aerodynamics of leaves, is used for calculating ET in our study. Ishigooka et al. (2005) provides the ET data for every province and month. The climatic data for the calculation are 0.5 degree grid data and are averaged for each province.

Available statistics for rice production in Cambodia are few, because the nation had been the planned economy until 1993. Data on rice production, which is divided into wet and dry seasons, are available from 1995. The short data period, along with data quality, is one of constraints in constructing the supply and demand model of rice. The time series data for production, planted area, and harvested area for the two seasons for all provinces are provided by the Department of Planning, Statistics and International Cooperation in the Ministry of Agriculture, Forestry and Fisheries of Cambodia. The farm price for rice is obtained from FAO-STAT and is a national average price for Cambodia. The consumer price index (CPI), GDP, and population are from the Asian Development Bank and the exchange rate and the world price of rice (Bangkok broken 5%, FOB) are data from IMF. The production data are available from 1995, and functions of yield and planted area are estimated using pooled data from 1995 to 2000 for each province. Import, stock, and demand functions are estimated using time series data which are available from 1983 to 2001. The yield and planted area functions of both seasons are not estimated for each province due to the lack of time series data. Parameters are obtained by estimating one function which includes provincial dummies using pooled data for nineteen provinces over six years. The estimation periods of these yield and planted area functions are from 1995 to 2000 which starts in the earliest available year for statistics of production of the two seasons and ends in the last year of available ET values. Parameters of yield and area functions for ET of each province are parameters of the reference province, i.e., Battambang province for the wet season and Prey Veng province for the dry season, plus those of variables of ET times statistically significant provincial dummies, e.g. $\ln ET_{MAR} * D_{02}$. The water variable in this study is the actual evapotranspiration. The estimated yield and planted area functions are shown in the following general form:

a) Yield function of wet season rice cultivation

$$YW_t = f_{YW} (T, T*D_{02},\ldots, T*D_{19}, \ln ET_{MARt}, \ln ET_{MARt}*D_{02},\ldots, \ln ET_{MARt}*D_{19},\ldots, \ln ET_{JLYt}, \ln ET_{JLYt}*D_{02},\ldots, \ln ET_{JLYt}*D_{19}) \quad (3\text{-}14)$$

b) Planted area function of wet season rice cultivation

$$APW_t = f_{APW} (D_{02},\ldots, D_{19}, APW_{t-1}, FPR_{t-1}, \ln ET_{MAYt}, \ln ET_{MAYt}*D_{02}, \ldots, \ln ET_{MAYt}*D_{19}, \ln ET_{MAYt-1}, \ln ET_{MAYt-1}*D_{02}, \ldots, \ln ET_{MAYt-1}*D_{19}, \ln ET_{JUNt}, \ln ET_{JUNt}*D_{02}, \ldots, \ln ET_{JUNt}*D_{19}, \ln ET_{JUNt-1}, \ln ET_{JUNt-1}*D_{02}, \ldots, \ln ET_{JUNt-1}*D_{19}) \quad (3\text{-}15)$$

c) Yield function of dry season rice cultivation

$$YD_t = f_{YD} (T, T*D_{02},\ldots, T*D_{12}, \ln ET_{JANt}, \ln ET_{JANt}*D_{02},\ldots, \ln ET_{JANt}*D_{12},\ldots, \ln ET_{MAYt}, \ln ET_{MAYt}*D_{02},\ldots, \ln ET_{MAYt}*D_{12}) \quad (3\text{-}16)$$

d) Planted area function of dry season rice cultivation

$$APD_t = f_{APD} (D_{02},\ldots, D_{12}, APD_{t-1}, FPR_{t-1}, \ln ET_{DECt-1}, \ln ET_{DECt-1}*D_{02},\ldots,\ln ET_{DECt-1}*D_{12}, \ln ET_{DECt-2}, \ln ET_{DECt-2}*D_{02},\ldots,\ln ET_{DECt-2}*D_{12}, \ln ET_{JANt}, \ln ET_{JANt}*D_{02},\ldots, \ln ET_{JANt}*D_{12}, \ln ET_{JANt-1}, \ln ET_{JANt-1}*D_{02},\ldots, \ln ET_{JANt-1}*D_{12}) \quad (3\text{-}17)$$

where T is a time trend, D_{02} through D_{19} are dummy variables of individual provinces, FPR is the farm price of rice, ET_{JAN} through ET_{DEC} are ET values for January through December.

These yield and planted area functions have many variables, and these variables are selected by empirically obtained statistical criteria. Monthly ETs of these yield functions are selected using stepwise selection method as a guide only with the hypothesized specification estimated by OLS because the water supply affects growth through the cropping season. The p-value of the F statistics as a criterion for the variable selection is 0.2. Alternatively, the numbers of variables in the planted area functions is twice as large as the yield functions due to inclusion of lagged variables, and therefore, obtaining stable estimates of these functions is difficult. Considering the difficulties of the estimation, first, ETs of the transplanting season, i.e., May and June in the wet season and those of December and January in the dry season, are selected as water variables, and then, these variables are selected by backward elimination method. The p-value of the F statistics as a criterion for the variable selection is 0.3, and these functions are estimated by OLS.

3-5. Estimation results of all functions

3-5-1. Yield functions

3-5-1-1. Yield function of wet season rice

YW= + 3.40365
(2.12)
+ 0.09519*TREND*D03
(4.69)
+ 0.10142*TREND*D06
(4.23)
+ 0.11065*TREND*D11
(2.50)
+ 0.04941*TREND*D15
(2.40)
- 0.10616*TREND*D16
(-4.99)
- 0.08375*TREND*D17
(-1.82)
- 0.07376*TREND*D18
(-3.52)
- 0.03100*TREND*D19
(-1.51)
- 0.06381*TREND*D20
(-3.10)
- 0.05010*TREND*D21
(-2.47)
- 0.46261*ln(ETMAR)*D07
(-1.96)
- 0.11613*ln(ETMAR)*D08
(-4.51)
+ 0.11765*ln(ETAPR)
(1.95)
- 0.31542*ln(ETAPR)*D01
(-1.91)
+ 0.11452*ln(ETAPR)*D02
(5.41)
+ 0.08901*ln(ETAPR)*D17
(1.90)
+ 0.39643*ln(ETMAY)
(2.34)
+ 0.30164*ln(ETMAY)*D01
(2.18)
- 1.87254*ln(ETMAY)*D04
(-2.66)
+ 0.28439*ln(ETMAY)*D07
(1.74)
- 0.84877*ln(ETJUN)
(-2.96)
+ 1.74622*ln(ETJUN)*D04
(2.55)
+ 0.88050*ln(ETJUN)*D11
(1.32)
- 0.98534*ln(ETJLY)*D11
(-1.43)

$AdjR^2=0.6786$

YW Yield of Wet Rice for all provinces (MT/HA)

TREND	Time Trend from 1995 to 2000
D01	Dummy Variable, 1 in Phnom Penh, 0 otherwise
D02	Dummy Variable, 1 in Kandal, 0 otherwise
D03	Dummy Variable, 1 in Kampong Cham, 0 otherwise
D04	Dummy Variable, 1 in Svay Rieng, 0 otherwise
D05	Dummy Variable, 1 in Prey Veng, 0 otherwise
D06	Dummy Variable, 1 in Ta Keo, 0 otherwise
D07	Dummy Variable, 1 in Kompong Thom, 0 otherwise
D08	Dummy Variable, 1 in Siem Reap, 0 otherwise
D09	Dummy Variable, 1 in Battambang, 0 otherwise (unused, Base)
D11	Dummy Variable, 1 in Pursat, 0 otherwise
D12	Dummy Variable, 1 in Kampong Chhnang, 0 otherwise
D15	Dummy Variable, 1 in Kam Pot, 0 otherwise
D16	Dummy Variable, 1 in Koh Kong, 0 otherwise
D17	Dummy Variable, 1 in Kompong Speu, 0 otherwise
D18	Dummy Variable, 1 in Preah Vihea, 0 otherwise
D19	Dummy Variable, 1 in Stung Treng, 0 otherwise
D20	Dummy Variable, 1 in Rottanakiri, 0 otherwise
D21	Dummy Variable, 1 in Mondulkiri, 0 otherwise
D22	Dummy Variable, 1 in Kratie, 0 otherwise
ETMAR	Evapotranspiration of March
ETAPR	Evapotranspiration of April
ETMAY	Evapotranspiration of May
ETJUN	Evapotranspiration of June
ETJLY	Evapotranspiration of July

3-5-1-1-1. Yield function of wet rice in Phnom Penh

YW01= +3.40365
+0.00000*TREND
+0.00000*ln (ET01MAR)
-0.19777 *ln (ET01APR)
+0.69807*ln (ET01MAY)
-0.84877*ln (ET01JUN)
+0.00000*ln (ET01JLY)

YW01	Yield of wet rice in Phnom Penh
ET01MAR	Evapotranspiration of March in Phnom Penh
ET01APR	Evapotranspiration of April in Phnom Penh
ET01MAY	Evapotranspiration of May in Phnom Penh
ET01JUN	Evapotranspiration of June in Phnom Penh
ET01JLY	Evapotranspiration of July in Phnom Penh

3-5-1-1-2. Yield function of wet rice in Kandal

YW02= +3.40365
+0.00000*TREND
+0.00000*ln (ET02MAR)
+0.23217*ln (ET02APR)
+0.39643*ln (ET02MAY)
-0.84877 *ln (ET02JUN)
+0.00000* ln (ET02JLY)

YW02	Yield of wet rice in Kandal
ET02MAR	Evapotranspiration of March in Kandal
ET02APR	Evapotranspiration of April in Kandal
ET02MAY	Evapotranspiration of May in Kandal
ET02JUN	Evapotranspiration of June in Kandal
ET02JLY	Evapotranspiration of July in Kandal

3-5-1-1-3. Yield function of wet rice in Kampong Cham

YW03= +3.40365
+0.09519*TREND
+0.00000*ln (ET03MAR)
+0.11765*ln (ET03APR)
+0.39643*ln (ET03MAY)
-0.84877*ln (ET03JUN)
+0.00000*ln (ET03JLY)

YW03	Yield of wet rice in Kampong Cham
ET03MAR	Evapotranspiration of March in Kampong Cham
ET03APR	Evapotranspiration of April in Kampong Cham
ET03MAY	Evapotranspiration of May in Kampong Cham
ET03JUN	Evapotranspiration of June in Kampong Cham
ET03JLY	Evapotranspiration of July in Kampong Cham

3-5-1-1-4. Yield function of wet rice in Svay Rieng

YW04= +3.40365
+0.00000*TREND
+0.00000*ln (ET04MAR)
+0.11765* ln (ET04APR)
-1.47611*ln (ET04MAY)
+0.89745*ln (ET04JUN)
+0.00000* ln (ET04JLY)

YW04	Yield of wet rice in Svay Rieng
ET04MAR	Evapotranspiration of March in Svay Rieng
ET04APR	Evapotranspiration of April in Svay Rieng
ET04MAY	Evapotranspiration of May in Svay Rieng
ET04JUN	Evapotranspiration of June in Svay Rieng
ET04JLY	Evapotranspiration of July in Svay Rieng

3-5-1-1-5. Yield function of wet rice in Prey Veng

YW05= +3.40365
+0.00000*TREND
+0.00000*ln (ET05MAR)
+0.11765*ln (ET05APR)
+0.39643*ln (ET05MAY)
-0.84877*ln (ET05JUN)
+0.00000*ln (ET05JLY)

YW05	Yield of wet rice in Prey Veng
ET05MAR	Evapotranspiration of March in PreyVeng
ET05APR	Evapotranspiration of April in Prey Veng
ET05MAY	Evapotranspiration of May in Prey Veng
ET05JUN	Evapotranspiration of June in Prey Veng
ET05JLY	Evapotranspiration of July in Prey Veng

3-5-1-1-6. Yield function of wet rice in Ta Keo

YW06= +3.40365
+0.00000*TREND
+0.00000*ln (ET06MAR)
+0.11765*ln (ET06APR)
+0.39643*ln (ET06MAY)
-0.84877*ln (ET06JUN)
+0.00000*ln (ET06JLY)

YW06	Yield of wet rice in Ta Keo
ET06MAR	Evapotranspiration of March in TaKeo
ET06APR	Evapotranspiration of April in Ta Keo
ET06MAY	Evapotranspiration of May in Ta Keo
ET06JUN	Evapotranspiration of June in Ta Keo

ET06JLY Evapotranspiration of July in Ta Keo

3-5-1-1-7. Yield function of wet rice in Kompong Thom

YW07= +3.40365
+0.00000*TREND
-0.46261*ln (ET07MAR)
+0.11765*ln (ET07APR)
+0.68082*ln (ET07MAY)
-0.84877*ln (ET07JUN)
+0.00000*ln (ET07JLY)

YW07 Yield of wet rice in Kompong Thom
ET07MAR Evapotranspiration of March in Kompong Thom
ET07APR Evapotranspiration of April in Kompong Thom
ET07MAY Evapotranspiration of May in Kompong Thom
ET07JUN Evapotranspiration of June in Kompong Thom
ET07JLY Evapotranspiration of July in Kompong Thom

3-5-1-1-8. Yield function of wet rice in Siem Reap

YW08= +3.40365
+0.00000*TREND
-0.11613*ln (ET08MAR)
+0.11765*ln (ET08APR)
+0.39643* ln (ET08MAY)
-0.84877*ln (ET08JUN)
+0.00000*ln (ET08JLY)

YW08 Yield of wet rice in Siem Reap
ET08MAR Evapotranspiration of March in Siem Reap
ET08APR Evapotranspiration of April in Siem Reap
ET08MAY Evapotranspiration of May in Siem Reap
ET08JUN Evapotranspiration of June in Siem Reap
ET08JLY Evapotranspiration of July in Siem Reap

3-5-1-1-9. Yield function of wet rice in Battambang

YW09= +3.40365
+0.00000*TREND
+0.00000*ln (ET09MAR)
+0.11765*ln (ET09APR)
+0.39643*ln (ET09MAY)
-0.84877*ln (ET09JUN)
+0.00000*ln (ET09JLY)

YW09 Yield of wet rice in Battambang
ET09MAR Evapotranspiration of March in Battambang
ET09APR Evapotranspiration of April in Battambang
ET09MAY Evapotranspiration of May in Battambang
ET09JUN Evapotranspiration of June in Battambang
ET09JLY Evapotranspiration of July in Battambang

3-5-1-1-10. Yield function of wet rice in Pursat

YW11= +3.40365
+ 0.11065*TREND
+0.00000*ln (ET11MAR)
+0.11765* ln (ET11APR)
+0.39643*ln (ET11MAY)
+0.03173*ln (ET11JUN)
-0.98534*ln (ET11JLY)

YW11 Yield of wet rice in Pursat
ET11MAR Evapotranspiration of March in Pursat
ET11APR Evapotranspiration of April in Pursat
ET11MAY Evapotranspiration of May in Pursat
ET11JUN Evapotranspiration of June in Pursat
ET11JLY Evapotranspiration of July in Pursat

3-5-1-1-11. Yield function of wet rice in Kampong Chhnang

YW12= +3.40365
+ 0.00000* TREND
+0.00000 * ln (ET12MAR)
+0.11765 * ln (ET12APR)
+0.39643 * ln (ET12MAY)
-0.84877 * ln (ET12JUN)
+0.00000 * ln (ET12JLY)

YW12 Yield of wet rice in Kampong Chhnang
ET12MAR Evapotranspiration of March inKampong hhnang
ET12APR Evapotranspiration of April in Kampong Chhnang
ET12MAY Evapotranspiration of May in Kampong Chhnang
ET12JUN Evapotranspiration of June in Kampong Chhnang
ET12JLY Evapotranspiration of July in Kampong Chhnang

3-5-1-1-12. Yield function of wet rice in Kam Pot

YW15= +3.40365
+ 0.04941*TREND
+0.00000*ln (ET15MAR)
+0.11765*ln (ET15APR)
+0.39643* ln (ET15MAY)
-0.84877*ln (ET15JUN)
+0.00000* ln (ET15JLY)

YW15 Yield of wet rice in Kam Pot
ET15MAR Evapotranspiration of March in Kam Pot
ET15APR Evapotranspiration of April in p Kam Pot
ET15MAY Evapotranspiration of May in Kam Pot
ET15JUN Evapotranspiration of June in p Kam Pot
ET15JLY Evapotranspiration of July in Kam Pot

3-5-1-1-13. Yield function of wet rice in Koh Kong

YW16= +3.40365
-0.10616 *TREND
+0.00000*ln (ET16MAR)
+0.11765*ln (ET16APR)
+0.39643*ln (ET16MAY)
-0.84877*ln (ET16JUN)
+0.00000*ln (ET16JLY)

YW16 Yield of wet rice in Koh Kong
TREND Time Trend from 1996 to 2000,5 after 2001
ET16MAR Evapotranspiration of March in KohKong
ET16APR Evapotranspiration of April in Koh Kong
ET16MAY Evapotranspiration of May in Koh Kong
ET16JUN Evapotranspiration of June in Koh Kong
ET16JLY Evapotranspiration of July in Koh Kong

3-5-1-1-14. Yield function of wet rice in Kompong speu

YW17= +3.40365
-0.08375*REND
+0.00000*ln (ET17MAR)
+0.20666*ln (ET17APR)
+0.39643*ln (ET17MAY)
-0.84877*ln (ET17JUN)
+0.00000*ln (ET17JLY)

YW17 Yield of wet rice in Kampong speu
TREND Time Trend from 1996 to 2000,5 after 2001
ET17MAR Evapotranspiration of March in Kampong speu
ET17APR Evapotranspiration of April in Kampong speu
ET17MAY Evapotranspiration of May in Kampong speu
ET17JUN Evapotranspiration of June in Kampong speu
ET17JLY Evapotranspiration of July in Kampong speu

3-5-1-1-15. Yield function of wet rice in Preah Vihea

YW18= +3.40365
-0.08375*TREND
+0.00000*ln (ET18MAR)
+0.20666*ln (ET18APR)
+0.39643*ln (ET18MAY)
-0.84877*ln (ET18JUN)
+0.00000*ln (ET18JLY)

YW18 Yield of wet rice in Preah Vihea
TREND Time Trend from 1996 to 2000,5 after 2001
ET18MAR Evapotranspiration of March in Preah Vihea
ET18APR Evapotranspiration of April in Preah Vihea
ET18MAY Evapotranspiration of May in Preah Vihea
ET18JUN Evapotranspiration of June in Preah Vihea
ET18JLY Evapotranspiration of July in Preah Vihea

3-5-1-1-16. Yield function of wet rice in Stung Treng

YW19= +3.40365
-0.03100*TREND
+0.00000*ln (ET19MAR)
+0.11765*ln (ET19APR)
+0.39643*ln (ET19MAY)
-0.84877*ln (ET19JUN)
+0.00000*ln (ET19JLY)

YW19 Yield of wet rice in Stung Treng
TREND Time Trend from 1996 to 2000,5 after 2001
ET19MAR Evapotranspiration of March in Stung Treng
ET19APR Evapotranspiration of April in Stung Treng
ET19MAY Evapotranspiration of May in Stung Treng
ET19JUN Evapotranspiration of June in Stung Treng
ET19JLY Evapotranspiration of July in Stung Treng

3-5-1-1-17. Yield function of wet rice in Rottanakiri

YW20= +3.40365
-0.06381*TREND
+0.00000*ln (ET20MAR)
+0.11765*ln (ET20APR)
+0.39643*ln (ET20MAY)
-0.84877*ln (ET20JUN)
+0.00000*ln (ET20JLY)

YW20 Yield of wet rice in Rottanakiri
TREND Time Trend from 1996 to 2000,5 after 2001
ET20MAR Evapotranspiration of March in Rottanakiri
ET20APR Evapotranspiration of April in Rottanakiri
ET20MAY Evapotranspiration of May in Rottanakiri
ET20JUN Evapotranspiration of June in Rottanakiri
ET20JLY Evapotranspiration of July in Rottanakiri

3-5-1-1-18. Yield function of wet rice in Mondulkiri

YW21= +3.40365
-0.05010*TREND
+0.00000*ln (ET21MAR)
+0.11765*ln (ET21APR)
+0.39643*ln (ET21MAY)
-0.84877*ln (ET21JUN)
+0.00000*ln (ET21JLY)

YW21 Yield of wet rice in Mondulkiri
TREND Time Trend from 1996 to 2000,5 after 2001
ET21MAR Evapotranspiration of March in Mondulkiri
ET21APR Evapotranspiration of April in Mondulkiri
ET21MAY Evapotranspiration of May in Mondulkiri
ET21JUN Evapotranspiration of June in Mondulkiri
ET21JLY Evapotranspiration of July in Mondulkiri

3-5-1-1-19. Yield function of wet rice in Kratie

YW22= +3.40365
+0.00000*TREND
+0.00000 * ln (ET22MAR)
+0.11765 * ln (ET22APR)
+0.39643 * ln (ET22MAY)
-0.84877 * ln (ET22JUN)
+0.00000 * ln (ET22JLY)

YW22 Yield of wet rice in Kratie
ET22MAR Evapotranspiration of March in Kratie
ET22APR Evapotranspiration of April in Kratie
ET22MAY Evapotranspiration of May in Kratie
ET22JUN Evapotranspiration of June in Kratie
ET22JLY Evapotranspiration of July in Kratie

3-5-1-2. Yield function of dry season rice

YD= - 2.67199
(-4.86)
+ 2.91089**D11
(1.93)
- 0.09891*TREND*D01
(-1.83)
+ 0.16861*TREND*D02
(1.79)
+ 0.10317*TREND*D03
(2.12)
- 0.13776*TREND*D09
(-2.49)
+ 1.12380*ln(ETJAN)
(10.18)
- 4.77987*ln(ETJAN)*D02
(-3.04)
+ 2.22020*ln(ETJAN)*D09
(4.30)
- 1.22031*ln(ETFEB)*D08
(-2.99)
- 0.87649*ln(ETFEB)*D11
(-2.09)
+ 0.13943*ln(ETMAR)
(1.86)
- 0.53233*ln(ETMAR)*D01
(-2.63)
+ 0.05519*ln(ETMAR)*D12
(2.05)

+ 0.43562*ln(ETMAR)*D17
(2.33)
+ 0.10595*ln(ETAPR)
(1.30)
+ 0.47643*ln(ETAPR)*D01
(2.25)
+ 0.60381*ln(ETAPR)*D08
(2.33)
- 1.75954*ln(ETAPR)*D09
(-3.85)
+ 4.46306*ln(ETMAY)*D02
(3.15)
- 0.06201*ln(ETMAY)*D03
(-1.46)
- 0.09500*ln(ETMAY)*D04
(-3.91)
- 0.09608*ln(ETMAY)*D06
(-3.65)
+ 0.36658*ln(ETMAY)*D08
(1.72)
- 0.43031*ln(ETMAY)*D17
(-2.85)

$AdjR^2$=0.8003

YD	Yield of Dry Rice for all provinces (MT/HA)
TREND	Time Trend from 1995 to 2000
D01	Dummy Variable, 1 in Phnom Penh, 0 otherwise
D02	Dummy Variable, 1 in Kandal, 0 otherwise
D03	Dummy Variable, 1 in Kampong Cham, 0 otherwise
D04	Dummy Variable, 1 in Svay Rieng, 0 otherwise
D05	Dummy Variable, 1 in Prey Veng, 0 otherwise (unused, Base)
D06	Dummy Variable, 1 in Ta Keo, 0 otherwise
D07	Dummy Variable, 1 in Kompong Thom, 0 otherwise
D08	Dummy Variable, 1 in Siem Reap, 0 otherwise
D09	Dummy Variable, 1 in Battambang, 0 otherwise
D11	Dummy Variable, 1 in Pursat, 0 otherwise
D12	Dummy Variable, ! in Kampong Chhnang, 0 otherwise
D17	Dummy Variable, 1 in Kompong Speu, 0 otherwise
D22	Dummy Variable, 1 in Kratie, 0 otherwise
ETJAN	Evapotranspiration of January
ETFEB	Evapotranspiration of February
ETMAR	Evapotranspiration of March
ETAPR	Evapotranspiration of April
ETMAY	Evapotranspiration of May

3-5-1-2-1. Yield function of dry rice in Phnom Penh

YD01= -2.67199
-0.09891*TREND
+1.12380*ln (ET01 JAN)
+0.00000*ln (ET01 FEB)
-0.39290*ln (ET01 MAR)
+0.58238*ln (ET01 APR)
+0.00000*ln (ET01 MAY)

YD01	Yield of dry rice in Phnom Penh
TREND	Time Trend from 1996 to 2000,5 after 2001
ET01 JAN	Evapotranspiration of January in Phnom Penh
ET01 FEB	Evapotranspiration of February in Phnom Penh
ET01MAR	Evapotranspiration of March in Phnom Penh
ET01APR	Evapotranspiration of April in Phnom Penh
ET01MAY	Evapotranspiration of May in Phnom Penh

3-5-1-2-2. Yield function of dry rice in Kandal

YD02= -2.67199
+0.1686*TREND
-3.65607*ln (ET02 JAN)
+0.00000*ln (ET02 FEB)
+0.13943*ln (ET02 MAR)
+0.10595*ln (ET02 APR)
+4.46306*ln (ET02 MAY)

YD02	Yield of dry rice in Kandal
ET02 JAN	Evapotranspiration of January in Kandal
ET02 FEB	Evapotranspiration of March in Kandal
ET02MAR	Evapotranspiration of March in Kandal
ET02APR	Evapotranspiration of April Kandal
ET02MAY	Evapotranspiration of May in Kandal

3-5-1-2-3. Yield function of dry rice in Kampong Cham

YD03= -2.67199
+0.10317*TREND
+1.12380* ln (ET03 JAN)
+0.00000* ln (ET03 FEB)
+0.13943* ln (ET03 MAR)
+0.10595* ln (ET03 APR)
-0.06201*ln (ET03 MAY)

YD03	Yield of dry rice in Kampong Cham
ET03 JAN	Evapotranspiration of January in Kampong Cham
ET03 FEB	Evapotranspiration of February in Kampong Cham
ET03MAR	Evapotranspiration of March in Kampong Cham
ET03APR	Evapotranspiration of April in Kampong Cham
ET03MAY	Evapotranspiration of May in Kampong Cham

3-5-1-2-4. Yield function of dry rice in Svay Rieng

YD04= -2.67199
+0.00000*TREND
+1.12380* ln (ET04 JAN)
+0.00000* ln (ET04 FEB)
+0.13943-* ln (ET04 MAR)
+0.10595* ln (ET04 APR)
-0.09500 * ln (ET04 MAY)

YD04	Yield of dry rice in Svay Rieng
ET04 JAN	Evapotranspiration of January in Svay Rieng
ET04 FEB	Evapotranspiration of February in Svay Rieng
ET04MAR	Evapotranspiration of March in Svay Rieng
ET04APR	Evapotranspiration of April in Svay Rieng
ET04MAY	Evapotranspiration of May in Svay Rieng

3-5-1-2-5. Yield function of dry rice in Prey Veng

YD05= -2.67199
+0.00000*TREND
+1.12380*ln (ET05 JAN)
+0.00000*ln (ET05 FEB)
+0.13943*ln (ET05 MAR)
+0.10595*ln (ET05 APR)
+0.00000*ln (ET05 MAY)

YD05 Yield of dry rice in Prey Veng
ET05 JAN Evapotranspiration of January in Prey Veng
ET05 FEB Evapotranspiration of February in Prey Veng
ET05MAR Evapotranspiration of March in Prey Veng
ET05APR Evapotranspiration of April in Prey Veng
ET05MAY Evapotranspiration of May in Prey Veng

3-5-1-2-6. Yield function of dry rice in Ta Keo

YD06= -2.67199
+0.00000*TREND
+1.12380*ln (ET06 JAN)
+0.00000*ln (ET06 FEB)
+0.13943*ln (ET06 MAR)
+0.10595*ln (ET06 APR)
-0.09608 *ln (ET06 MAY)

YD06 Yield of dry rice in Ta Keo
ET06 JAN Evapotranspiration of January in Ta Keo
ET06 FEB Evapotranspiration of February in Ta Keo
ET06MAR Evapotranspiration of March in Ta Keo
ET06APR Evapotranspiration of April in Ta Keo
ET06MAY Evapotranspiration of May in Ta Keonh

3-5-1-2-7. Yield function of dry rice in Kompong Thom

YD07= -2.67199
+0.00000*TREND
+1.12380*ln (ET07 JAN)
+0.00000*ln (ET07 FEB)
+0.13943*ln (ET07 MAR)
+0.10595*ln (ET07 APR)
+0.00000*ln (ET07 MAY)

YD07 Yield of dry rice in Kompong Thom
ET07JAN Evapotranspiration of January in Kompong Thom
ET07FEB Evapotranspiration of February in Kompong hom
ET07MAR Evapotranspiration of March in Kompong Thom
ET07APR Evapotranspiration of April in Kompong Thom
ET07MAY Evapotranspiration of May in Kompong Thom

3-5-1-2-8. Yield function of dry rice in Siem Reap

YD08= -2.67199
+0.00000*TREND
+1.12380* ln (ET08 JAN)
-1.22031* ln (ET08 FEB)
+0.13943* ln (ET08 MAR)
+0.70976* ln (ET08 APR)
+0.36658 * ln (ET08 MAY)

YD08 Yield of dry rice in Siem Reap
ET08 JAN Evapotranspiration of January in Siem Reap
ET08 FEB Evapotranspiration of February in Siem Reap
ET08MAR Evapotranspiration of March in Siem Reap
ET08APR Evapotranspiration of April in Siem Reap
ET08MAY Evapotranspiration of May in Siem Reap

3-5-1-2-9. Yield function of dry rice in Battambang

YD09= -2.67199
-0.13776 *TREND
+3.34400 * ln (ET09 JAN)
+0.00000* ln (ET09 FEB)
+0.13943* ln (ET09 MAR)
-1.65359 * ln (ET09 APR)
+0.00000 * ln (ET09 MAY)

YD09 Yield of dry rice in Battambang
TREND Time Trend from 1996 to 2000,5 after 2001
ET09 JAN Evapotranspiration of January in Battambang
ET09 FEB Evapotranspiration of February in Battambang
ET09MAR Evapotranspiration of March in Battambang
ET09APR Evapotranspiration of April in Battambang
ET09MAY Evapotranspiration of May in Battambang

3-5-1-2-10. Yield function of dry rice in Pursat

YD11= +0.23890
+0.00000*TREND
+1.12380*ln (ET11 JAN)
-0.87649*ln (ET11 FEB)
+0.13943*ln (ET11 MAR)
+0.10595*ln (ET11 APR)
+0.00000*ln (ET11 MAY)

YD11 Yield of dry rice in Pursa
ET11 JAN Evapotranspiration of January in Pursa
ET11 FEB Evapotranspiration of February in Pursa
ET11MAR Evapotranspiration of March in Pursa
ET11APR Evapotranspiration of April in Pursa
ET11MAY Evapotranspiration of May in Pursa

3-5-1-2-11. Yield function of dry rice in Kampong Chhnang

YD12= -2.67199
0.00000*TREND
+1.12380* ln (ET12 JAN)
+0.00000* ln (ET12 FEB)
+0.19462* ln (ET12 MAR)
+0.10595 * ln (ET12 APR)
+0.00000 * ln (ET12 MAY)

YD12 Yield of dry rice in Kampong Chhnang
ET12 JAN Evapotranspiration of January in Kampong Chhnang
ET12 FEB Evapotranspiration of February in Kampong Chhnang
ET12MAR Evapotranspiration of March in Kampong Chhnang
ET12APR Evapotranspiration of April in Kampong Chhnang
ET12MAY Evapotranspiration of May in Kampong Chhnang

3-5-1-2-12. Yield function of dry rice in Kompong speu

YD17= -2.67199
+0.00000*TREND
+1.12380*ln (ET17 JAN)
+0.00000*ln (ET17FEB)
+0.57505*ln (ET17 MAR)
+0.10595*ln (ET17 APR)
-0.43031*ln (ET17 MAY)

YD17 Yield of dry rice in Kompong speu
ET17JAN Evapotranspiration of January in Kompong speu
ET17 FEB Evapotranspiration of February in Kompong speu
ET17MAR Evapotranspiration of March in Kompong speu
ET17APR Evapotranspiration of April in Kompong speu
ET17MAY Evapotranspiration of May in Kompong speu

3-5-1-2-13. Yield function of dry rice in Kratie

YD22= -2.67199
0.00000*TREND
+1.12380*ln (ET22JAN)
+0.00000*ln (ET22 FEB)
+0.13943*ln (ET22 MAR)
+0.10595*ln (ET22 APR)
+0.00000*ln (ET22 MAY)

YD22	Yield of dry rice in Kratie
ET22JAN	Evapotranspiration of January in Kratie
ET22 FEB	Evapotranspiration of February in Kratie
ET22MAR	Evapotranspiration of March in Kratie
ET22APR	Evapotranspiration of April in Kratie
ET22MAY	Evapotranspiration of May in Kratie

3-5-2. Planted area functions

3-5-2-1. Planted area function of wet season rice

APW= - 6463
(-0.14)
- 2221336*D05
(-5.87)
+ 0.85037*APW(t-1)
(15.02)
+ 0.00944*FP(t-1)/[CPI(t-1)/100]*D05
(1.52)
+ 92680*ln(ETMAY)
(9.52)
- 95019*ln(ETMAY)*D01
(-5.77)
- 85710*ln(ETMAY)*D02
(-5.01)
- 63164*ln(ETMAY)*D03
(-3.76)
-111512*ln(ETMAY)*D04
(-5.85)
- 66418*ln(ETMAY)*D06
(-3.33)
- 81363*ln(ETMAY)*D07
(-4.73)
- 73572*ln(ETMAY)*D11
(-4.48)
-119268*ln(ETMAY)*D12
(-6.01)
-102987*ln(ETMAY)*D15
(-6.58)
- 95084*ln(ETMAY)*D16
(-6.32)
- 87467*ln(ETMAY)*D17
(-5.91)
- 98704*ln(ETMAY)*D18
(-6.58)
- 96906*ln(ETMAY)*D19
(-6.72)
- 92188*ln(ETMAY)*D20
(-6.41)
- 96562*ln(ETMAY)*D21
(-4.50)
-104672*ln(ETMAY)*D22
(-4.77)
- 87472*ln[ETMAY(t-1)]
(-7.47)
+ 83302*ln[ETMAY(t-1)]*D01
(4.92)
+ 75050*ln[ETMAY(t-1)]*D02
(4.28)
+ 74012*ln[ETMAY(t-1)]*D03
(4.31)
+105287*ln[ETMAY(t-1)]*D04
(5.45)
+ 79784*ln[ETMAY(t-1)]*D05
(4.03)
+100213*ln[ETMAY(t-1)]*D06
(4.85)
+ 73241*ln[ETMAY(t-1)]*D07
(4.20)
+ 75349*ln[ETMAY(t-1)]*D08
(4.63)
+ 64419*ln[ETMAY(t-1)]*D11
(3.85)
+110296*ln[ETMAY(t-1)]*D12
(5.41)
+ 96034*ln[ETMAY(t-1)]*D15
(5.99)
+ 83501*ln[ETMAY(t-1)]*D16
(5.36)
+ 78199*ln[ETMAY(t-1)]*D17
(5.14)
+ 87432*ln[ETMAY(t-1)]*D18
(5.63)
+ 85583*ln[ETMAY(t-1)]*D19
(5.72)
+ 80755*ln[ETMAY(t-1)]*D20
(5.43)
+ 84777*ln[ETMAY(t-1)]*D21
(3.87)
+ 93601*ln[ETMAY(t-1)]*D22
(4.18)
+ 7998*ln(ETJUN)
(1.05)
- 16651*ln(ETJUN)*D03
(-1.01)
+137638*ln(ETJUN)*D05
(3.08)
- 38671*ln(ETJUN)*D06
(-1.54)
- 80008*ln(ETJUN)*D08
(-5.01)
+261160*ln[ETJUN(t-1)]*D05
(6.59)

AdjR^2=0.9912

APW	Planted area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
CPI	Consumer Price Index (1995=100)
D01	Dummy Variable, 1 in Phnom Penh, 0 otherwise
D02	Dummy Variable, 1 in Kandal, 0 otherwise

D03	Dummy Variable, 1 in Kampong Cham, 0 otherwise
D04	Dummy Variable, 1 in Svay Rieng, 0 otherwise
D05	Dummy Variable, 1 in Prey Veng, 0 otherwise
D06	Dummy Variable, 1 in Ta Keo, 0 otherwise
D07	Dummy Variable, 1 in Kompong Thom, 0 otherwise
D08	Dummy Variable, 1 in Siem Reap, 0 otherwise
D09	Dummy Variable, 1 in Battambang, 0 otherwise (unused, Base)
D11	Dummy Variable, 1 in Pursat, 0 otherwise
D12	Dummy Variable, 1 in Kampong Chhnang, 0 otherwise
D15	Dummy Variable, 1 in Kam Pot, 0 otherwise
D16	Dummy Variable, 1 in Koh Kong, 0 otherwise
D17	Dummy Variable, 1 in Kompong Speu, 0 otherwise
D18	Dummy Variable, 1 in Preah Vihea, 0 otherwise
D19	Dummy Variable, 1 in Stung Treng, 0 otherwise
D20	Dummy Variable, 1 in Rottanakiri, 0 otherwise
D21	Dummy Variable, 1 in Mondulkiri, 0 otherwise
D22	Dummy Variable, 1 in Kratie, 0 otherwise
ETMAY	Evapotranspiration of May
ETJUN	Evapotranspiration of June

3-5-2-1-1. Planted Area function of wet rice in Phnom Penh

APW01= - 6379.25000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00033*FP(-1)/(CPI(-1)/100)
- 2339.00000*ln (ET01MAY)
-4170.00000*ln (ET01 MAY(-1))
+ 7998.00000*ln (ET01JUN)
+ 0.00000*ln (ET01JUN(-1))

APW01	Area Function of wet rice in Phnom Penh
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET01MAY	Evapotranspiration of May in Phnom Penh
ET01JUN	Evapotranspiration of June in Phnom Penh

3-5-2-1-2. Planted Area function of wet rice in Kandal

APW02= -7011.09000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+0.00191*FP(-1)/(CPI(-1)/100)
+6970.00000*ln (ET02MAY)
-12422.00000*ln (ET02 MAY(-1))
+ 7998.00000*ln (ET02JUN)
+ 0.00000*ln (ET02JUN(-1))

APW02	Area Function of wet rice in Kandal
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted Area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET02MAY	Evapotranspiration of May in Kandal
ET02JUN	Evapotranspiration of June in Kandal

3-5-2-1-3. Planted Area function of wet rice in Kampong Cham

APW03= -13050.58000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+0.00697*FP(-1)/(CPI(-1)/100)
+29516.000000*ln (ET03MAY)
-13460.00000*ln (ET03 MAY(-1))
-8653.00000*ln (ET03JUN)
+ 0.00000*ln (ET03JUN(-1))

APW03	Area Function of wet rice in Kampong Cham
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted Area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET03MAY	Evapotranspiration of May in Kampong Cham
ET03JUN	Evapotranspiration of June in Kampong Cham

3-5-2-1-4. Planted Area function of wet rice in Svay Rieng

APW04= -11753.26000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+0.00691*FP(-1)/(CPI(-1)/100)
-18832.00000*ln (ET04MAY)
+17815.00000*ln (ET04 MAY(-1))
+ 7998.00000*ln (ET04JUN)
+ 0.00000*ln (ET04JUN(-1))

APW04	Area Function of wet rice in Svay Rieng
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted Area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET04MAY	Evapotranspiration of May in Svay Rieng
ET04JUN	Evapotranspiration of June in Svay Rieng

3-5-2-1-5. Planted Area function of wet rice in Prey Veng

APW05= -2227799.36000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+0.00944*FP(-1)/(CPI(-1)/100)
+92680.00000*ln (ET05MAY)
-7688.00000*ln (ET05 MAY(-1))
+145636.00000*ln (ET05JUN)
+261160.00000*ln (ET05JUN(-1))

APW05	Area Function of wet rice in Prey Veng
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted Area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET05MAY	Evapotranspiration of May in Prey Veng
ET05JUN	Evapotranspiration of June in Prey Veng

3-5-2-1-6. Planted Area function of wet rice in Ta keo

APW06= -12374.70000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00748*FP(-1)/(CPI(-1)/100)
+ 26262.00000*ln (ET06MAY)
+12741.00000*ln (ET06 MAY(-1))
-30673.00000*ln (ET06JUN)
+ 0.00000*ln (ET06JUN(-1))

APW06	Area Function of wet rice in Ta keo
TREND	Time Trend from 1996 to 2000, 5 after 2001
APW	Planted Area of wet rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)

ET06MAY Evapotranspiration of May in Ta keo
ET06JUN Evapotranspiration of June in Ta keo

3-5-2-1-7. Planted Area function of wet rice in Kompong Thom

APW07= -8398.44 000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00516*FP(-1)/(CPI(-1)/100)
+11317.00000*ln (ET07MAY)
-14231.00000*ln (ET07 MAY(-1))
+ 7998.00000*ln (ET07JUN)
+ 0.00000*ln (ET07JUN(-1))

APW07 Area Function of wet rice in Kompong Thom
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET07MAY Evapotranspiration of May in Kompong Thom
ET07JUN Evapotranspiration of June in Kompong Thom

3-5-2-1-8. Planted Area function of wet rice in Siem Reap

APW08= -7271.07000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00792*FP(-1)/(CPI(-1)/100)
+92680.00000*ln (ET08MAY)
-12123.00000*ln (ET08 MAY(-1))
- 72010.00000*ln (ET08JUN)
+ 0.00000*ln (ET08JUN(-1))

APW08 Area Function of wet rice in Siem Reap
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET08MAY Evapotranspiration of May in Siem Reap
ET08JUN Evapotranspiration of June in Siem Reap

3-5-2-1-9. Planted Area function of wet rice in Battambang

APW09= -3314.56000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.01430*FP(-1)/(CPI(-1)/100)
+92680.00000*ln (ET09MAY)
-87472.00000*ln (ET09 MAY(-1))
+ 7998.00000*ln (ET09JUN)
+ 0.00000*ln (ET09JUN(-1))

APW09 Area Function of wet rice in Battambang
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET09MAY Evapotranspiration of May in Battambang
ET09JUN Evapotranspiration of June in Battambang

3-5-2-1-10. Planted Area function of wet rice in Pursat

APW11= -9077.98 000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00338*FP(-1)/(CPI(-1)/100)
+19108.00000*ln (ET11MAY)
-23053.00000*ln (ET11 MAY(-1))
+ 7998.00000*ln (ET11JUN)
+ 0.00000*ln (ET11JUN(-1))

APW11 Area Function of wet rice in Pursat
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET11MAY Evapotranspiration of May in Pursat
ET11JUN Evapotranspiration of June in Pursat

3-5-2-1-11. Planted Area function of wet rice in Kampong Chhnang

APW12= -67174.46000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00352*FP(-1)/(CPI(-1)/100)
-26588.00000*ln (ET12MAY)
+22824.00000*ln (ET12 MAY(-1))
+ 7998.00000*ln (ET12JUN)
+ 0.00000*ln (ET12JUN(-1))

APW12 Area Function of wet rice in kampong Chhnang
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET12MAY Evapotranspiration of May in kampong Chhnang
ET12JUN Evapotranspiration of June in kampong Chhnang

3-5-2-1-12. Planted Area function of wet rice in Kam Pot

APW15= -11212.50000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00624*FP(-1)/(CPI(-1)/100)
-10307.00000*ln (ET15MAY)
+8562.00000*ln (ET15 MAY(-1))
+ 7998.00000*ln (ET15JUN)
+ 0.00000*ln (ET15JUN(-1))

APW15 Area Function of wet rice in Kam Pot
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET15MAY Evapotranspiration of May in Kam Pot
ET15JUN Evapotranspiration of June in Kam Pot

3-5-2-1-13. Planted Area function of wet rice in Koh Kong

APW16= -6278.22000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00032*FP(-1)/(CPI(-1)/100)
-2404.00000*ln (ET16MAY)
-3971.00000*ln (ET16 MAY(-1))
+ 7998.00000*ln (ET16JUN)
+ 0.00000*ln (ET16JUN(-1))

APW16 Area Function of wet rice in Koh Kong
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET16MAY Evapotranspiration of May in Koh Kong
ET16JUN Evapotranspiration of Jun in Koh Kong

3-5-2-1-14. Planted Area function of wet rice in Kompong Speu

APW17= -6638.28 000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00357*FP(-1)/(CPI(-1)/100)
+5213.00000*ln (ET17MAY)
-9273.00000*ln (ET17 MAY(-1))
+ 7998.00000*ln (ET17JUN)
+ 0.00000*ln (ET17JUN(-1))

APW17 Area Function of wet rice in Kompong Speu
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET17MAY Evapotranspiration of May in Kompong Speu
ET17JUN Evapotranspiration of Jun in Kompong Speu t

3-5-2-1-15. Planted Area function of wet rice in Preah Viheat

APW18= -6170.30000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00070*FP(-1)/(CPI(-1)/100)
-6024.00000*ln (ET18MAY)
-40.00000*ln (ET18 MAY(-1))
+ 7998.00000*ln (ET18JUN)
+ 0.00000*ln (ET18JUN(-1))

APW18 Area Function of wet rice in Preah Viheat
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET18MAY Evapotranspiration of May in Preah Viheat
ET18JUN Evapotranspiration of Jun in Preah Viheat

3-5-2-1-16. Planted Area function of wet rice in Stung Treng

APW19= -6357.20000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00066*FP(-1)/(CPI(-1)/100)
-4226.00000*ln (ET19MAY)
-1889.00000*ln (ET19 MAY(-1))
+ 7998.00000*ln (ET19JUN)
+ 0.00000*ln (ET19JUN(-1))

APW19 Area Function of wet rice in Stung Treng
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET19MAY Evapotranspiration of May in Stung Treng
ET19JUN Evapotranspiration of Jun in Stung Treng

3-5-2-1-17. Planted Area function of wet rice in Rottanakiri

APW20= -6022.42000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00079*FP(-1)/(CPI(-1)/100)
+492.00000*ln (ET20MAY)
-6717.00000*ln (ET20 MAY(-1))
+ 7998.00000*ln (ET20JUN)
+ 0.00000*ln (ET20JUN(-1))

APW20 Area Function of wet rice in Rottanakiri
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET20MAY Evapotranspiration of May in Rottanakiri
ET20JUN Evapotranspiration of Jun in Rottanakiri

3-5-2-1-18. Planted Area function of wet rice in Mondukiri

APW21= -5725.57 000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00030*FP(-1)/(CPI(-1)/100)
-3882.00000*ln (ET21MAY)
-2695.00000*ln (ET21 MAY(-1))
+ 7998.00000*ln (ET21JUN)
+ 0.00000*ln (ET21JUN(-1))

APW21 Area Function of wet rice in Mondukiri
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET21MAY Evapotranspiration of May in Mondukiri
ET21JUN Evapotranspiration of Jun in Mondukiri

3-5-2-1-19. Planted Area function of wet rice in Kratie

APW22= -6651.68000
+ 0.00000*TREND
+ 0.85037*AP(-1)
+ 0.00109*FP(-1)/(CPI(-1)/100)
-11992.00000*ln (ET22MAY)
+6129.00000*ln (ET22MAY(-1))
+ 7998.00000*ln (ET22JUN)
+ 0.00000*ln (ET22JUN(-1))

APW22 Area Function of wet rice in Kratie
TREND Time Trend from 1996 to 2000, 5 after 2001
APW Planted Area of wet rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET22MAY Evapotranspiration of May in Kratie
ET22JUN Evapotranspiration of Jun in Kratie

3-5-2-2. Planted area function of dry season rice

APD= - 21830
(-1.37)
+ 352588*D06
(4.16)
+45604*D08
(1.15)
+ 0.86381*APD(t-1)
(18.64)
+ 0.01293*FP(t-1)/[CPI(t-1)/100]*D02
(6.47)
+ 19144*ln[ETDEC(t-1)]
(3.49)
-18554*ln[ETDEC(t-1)]*D01
(-2.67)
-11223*ln[ETDEC(t-1)]*D02
(-1.46)

-44522*ln[ETDEC(t-1)]*D03
(-3.38)
-19347*ln[ETDEC(t-1)]*D04
(-2.29)
-19587*ln[ETDEC(t-1)]*D07
(-2.81)
-22581*ln[ETDEC(t-1)]*D08
(-2.73)
-16357*ln[ETDEC(t-1)]*D09
(-2.42)
-19475*ln[ETDEC(t-1)]*D12
(-2.47)
-18140*ln[ETDEC(t-1)]*D17
(-2.69)
-19536*ln[ETDEC(t-1)]*D22
(-2.38)
+ 33519*ln[ETDEC(t-2)]
(4.30)
- 33934*ln[ETDEC(t-2)]*D01
(-3.23)
- 39881*ln[ETDEC(t-2)]*D02
(-3.44)
- 40059*ln[ETDEC(t-2)]*D03
(-2.24)
- 27062*ln[ETDEC(t-2)]*D04
(-2.38)
- 33599*ln[ETDEC(t-2)]*D06
(-2.88)
- 32558*ln[ETDEC(t-2)]*D07
(-3.08)
- 38433*ln[ETDEC(t-2)]*D08
(-3.29)
- 39522*ln[ETDEC(t-2)]*D09
(-3.90)
- 28448*ln[ETDEC(t-2)]*D12
(-2.55)
- 32879*ln[ETDEC(t-2)]*D17
(-3.35)
- 29984*ln[ETDEC(t-2)]*D22
(-2.41)
+ 2431*ln(ETJAN)
(1.18)
+ 27478*ln(ETJAN)*D03
(2.89)
- 44644*ln(ETJAN)*D06
(-4.25)
- 48094*ln[ETJAN(t-1)]
(-5.12)
+ 50858*ln[ETJAN(t-1)]*D01
(4.47)
+ 49513*ln[ETJAN(t-1)]*D02
(3.68)
+ 59881*ln[ETJAN(t-1)]*D03
(3.91)
+ 44710*ln[ETJAN(t-1)]*D04
(3.28)
+ 51483*ln[ETJAN(t-1)]*D07
(4.20)
+ 48689*ln[ETJAN(t-1)]*D08
(3.84)
+ 55749*ln[ETJAN(t-1)]*D09
(5.02)
+ 46546*ln[ETJAN(t-1)]*D12
(3.83)
+ 49201*ln[ETJAN(t-1)]*D17
(4.50)
+ 48087*ln[ETJAN(t-1)]*D22
(3.98)

AdjR^2=0.9784

APD	Planted area of dry rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
CPI	Consumer Price Index (1995=100)
D01	Dummy Variable, 1 in Phnom Penh, 0 otherwise
D02	Dummy Variable, 1 in Kandal, 0 otherwise
D03	Dummy Variable, 1 in Kampong Cham, 0 otherwise
D04	Dummy Variable, 1 in Svay Rieng, 0 otherwise
D05	Dummy Variable, 1 in Prey Veng, 0 otherwise (unused Base)
D06	Dummy Variable, 1 in Ta Keo, 0 otherwise
D07	Dummy Variable, 1 in Kompong Thom, 0 otherwise
D08	Dummy Variable, 1 in Siem Reap, 0 otherwise
D09	Dummy Variable, 1 in Battambang, 0 otherwise
D12	Dummy Variable, 1 in Kampong Chhnang, 0 otherwise
D17	Dummy Variable, 1 in Kompong Speu, 0 otherwise
D22	Dummy Variable, 1 in Kratie, 0 otherwise
ETDEC	Evapotranspiration of December
ETJAN	Evapotranspiration of January

3-5-2-2-1. Planted Area function of dry rice in Phnom Penh

APD01= -22426.99000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00033*FP(-1)/(CPI(-1)/100)
+590.00000*ln (ET01DEC(-1))
-415.00000*ln (ET01DEC (-2))
+2430.58000*ln (ET01JAN)
+2764.00000*ln (ET01JAN (-1))

APD 01	Area Function of dry rice in Phnom Penh
TREND	Time Trend from 1996 to 2000, 5 after 2001
APD	Planted Area of dry rice for all provinces (HA)
FP	Farm price for all Cambodia (Riel/MT)
ET01DEC	Evapotranspiration of December in Phnom Penh
ET01JAN	Evapotranspiration of January in Phnom Penh

3-5-2-2-2. Planted Area function of dry rice in Kandak

APD 02= -21380.00000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.01293*FP(-1)/(CPI(-1)/100)
+7921.00000*ln (ET02DEC(-1))
-6362.00000*ln (ET02DEC (-2))
+ 2430.58 000*ln (ET02JAN)
+1419.00000*ln (ET02JAN (-1))

APD 02 Area Function of dry rice in Kandak

TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET02DEC Evapotranspiration of December in Kandak
ET02JAN Evapotranspiration of January in Kandak

3-5-2-2-3. Planted Area function of dry rice in Kampong Cham

APD 03= -26448.98000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.01040*FP(-1)/(CPI(-1)/100)
-25378.00000*ln (ET03DEC(-1))
-6540.00000*ln (ET03DEC (-2))
+ 29908.58 000*ln (ET03JAN)
+11787.00000*ln (ET03JAN (-1))

APD 03 Area Function of dry rice in Kampong Cham
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)

ET03DEC Evapotranspiration of December in Kampong Cham
ET03JAN Evapotranspiration of January in Kampong Cham

3-5-2-2-4. Planted Area function of dry rice in Svay Rieng

APD 04= -22699.28000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00323*FP(-1)/(CPI(-1)/100)
-203.00000*ln (ET04DEC(-1))
+6457.00000*ln (ET04DEC (-2))
+2430.58000*ln (ET04JAN)
-3384.00000*ln (ET04JAN (-1))

APD 04 Area Function of dry rice in Svay Rieng
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET04DEC Evapotranspiration of December in Svay Rieng
ET04JAN Evapotranspiration of January in Svay Rieng

3-5-2-2-5. Planted Area function of dry rice in Prey Veng

APD 05= -29454.37000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.01817*FP(-1)/(CPI(-1)/100)
-19144.00000*ln (ET05DEC(-1))
+33519.00000*ln (ET05DEC (-2))
+2430.58000*ln (ET05JAN)
-48094.0000*ln (ET05JAN (-1))

APD 05 Area Function of dry rice in Prey Veng
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET05DEC Evapotranspiration of December in Prey Veng
ET05JAN Evapotranspiration of January in Prey Veng

3-5-2-2-6. Planted Area function of dry rice in Ta Keo

APD 06= +324379.82 000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.01762*FP(-1)/(CPI(-1)/100)
+19144.00000*ln (ET06DEC(-1))
-80.00000*ln (ET06DEC (-2))
-42213.42000*ln (ET06JAN)
-48094.00000*ln (ET06JAN (-1))

APD 06 Area Function of dry rice in Ta Keo
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET06DEC Evapotranspiration of December in Ta Keo
ET06JAN Evapotranspiration of January in Ta Keo

3-5-2-2-7. Planted Area function of dry rice in Phnom Penh

APD 07= -22426.99000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00033*FP(-1)/(CPI(-1)/100)
-11992.00000*ln (ET07DEC(-1))
+6129.00000*ln (ET07DEC (-2))
+ 7998.00000*ln (ET07JAN)
+ 0.00000*ln (ET07JAN (-1))

APD 07 Area Function of dry rice in Kompong Thom
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET07DEC Evapotranspiration of December in Phnom Penh
ET07JAN Evapotranspiration of January in Phnom Penh

3-5-2-2-8. Planted Area function of dry rice in Siem Reap

APD 08= +22780.33 000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00311*FP(-1)/(CPI(-1)/100)
-3437.00000*ln (ET08DEC(-1))
-4914.00000*ln (ET08DEC (-2))
+2430.58000*ln (ET08JAN)
+595.00000*ln (ET08JAN (-1))

APD 08 Area Function of dry rice in Siem Reap
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET08DEC Evapotranspiration of December in Siem Reap
ET08JAN Evapotranspiration of January in Siem Reap

3-5-2-2-9. Planted Area function of dry rice in Battambang

APD 09= -22456.68000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00061*FP(-1)/(CPI(-1)/100)
+2787.00000*ln (ET09DEC(-1))
-6003.00000*ln (ET09DEC (-2))
+2430.58000*ln (ET09JAN)
+ 7655.00000*ln (ET09JAN (-1))

APW09 Area Function of dry rice in Battambang
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)

FP Farm price for all Cambodia (Riel/MT)
ET09DEC Evapotranspiration of December in Battambang
ET09JAN Evapotranspiration of January in Battambang

3-5-2-2-10. Planted Area function of dry rice in kampong Chhnang

APD 12= -22862.09000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00327*FP(-1)/(CPI(-1)/100)
-331.00000*ln (ET12DEC(-1))
+5071.00000*ln (ET12DEC (-2))
+2430.58000*ln (ET12JAN)
-1548.00000*ln (ET01JAN (-1))

APD 12 Area Function of dry rice in kampong Chhnang
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET12DEC Evapotranspiration of December in kampong Chhnang
ET12JAN Evapotranspiration of January in kampong Chhnang

3-5-2-2-11. Planted Area function of dry rice in Kompong Speu

APD 17= -22387.17 000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00032*FP(-1)/(CPI(-1)/100)
+1004.00000*ln (ET17DEC(-1))
+640.00000*ln (ET17DEC (-2))
+2430.58000*ln (ET17JAN)
+ 1107.00000*ln (ET17JAN (-1))

APD 17 Area Function of dry rice in Kompong Speu
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET17DEC Evapotranspiration of December in Kompong Speu
ET17JAN Evapotranspiration of January in Kompong Speu

3-5-2-2-12. Planted Area function of dry rice in kratie

APD 22= -22565.44 000
+ 0.00000*TREND
+ 0.86381*AP(-1)
+ 0.00203*FP(-1)/(CPI(-1)/100)
-392.00000*ln (ET22DEC(-1))
+3535.00000*ln (ET22DEC (-2))
+2430.58000*ln (ET22JAN)
-7.00000*ln (ET22JAN (-1))

APD 22 Area Function of dry rice in kratie
TREND Time Trend from 1996 to 2000, 5 after 2001
APD Planted Area of dry rice for all provinces (HA)
FP Farm price for all Cambodia (Riel/MT)
ET22DEC Evapotranspiration of December in kratie
ET22JAN Evapotranspiration of January in kratie

3-5-3. Harvested area

3-5-3-1. Harvested area of wet rice

AHW = APW - ABW = APW(1-RABW)

AHW Harvested area of wet rice (HA)
APW Planted area of wet rice (HA)
ABW Abandoned area of wet rice (HA)
RABW Ratio of abandoned area and planted area [(APW-AHW)/APW]

3-5-3-2. Harvested area of dry rice

AHD = APD - ABD = APD(1-RABD)

AHD Harvested area of dry rice (HA)
APD Planted area of dry rice (HA)
ABD Abandoned area of dry rice (HA)
RABD Ratio of abandoned area and planted area [(APD-AHD)/APD]

3-5-4. Production

3-5-4-1. Production of wet rice

QW = YW*AHW
QW Production of wet rice (MT)
YW Yield of wet rice (MT/HA)
AHW Harvested area of wet rice (HA)

3-5-4-2. Production of dry rice

QD = YD*AHD
QD Production of dry rice (MT)
YD Yield of dry rice (MT/HA)
AHD Harvested area of dry rice (HA)

3-5-4-3. Total production in milled equivalent

QME = 0.667*(QW+QD)
QME Total production in milled equivalent (MT)
QW Production of wet rice (MT: Paddy equivalent)
QD Production of dry rice (MT: Paddy equivalent)

3-5-5a Import Function of Cambodia (Relative price versions, for open economy)

Estimation period: 1983-2001

IMPME= 85497
(10.47)
- 9322.39*(WP*EXR)/FP
(-2.22) [WP:-0.263, FP: 0.263]
- 41589*D891
(-3.65)
+ 35816*D923
(2.26)
- 39977*D967
(-2.95)

AdjR^2=0.5900 D.W.=2.145

IMPME Rice imports in milled equivalent (MT)
WP World price of rice (Thailand: US$/MT)
FP Farm price for all Cambodia (Riel)
EXR Exchange Rate (Riel/US$)
D891 Dummy Variable, 1 in 1989 to 1991, 0 otherwise
D923 Dummy Variable, 1 in 1992 and 1993, 0 otherwise
D967 Dummy Variable, 1 in 1996 and 1997, 0 otherwise

3-5-5b. Import Function of Cambodia (World

price and production versions, for planned economy)

Estimation period: 1983-2001

IMPME= 181563
(6.66)
- 0.04442*WP*EXR/(CPI/100)
(-3.47) [-0.796]
- 0.03606*QME
(-4.24) [-1.054]
+ 58834*D88
(3.52)
- 72398*D91
(-4.21)
- 35373*D967
(-2.93)

AdjR^2=0.6987 D.W.=2.293

IMPME	Rice imports in milled equivalent (MT)
QME	Rice production in milled equivalent (MT)
WP	World price of rice (Thailand: US$/MT)
EXR	Exchange Rate (Riel/US$)
D88	Dummy Variable, 1 in 1988, 0 otherwise
D91	Dummy Variable, 1 in 1991, 0 otherwise
D967	Dummy Variable, 1 in 1996 and 1997, 0 otherwise

3-5-6. Stock change function of Cambodia

Estimation period: 1982-2001

STCME= - 116111
(-2.99)
- 45175*T8894
(-4.22)
+ 63119*T9500
(5.85)
177.75624*[FPt/(CPIt/100)-FPt-1/(CPIt-1/100)]
(-2.45)
+ 0.32968*(QMEt-QMEt-1)
(4.01)
+ 227030*D823
(3.02)
+ 255918*D889
(3.47)

AdjR^2=0.8760 D.W.=2.262

STCME	Rice stock change (ending stock - beginning stock)in milled equivalent (MT)
T8894	Time trend from 1988 to 1994, 0 otherwise
T9500	Time trend from 1995 to 2000, 0 otherwise
FP	Farm price for all Cambodia (Riel/MT)
CPI	Consumer Price Index (1995=100)
QME	Rice production in milled equivalent (000MT)
D823	Dummy Variable, 1 in 1982 and 1983, 0 otherwise
D889	Dummy Variable, 1 in 1988 and 1989, 0 otherwise

3-5-7. Total rice domestic supply of Cambodia

QSME= + QME + IMPME - EXPME - STCME

QSME	Total rice domestic supply in milled equivalent (MT)
QME	Total rice production in milled equivalent (MT)
IMPME	Rice imports in milled equivalent (MT)
EXPME	Rice export in milled equivalent (MT)
STCME	Rice stock change (ending stock - beginning stock)in milled equivalent (MT)

3-5-8. Rice consumption per capita

QSPC = QSME/(POP*1000)

QSPC	Rice domestic supply per capita (kg/person)
QSME	Total rice domestic supply in milled equivalent (MT)
POP	Population (million people)

3-5-9a. Demand Function of Rice for Average of Cambodia

Estimation period: 1991-2000

QSPC = + 291.65636
(8.90)
- 0.00015661*FP/(CPI/100)
(-3.35) [-0.3250]
- 0.19703*GDP/POP
(-2.81) [-0.2610]
- 34.93674*D92
(-3.75)
+ 49.55690*D95
(-2.56)
+ 11.38128*D97
(1.52)
+ 14.23134*D9698
(2.24)

AdjR^2=0.8599 D.W.=2.143

3-5-9b. Demand Function of Rice for Average of Cambodia

Estimation period: 1991-2000

QSPC = + 299.31567
(9.88)
- 0.00016728*FP/(CPI/100)
(-3.86) [-0.3471]
- 0.21318*GDP/POP
(-3.28) [-0.2823]
- 37.00111*D92
(-4.28)
+ 52.20910*D95
(-4.80)
+ 14.74369*D968
(2.42)

AdjR^2=0.8702 D.W.=2.541

QSPC	Rice domestic supply per capita (kg/person)
FP	Farm price for all Cambodia (Riel/MT)
CPI	Consumer Price Index (1995=100)
GDP	Gross Domestic Products (million US$)
POP	Population (million people)
D92	Dummy Variable, 1 in 1992, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise
D9698	Dummy Variable, 1 in 1996 and 1998, 0 otherwise

D968 Dummy Variable, 1 in 1996, 1997, and 1998, 0 otherwise

Table 3-1 and Table 3-2 show elasticities of yield of wet season rice and dry season rice with respect to time trend and evpotranspirations. Table 3-3 and Table 3-4 show elasticities of planted area of the two types of rice with respect to last year's planted area, last year's farm price, and last year's evapotranspirations.

Table 3-1. Elasticities of yield of wet season rice for evapotranspiration and trend

Province 9 base	Trend	Mar.	Apr.	May	Jun.	Jul.
Phnom Penh	0.000	0.000	-0.104	0.366	-0.445	0.000
Kandal	0.000	0.000	0.109	0.186	-0.399	0.000
Kampong Cham	0.166	0.000	0.059	0.198	-0.423	0.000
Svay Rieng	0.000	0.000	0.089	-1.119	0.680	0.000
Prey Veng	0.000	0.000	0.072	0.244	-0.521	0.000
Ta Keo	0.173	0.000	0.057	0.194	-0.414	0.000
Kompong Thom	0.000	-0.298	0.076	0.439	-0.547	0.000
Siem Reap	0.000	-0.084	0.085	0.286	-0.611	0.000
Battambang	0.000	0.000	0.065	0.220	-0.471	0.000
Pursat	0.217	0.000	0.066	0.223	0.018	-0.553
Kampong Chhnang	0.000	0.000	0.068	0.228	-0.488	0.000
Kam Pot	0.094	0.000	0.064	0.215	-0.460	0.000
Koh Kong	-0.271	0.000	0.086	0.289	-0.620	0.000
Kompong speu	-0.165	0.000	0.116	0.223	-0.478	0.000
Preah Vihea	-0.173	0.000	0.079	0.266	-0.569	0.000
Stung Treng	-0.069	0.000	0.074	0.251	-0.537	0.000
Rottanakiri	-0.156	0.000	0.082	0.277	-0.592	0.000
Mondulkiri	-0.119	0.000	0.080	0.268	-0.575	0.000
Kratie	0.000	0.000	0.072	0.243	-0.521	0.000

Note) Battambang is the base province for the calculation

Table 3-2. Elasticities of yield of dry season rice for evapotranspiration and trend

Province 5 base	Trend	Jan.	Feb.	Mar.	Apr.	May.
Phnom Penh	-0.142	0.460	0.000	-0.161	0.238	0.000
Kandal	0.173	-1.070	0.000	0.041	0.031	1.306
Kampong Cham	0.129	0.401	0.000	0.050	0.038	-0.022
Svay Rieng	0.000	0.424	0.000	0.053	0.040	-0.036
Prey Veng	0.000	0.364	0.000	0.045	0.034	0.000
Ta Keo	0.000	0.389	0.000	0.048	0.037	-0.033
Kompong Thom	0.000	0.541	0.000	0.067	0.051	0.000
Siem Reap	0.000	0.463	-0.503	0.057	0.292	0.151
Battambang	-0.199	1.382	0.000	0.058	-0.684	0.000
Pursat	0.000	0.480	-0.374	0.060	0.045	0.000
Kampong Chhnang	0.000	0.394	0.000	0.068	0.037	0.000
Kompong speu	0.000	0.461	0.000	0.236	0.043	-0.177
Kratie	0.000	0.462	0.000	0.057	0.044	0.000

Note) PreyVeng is the base province for the calculation

Table 3-3. Elasticities of planted area of wet season rice for price and evapotranspiration

Province	Planted area (t-1)	Farm price (t-1)	Evapotranspiration			
			May	May (t-1)	Jun.	Jun. (t-1)
Phnom Penh	0.887	0.000	-0.265	-0.472	0.906	0.000
Kandal	0.871	0.000	0.145	-0.259	0.167	0.000
Kampong Cham	0.843	0.000	0.180	-0.082	-0.053	0.000
Svay Rieng	0.839	0.000	-0.117	0.111	0.050	0.000
Prey Veng	0.849	0.025	0.418	-0.035	0.658	1.179
Ta Keo	0.849	0.000	0.147	0.071	-0.172	0.000
Kompong Thom	0.862	0.000	0.089	-0.112	0.063	0.000
Siem Reap	0.827	0.000	0.535	-0.070	-0.416	0.000
Battambang	0.825	0.000	0.304	-0.287	0.026	0.000
Pursat	0.838	0.000	0.253	-0.305	0.106	0.000
Kampong Chhnang	0.824	0.000	-0.354	0.304	0.106	0.000
Kam Pot	0.830	0.000	-0.077	0.064	0.059	0.000
Koh Kong	0.806	0.000	-0.391	-0.646	1.301	0.000
Kompong speu	0.847	0.000	0.065	-0.116	0.100	0.000
Preah Vihea	0.834	0.000	-0.393	-0.003	0.522	0.000
Stung Treng	0.788	0.000	-0.323	-0.145	0.612	0.000
Rottanakiri	0.818	0.000	0.033	-0.450	0.535	0.000
Mondulkiri	0.795	0.000	-0.667	-0.463	1.374	0.000
Kratie	0.833	0.000	-0.492	0.251	0.328	0.000

Note) Battambang is the base province for the calculation

Table 3-4. Elasticities of planted area of dry season rice for price and evapotranspiration

Province	Planted area (t-1)	Farm price (t-1)	Evapotranspiration			
			Dec. (t-1)	Dec. (t-2)	Jan. (t)	Jan. (t-1)
Phnom Penh	0.892	0.000	0.573	-0.403	2.362	2.686
Kandal	0.786	0.184	0.190	-0.152	0.058	0.034
Kampong Cham	0.784	0.000	-0.962	-0.248	1.133	0.447
Svay Rieng	0.728	0.000	-0.035	1.112	0.418	-0.583
Prey Veng	0.803	0.000	0.425	0.744	0.054	-1.067
Ta Keo	0.848	0.000	0.389	-0.002	-0.859	-0.978
Kompong Thom	0.761	0.000	-0.187	0.405	1.024	1.428
Siem Reap	0.820	0.000	-0.406	-0.580	0.287	0.070
Battambang	0.840	0.000	1.652	-3.559	1.441	4.539
Kampong Chhnang	0.793	0.000	-0.039	0.604	0.289	-0.184
Kompong speu	0.877	0.000	0.880	0.561	2.131	0.970
Kratie	0.826	0.000	-0.066	0.597	0.411	-0.001

Note) PreyVeng is the base province for the calculation

3-6. Simulation results

3-6-1. Results of estimation of yield functions

Table 3-1 and Table 3-2 show elasticities of yield with respect to ET in the wet and dry seasons. In the case of Phnom Penh, the elasticity of yield for ET in May is 0.366, indicating that if ET in May increases 1%; the yield will increase 0.366%. Differences in these elasticities correspond to the parameter ky; the yield response coefficient for the relationship between yield and water stress as specified in the introduction.

These results show that higher ET levels in May leads higher yields but those same elevated levels in June leads lower yield in many provinces for wet season cultivation. This is likely occurring because if transplanting is delayed from May to June, the growing period will be shortened, the number of shoots will decrease, and the stock of starch before the shooting period will decrease. These results also show that ET in January leads to higher yields in many provinces for dry season cultivation. Therefore, water supply during the transplanting season is quite critical for rice production.

3-6-2. Results of estimation of planted area functions

Table 3-3 and Table 3-4 show elasticities of planted area with respect to the previous year's planted area and farm price, and current and one year lagged ET for wet and dry seasons. The elasticities of lagged planted area are around 0.8 and it indicates significant stability in planted area. The elasticities of area for farm price are zero for almost all provinces; however, that of Kandal province, where production primarily occurs in the dry season, is very high. If the elasticities of planted area with respect to ET in May is positive, June will be negative for the wet season, and if the elasticities in December are positive, those in January are negative.

3-6-3. Simulation results of supply and demand model

The simulation term is from 2001 to 2015. The assumptions of the simulation are as follows; (1) the forecast growth value of CPI is the average annual growth between 1998 and 2003, (2) the growth value of real GDP is the average annual growth between 1996 and 2002, (3) the growth value of exchange rate is the average annual growth between 2000 and 2002, (4) the growth value of population is the average annual growth between 1996 and 2002, (5) the linear trend of the yield functions are continued, (6) there is no trend applied to area, (7) the price elasticities of planted areas for all provinces are same as those of the main production provinces.

Figure 3-3 through Figure 3-6 show the simulation results for the production of rice during the wet season and dry season for the main production provinces and for Cambodia as a whole. The production of wet season rice in Battambang province is expected to increase 23,800t (metric tons) from 2005 to 2015. On the other hand, the production of dry season rice in PreyVeng will increase 99,800t during the period; however, the production will at first decline due to unstable water supplies.

The production of wet and dry season rice for all of Cambodia will increase 386,100t and 192,800t respectively through additional area but also through improved yields over the period. While planted area during the dry season in Kanpong Cham, Ta Keo, Siem Reap, and Battambang will decrease, area in other provinces will increase. Production of dry season rice for the country as a whole will increase. However, future rice production during the dry season is potentially quite variable due to the difficulties of management of irrigation facilities under uncertain land ownership.

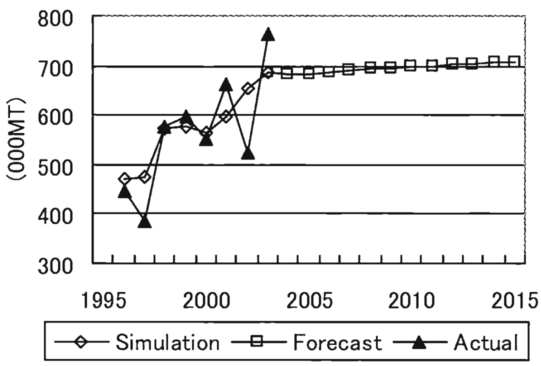

Fig. 3-3. Production of wet season rice in Battambang

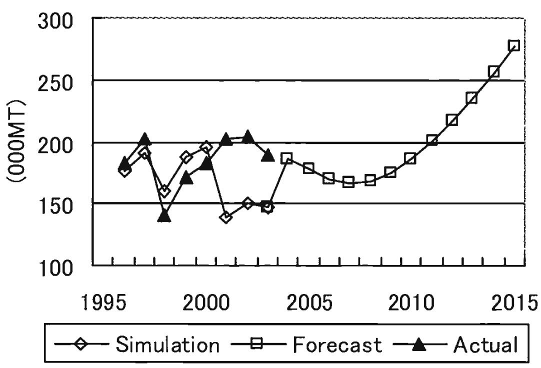

Fig. 3-4. Production of dry season rice in Prey Veng

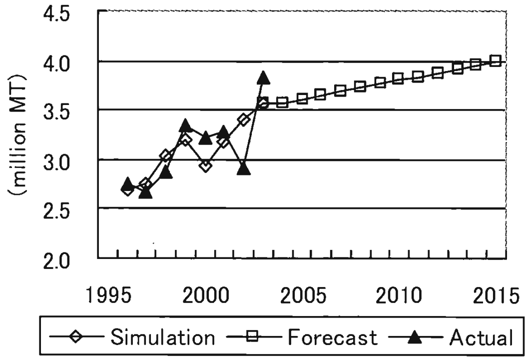

Fig. 3-5. Production of wet season rice for all Cambodia

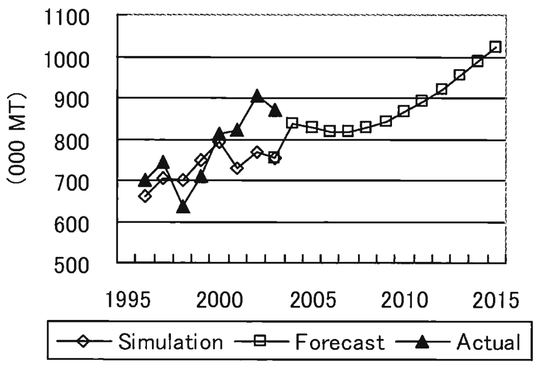

Fig. 3-6. Production of dry season rice for all Cambodia

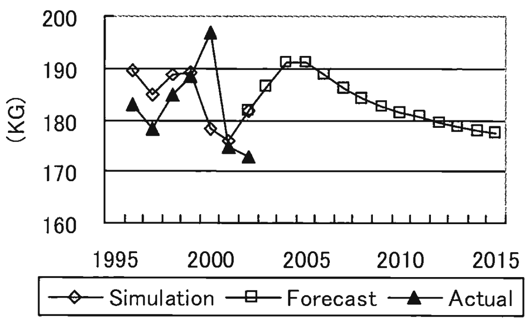

Fig. 3-7. Per capita consumption

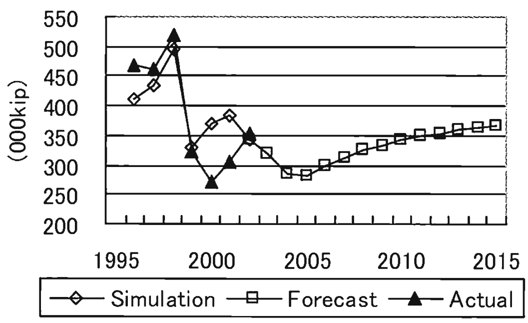

Fig. 3-8. Farm price

Figure 3-7 shows per capita rice consumption which decreases slightly due to a negative income elasticity while total consumption expands with population. Figure 3-8 shows the simulation of the equilibrium farm price. These prices are deflated by CPI. The farm price is estimated to be stable at around 350,000 Riel per metric ton.

3-7. Conclusions

A supply and demand model for rice in Cambodia which can be used to analyze production and water supply impacts for each province was developed for use in examining the impacts of changes in the regional water cycle. The supply and demand model can estimate changes in yield and planted area independently and considering supply responses and demand changes to the market price while equating supply and demand. While much previous research has considered only yields, the inclusion of area and demand response to price changes makes the results are more realistic than those of a yield function analysis alone. The baseline analysis, to be used in a subsequent water cycle scenario, indicates that production of wet and dry season rice steadily increases and prices rise modestly throughout the projection period. This deterministic projection is used as the starting point, and increased variation in the water cycle is then introduced into the system.

Chapter 4
Development of the Rice Econometric Model with Endogenous Water in Thailand (REMEW-THAI)

4-1. Introduction

The world's leading rice exporter is Thailand, and this country exported 7.43 million metric tons (mMT) in 2006 and followed by India, Vietnam, Pakistan, and the USA, with rice exports of 3.30 mMT, 4.74 mMT, 4.64 mMT, 3.69 mMT, and 3.30 mMT respectively. Thailand's world rice trade was 24.3% in 2006; therefore, production trends affects the world food market. The variance of rice production depends in part on water supply changes and domestic policies.

There is an extensive body of existing literature on rice production and policies in Thailand. Siamwalla & Setboonsarng (1989) analyzed the effects of export taxes and price supports for rice, sugar, maize, and rubber by using a comparative static model. Kagatsume (1988) analyzed the impacts of a rice-premium policy on the market of rice in Thailand using a supply and demand model of rice, and found that this policy has a price stabilizing effect. O'Mara & Le-Si (1985) analyzed impacts of price changes of rice on agricultural income and production using an income classification model, and they shed light on the problem that farmers lost their incentives to produce through the rice-premium policy. Choeun, Godo, & Hayami (2006) used a comparative static model and clarified the issue that the export tax was higher than the optimum value in the low-income era by politicians' lead.

Tax revenue in Thailand increased due to the growth of the industrial sector, and the rice-premium policy was abolished in 1986. However, the policy had another function, the stabilization of domestic price of rice. The paddy mortgage scheme was started 1984 for the purpose of price stabilization.

The model developed in this chapter focuses on the analyses of impacts of water supply changes on the regional rice market; thus, analyses of the impacts of policy change is reserved for other articles. However, the understanding of the paddy mortgage scheme is quite important to understand the background of the supply and demand of rice in Thailand. The outline of the policy is described in the next section.

4-2. Paddy mortgage scheme

The paddy mortgage scheme allows the farmer to obtain financing from the Bank of Agricultural Cooperatives (BAAC) when the farmer pledges their paddy to the Public Warehouse Organization (PWO). If the market price is higher than the loan rate plus interest rate, the farmer will be able to buy back their paddy at this lower adjusted loan price. Conversely, if the market price is lower than the loan rate plus interest rate, pledged paddy of farmers will be confiscated by the government and the farmer retains the original payment.

Let's examine the workflow in more detail. First, farmers applies to participate in the scheme to the office of the Ministry of Agriculture and Cooperatives (MOAC), and if the office affirms that the farmer cultivates his or her land, they will get a certificate of registration in the scheme. The farmers bring their paddy to a miller who is also a member of the scheme. The farmers will get a certificate of shipment after the examination of the water content of the paddy by the PWO. Farmers who get the certificate present it to the BAAC and obtain the bank loan. The paddy is milled by directive of the government and is brought to the warehouse of the PWO. Furthermore, the interest rate of the BAAC for the scheme in the wet season in 2008 was 3%, and the upper limit of the loan provision to an individual farm was 500,000 Baht.

If a farmer participates in the scheme and sells his or her paddy to the government at the loan rate, the farmer gets the revenue which is loan rate times sales quantity. The paddy mortgage scheme forms a floor revenue when the market price is lower than the loan rate. However, the percentage of paddy production enrolled in the scheme has varied between 2.89% in 1999 and 25.23% in 2005. Clearly, the loan rate is not the floor price for all farmers in Thailand.

Academic and business experts pointed out some problems of the scheme in our interviews in Bangkok and its suburb. The problems raised are as follows; (1) The scheme mainly assists rich farmers who cultivate rice in the dry season. (2) The scheme diminishes the function of price formation in the central market. (3) The scheme expands the budget deficit. (4) The price of the milled rice sold by the government is higher than the market price, and it lowers the competitive edge of Thai rice in the global market.

The loan rate in dry season has been higher than the average farm price from 2004 to 2008; however, the loan rate in wet season has been lower than the average farm price from 2002 to 2007. The fluctuations in price of dry season rice is wider than that of wet season rice, so, the government may have set the loan rate at a relatively high level for dry season rice.

The price stabilization effect of the paddy mortgage scheme is one of the mitigation policies for reducing impacts of the water supply changes on producers.

4-3. Model

The supply and demand model of rice in Thailand is more detailed in the North-East region because of its location in the critical Mekong River basin. Yield and planted area functions are estimated for each province in the North-East region and those in the North, Central, and South regions are estimated at the regional aggregate. There are nineteen provinces in the North-East region. There are two cultivation types, i.e., major rice or rainy season rice and second rice or dry season rice. The generalized forms of the model are as follows:

Yield function of major rice:

$YW^i = f_{YWi}(T, ET_{MAR\,t}^{\,i}, \ldots, ET_{DEC\,t}^{\,i})$, (4-1)

Planted Area function of major rice:

$APW^i_t = f_{APWi}(APW^i_{t-1}, FP_{t-1}, ET_{MAR\,t-1}^{\,i}, \ldots, ET_{DEC\,t-1}^{\,i})$ (4-2)

Harvested area of major rice:

$AHW^i_t = APW^i_t - ABW^i_t = APW^i_t(1\text{-}RABW^i_t)$ (4-3)

Production of major rice:

$QW^i = YW^iAHW^i$, $QW = \sum_i QW^i$, (4-4)

Yield function of second rice:

$YD^i = f_{YDi}(T, ET_{NOV\,t-1}^{\,i}, \ldots, ETJUN^i_t)$, (4-5)

Planted Area function of second rice:

$APD^i_t = f_{APDi}(APD^i_{t-1}, FP_{t-1}, ETNOV^i_{t-2}, \ldots, ET_{JUN\,t-1}^{\,i})$ (4-6)

Harvested area of second rice:

$AHD^i_t = APD^i_t - ABD^i_t = APD^i_t(1\text{-}RABD^i_t)$ (4-7)

Production of second rice:

$QD^i = YD^iAHD^i$, $QD = \sum_i QD^i$, (4-8)

Total production:

$Q = 0.667(QW + QD)$, (4-9)

Export function:

$EXP = f_{EXP}(T, Q)$, (4-10)

Stock change function:

$STC = f_{STC}(T, FP_{t,t-1}, Q_{t,t-1})$, (11)

Total supply:

$QS = Q + IMP - EXP - STC$, (12)

Demand function:

$QS/POP = f_{QS}(RP, GDP/POP)$, (13)

Price linkage function:

$FP = f_{FP}(RP)$, (14)

where i is the province in the North-East region and in the regional aggregate elsewhere, t denotes that the data are measured at time t, T is a time trend, $ET_{JAN}^{\,i}$ through $ET_{DEC}^{\,i}$ are evapotranspiration values for January through December, *YW*, *APW*, *AHW*, *ABW*, *RABW*, and *QW* are yield, planted area, harvested area, abandoned area, abandoned area ratio, and production of main season rice, *YD*, *APD*, *AHD*, *ABD*, *RABD*, and *QD* are yield, planted area, harvested area, abandoned area, abandoned area ratio, and production of second season rice, *Q* is total production, *IMP* is imports, *EXP* is exports, STC is the annual change of stocks, i.e., ending stock minus beginning stock, *QS* is total supply, *POP* is population, *GDP* is gross domestic products, *EXR* is exchange rate, FP is the producer price, *RP* is the retail price. The retail price is fed to the other three countries' models through price linkage functions. The retail price of the Bangkok 5% broken is used to Laotian and Cambodian rice models, and that of the Bangkok 35% broken is used for Vietnamese rice model. All functions are specified as linear functions.

The planted area functions are based on the adaptive expectation model in which the ET is expected variable for farmers. There are a total of 80 functions in the Thai rice model and an additional 45 identities. Figure 4-1 and Figure 4-2 show flowcharts of the model for the production and the supply and demand sector.

4-4. Data

The source of the data of evapotranspiration (ET) is same as that of the Lao and Cambodian rice models.

The time series data for production and planted area of the two types of rice cultivations for each province are provided by the Center for Agricultural Information at the Office of Agricultural Economics of the Ministry of Agriculture and Co-operatives of Thailand. The farm price for rice is obtained from FAO-STAT and the retail price of rice is obtained from the IRRI, which is available from 1961 to 1997 and is held constant after 1997. These prices are a national average price for Thailand. CPI, GDP, and population are from the Asian Development Bank (ADB) and the exchange rate and the world price of rice are numbers from the International Monetary Fund (IMF). The estimation period for yield and planted area functions for each province in the North-East region and aggregated other regions, and import, stock change, and demand functions for the country as a whole are from 1982 to 2000 which starts in the earliest available year for statistics of production and ends in the last year of available ET values.

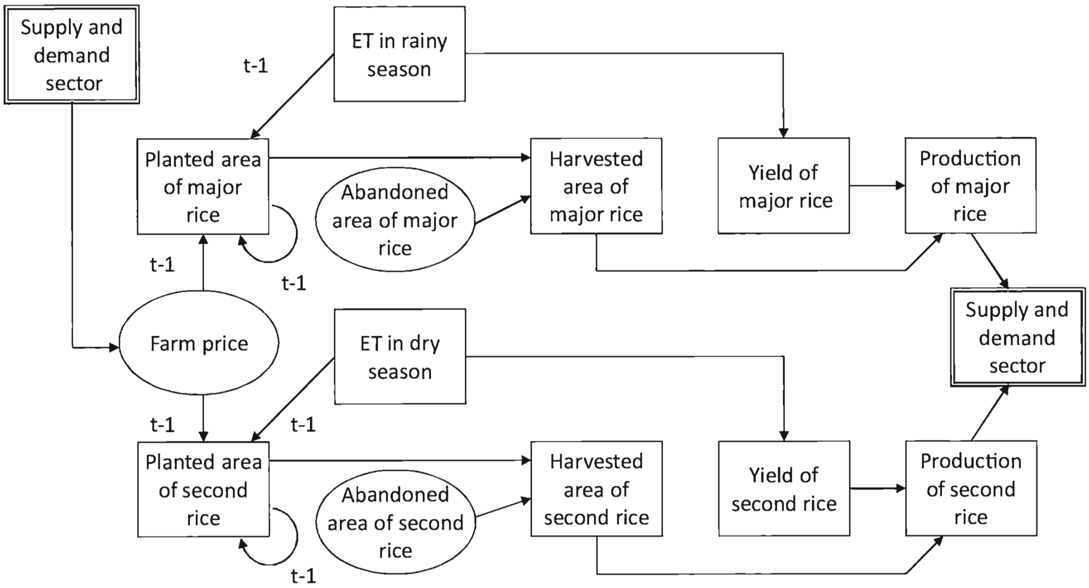

Fig. 4-1. Flowchart of the rice production sector of Thai rice model

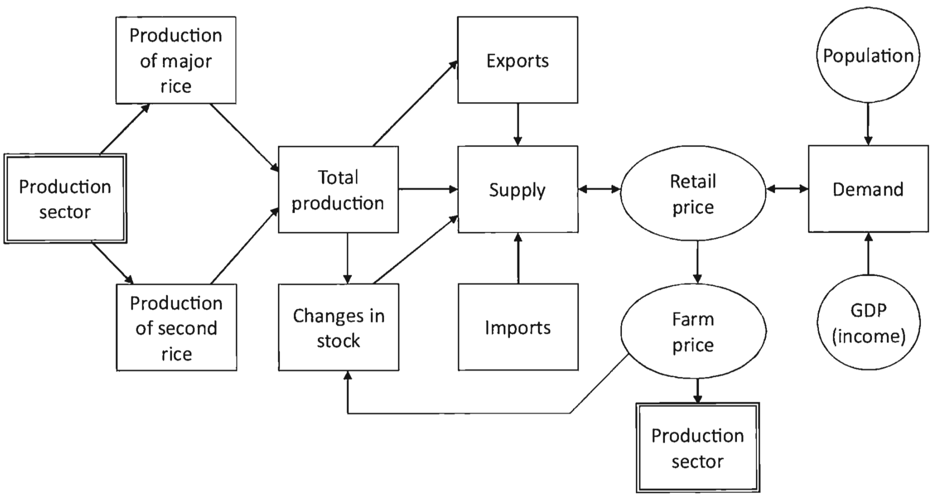

Fig. 4-2. Flowchart of the supply and demand sector of Thai rice model

4-5. Estimation results of all functions

The estimation method of all functions is OLS, and the estimation period is from 1982 to 2000. First, yield functions of major rice in North East region for each province are shown, and yield functions of major rice in the other three aggregate regions, i.e., North, South, and Central regions follow them. Second, yield functions of second rice in these regions are shown. Third, planted area functions of major and second rice in these regions are shown. Finally, estimated results of export, stock change, demand, and price linkage function are shown.

4-5-1. Yield functions

4-5-1-1. Yield function of major rice

4-5-1-1-1. Yield function of major rice in North East region

4-5-1-1-1-1. Yield function of major rice in Nakhon Phanom

YMH01 = + 0.62083
(1.58)
+ 0.04878*TREND
(12.03)
- 0.00823*ET01MAY

(-7.06) [-0.431]
+ 0.01179*ET01JLY
(3.90) [0.668]
- 0.00768*ET01AUG
(-3.79) [-0.404]
+ 0.00761*ET01OCT
(3.85) [0.500]
- 0.23554*D97
(-3.22)
- 0.22855*D989
(-3.90)
AdjR^2=0.9089 D.W.=1.559

YMH01 Yield of Major Rice in Nakhon Phanom
TREND Time Trend from 1982 to 2000
ET01MAY Evapotranspiration of May in Nakhon Phanom
ET01JLY Evapotranspiration of July in Nakhon Phanom
ET01AUG Evapotranspiration of August in Nakhon Phanom
ET01OCT Evapotranspiration of October in Nakhon Phanom
D97 Dummy Variable, 1 in 1997, 0 otherwise
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-1-1-2. Yield function of major rice in Sakon Nakhon

YMH02 = + 1.63175
(2.82)
+ 0.04597*T8298)
(8.19)
+ 0.00806*ET02APR
(6.19) [0.252]
- 0.01782*ET02MAY
(-7.52) [-0.922]
- 0.02310*ET02JUN
(-3.96) [-1.173]
+ 0.02406*ET02JLY
(4.76) [1.274]
+ 0.00724*ET02AUG
(2.88) [0.360]
- 0.00583*ET02SEP
(-2.35) [-0.313]
+ 0.00668*ET02NOV
(1.89) [0.302]
+ 0.31891*D84
(4.23)
+ 0.34969*D93
(4.27)
- 0.39614*D94
(-3.77)
AdjR^2=0.8474 D.W.=1.992

YMH02 Yield of Major Rice in Sakon Nakhon
T8298 Time Trend from 1982 to 1998, 0 before 1982, 0 after 1998
ET02APR Evapotranspiration of April in Sakon Nakhon
ET02MAY Evapotranspiration of May in Sakon Nakhon
ET02JUN Evapotranspiration of June in Sakon Nakhon
ET02JLY Evapotranspiration of July in Sakon Nakhon
ET02AUG Evapotranspiration of August in Sakon Nakhon
ET02SEP Evapotranspiration of September in Sakon Nakhon
ET02NOV Evapotranspiration of November in Sakon Nakhon
D84 Dummy Variable, 1 in 1984, 0 otherwise
D93 Dummy Variable, 1 in 1993, 0 otherwise
D94 Dummy Variable, 1 in 1994, 0 otherwise

4-5-1-1-1-3. Yield function of major rice in Nong Khai

YMH03 = + 0.46487
(1.65)
+ 0.01231*TREND
(3.40)
+ 0.00369*ET03APR
(3.83) [0.112]
- 0.00935*ET03MAY
(-4.99) [-0.484]
+ 0.01476*ET03AUG
(5.95) [0.705]
+ 0.00633*ET03OCT
(2.34) [0.355]
- 0.36983*D86
(-4.47)
- 0.37117*D90
(-4.42)
- 0.14839*D967
(-2.33)
AdjR^2=0.8657 D.W.=2.057

YMH03 Yield of Major Rice in Nong Khai
TREND Time Trend from 1982 to 2000
ET03APR Evapotranspiration of April in Nong Khai
ET03MAY Evapotranspiration of May in Nong Khai
ET03AUG Evapotranspiration of August in Nong Khai
ET03OCT Evapotranspiration of October in Nong Khai
D86 Dummy Variable, 1 in 1986, 0 otherwise
D90 Dummy Variable, 1 in 1990, 0 otherwise
D967 Dummy Variable, 1 in 1996 to 1997, 0 otherwise

4-5-1-1-1-4. Yield function of major rice in Udon Thani

YMH04 = + 2.53763
(4.18)
+ 0.00379*ET04APR
(2.78) [0.111]
- 0.00543*ET04JUN
(-1.53) [-0.288]
+ 0.00745*ET04SEP
(1.74) [0.391]
- 0.01589*ET04NOV
(-2.62) [-0.717]
- 0.39942*D87
(-3.33)
- 1.45489*D88
(-12.02)
- 0.43588*D93
(-2.43)
AdjR^2= 0.8953 D.W.= 2.066

YMH04 Yield of Major Rice in Udon Thani
ET04APR Evapotranspiration of April in Udon Thani
ET04JUN Evapotranspiration of June in Udon Thani

ET04SEP Evapotranspiration of Septemer in Udon Thani
ET04NOV Evapotranspiration of November in Udon Thani
D87 Dummy Variable, 1 in 1987, 0 otherwise
D88 Dummy Variable, 1 in 1988, 0 otherwise
D93 Dummy Variable, 1 in 1993, 0 otherwise

4-5-1-1-1-5. Yield function of major rice in Loei

YMH06 = - 1.17177
(-1.41)
- 0.01282*ET06MAY
(-7.00) [-0.426]
+ 0.02831*ET06JLY
(4.96) [0.965]
+ 0.03165*ET06NOV
(5.48) [0.925]
- 0.46734*D82
(-3.77)
+ 0.59201*D00
(4.81)

$AdjR^2$=0.8507 D.W.=1.817

YMH06 Yield of Major Rice in Loei
ET06MAY Evapotranspiration of May in Loei
ET06JLY Evapotranspiration of July in Loei
ET06NOV Evapotranspiration of November in Loei
D82 Dummy Variable, 1 in 1982, 0 otherwise
D00 Dummy Variable, 1 in 2000, 0 otherwise

4-5-1-1-1-6. Yield function of major rice in Yasothon

YMH08 = + 2.53918
(4.07)
+ 0.02670*TREND
(7.64)
+ 0.00466*ET08MAY
(3.03) [0.248]
- 0.00698*ET08JUN
(-2.06) [-0.385]
+ 0.00786*ET08JLY
(2.40) [0.454]
+ 0.00712*ET08SEP
(2.41) [0.407]
- 0.01154*ET08OCT
(-3.80) [-0.795]
- 0.01385*ET08NOV
(-2.89) [-0.428]
- 0.56166*D88
(-5.27)

$AdjR^2$=0.8911 D.W.=2.097

YMH08 Yield of Major Rice in Yasothon
TREND Time Trend from 1982 to 2000
ET08MAY Evapotranspiration of May in Yasothon
ET08JUN Evapotranspiration of June in Yasothon
ET08JLY Evapotranspiration of July in Yasothon
ET08SEP Evapotranspiration of September in Yasothon
ET08OCT Evapotranspiration of October in Yasothon
ET08NOV Evapotranspiration of November in Yasothon
D88 Dummy Variable, 1 in 1988, 0 otherwise

4-5-1-1-1-7. Yield function of major rice in Ubon Ratchathani

YMH09= + 1.16657
(3.07)
+ 0.01449*TREND
(2.63)
- 0.00327*ET09APR
(-2.07) [-0.091]
+ 0.00583*ET09MAY
(3.25) [0.338]
- 0.00972*ET09JLY
(-2.82) [-0.616]
+ 0.00747*ET09AUG
(2.38) [0.457]
+ 0.46127*D85
(5.45)

$AdjR^2$=0.8828 D.W.=2.237

YMH09 Yield of Major Rice in Ubon Ratchathani
TREND Time Trend from 1982 to 2000
ET09APR Evapotranspiration of April in Ubon Ratchathani
ET09MAY Evapotranspiration of May in Ubon Ratchathani
ET09JLY Evapotranspiration of July in Ubon Ratchathani
ET09AUG Evapotranspiration of August in Ubon Ratchathani
D85 Dummy Variable, 1 in 1985, 0 otherwise

4-5-1-1-1-8. Yield function of major rice in Kalasin

YMH11= + 4.15186
(5.08)
+ 0.03328*TREND
(8.92)
- 0.00205*ET11APR
(-2.01) [-0.052]
+ 0.00282*ET11MAY
(1.48) [0.121]
- 0.00970*ET11JLY
(-2.04) [-0.462]
- 0.00802*ET11AUG
(-2.76) [-0.361]
- 0.00380*ET11OCT
(-1.52) [-0.201]
- 0.01067*ET11NOV
(-2.66) [-0.428]
+ 0.57323*D83
(4.85)
- 0.21475*D934
(-2.61)
- 0.33656*D989
(-5.64)

$AdjR^2$=0.8450 D.W.=1.933

YMH11 Yield of Major Rice in Kalasin
TREND Time Trend from 1982 to 2000
ET11APR Evapotranspiration of April in Kalasin
ET11MAY Evapotranspiration of May in Kalasin
ET11JLY Evapotranspiration of July in Kalasin
ET11AUG Evapotranspiration of August in Kalasin
ET11OCT Evapotranspiration of October in Kalasin

ET11NOV Evapotranspiration of November in Kalasin
D83 Dummy Variable, 1 in 1983, 0 otherwise
D934 Dummy Variable, 1 in 1993 to 1994, 0 otherwise
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-1-1-9. Yield function of major rice in Khon Kaen

YMH12 = + 2.51256
(10.08)
+ 0.00532*ET12JUN
(3.23) [0.278]
- 0.00463*ET12JLY
(-2.66) [-0.253]
- 0.00577*ET12SEP
(-2.57) [-0.279]
- 0.00401*ET12OCT
(-3.01) [-0.227]
- 0.22654*D82
(-3.92)
- 0.40232*D87
(-8.41)
- 0.09938*D95
(-1.91)

AdjR^2=0.8619 D.W.=2.095

YMH12 Yield of Major Rice in Khon Kaen
TREND Time Trend from 1982 to 2000
ET12JUN Evapotranspiration of June in Khon Kaen
ET12JLY Evapotranspiration of July in Khon Kaen
ET12SEP Evapotranspiration of September in Khon Kaen
ET12OCT Evapotranspiration of October in Khon Kaen
D82 Dummy Variable, 1 in 1982, 0 otherwise
D87 Dummy Variable, 1 in 1987, 0 otherwise
D95 Dummy Variable, 1 in 1995, 0 otherwise

4-5-1-1-1-10. Yield function of major rice in Maha Sarakham

YMH13 = + 1.51352
(7.76)
+ 0.04631*TREND
(13.34)
- 0.00509*ET13JUN
(-2.10) [-0.262]
+ 0.44242*D834
(7.78)
- 0.30566*D99
(-4.06)

AdjR^2=0.9083 D.W.=2.112

YMH13 Yield of Major Rice in Maha Sarakham
TREND Time Trend from 1982 to 2000
ET13JUN Evapotranspiration of June in Maha Sarakham
D834 Dummy Variable, 1 in 1983 to 1984, 0 otherwise
D99 Dummy Variable, 1 in 1999, 0 otherwise

4-5-1-1-1-11. Yield function of major rice in Roi Et

YMH14= + 1.35644
(3.80)
+ 0.04313*TREND
(9.43)
- 0.01191*ET14JUN
(-3.67) [-0.633]
+ 0.00947*ET14JLY
(2.43) [0.532]
- 0.32715*D82
(-3.51)
- 0.35764*D989
(-4.91)

AdjR^2=0.8900 D.W.=2.119

YMH14 Yield of Major Rice in Roi Et
TREND Time Trend from 1982 to 2000
ET14JUN Evapotranspiration of June in Roi Et
ET14JLY Evapotranspiration of July in Roi Et
D82 Dummy Variable, 1 in 1982, 0 otherwise
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-1-1-12. Yield function of major rice in Buri Ram

YMH15 = + 1.93605
(8.40)
+ 0.03313*TREND
(8.82)
- 0.00382*ET15APR
(-3.30) [-0.110]
- 0.00489*ET15OCT
(-2.30) [-0.281]
+ 0.56244*D835
(9.94)
- 0.22791*D912
(-3.71)

AdjR^2=0.8882 D.W.=1.763

YMH15 Yield of Major Rice in Buri Ram
TREND Time Trend from 1982 to 2000
ET15APR Evapotranspiration of April in Buri Ram
ET15OCT Evapotranspiration of October in Surin
D835 Dummy Variable, 1 in 1983 to 1985, 0 otherwise
D912 Dummy Variable, 1 in 1991 to 1992, 0 otherwise

4-5-1-1-1-13. Yield function of major rice in Surin

YMH16= + 0.60350
(1.12)
+ 0.00411*ET16APR
(2.27) [0.109]
+ 0.00744*ET16JLY
(2.06) [0.390]
+ 0.00764*ET16AUG
(2.48) [0.407]
+ 0.00664*ET16SEP
(1.97) [0.325]
- 0.01085*ET16OCT
(-3.50) [-0.628]
+ 0.43567*D88
(3.17)
+ 0.68427*D94
(6.34)
+ 0.33107*D97

(3.50)
$AdjR^2$= 0.9041 D.W.=2.053

YMH16 Yield of Major Rice in Surin
ET16APR Evapotranspiration of April in Surin
ET16JLY Evapotranspiration of July in Surin
ET16AUG Evapotranspiration of August in Surin
ET16SEP Evapotranspiration of September in Surin
ET16OCT Evapotranspiration of October in Surin
D88 Dummy Variable, 1 in 1988, 0 otherwise
D94 Dummy Variable, 1 in 1994, 0 otherwise
D97 Dummy Variable, 1 in 1997, 0 otherwise

4-5-1-1-1-14. Yield function of major rice in Si Sa Ket

YMH17 = - 0.58471
(-1.19)
+ 0.04291*TREND
(8.18)
+ 0.00461*ET17MAY
(3.14) [0.232]
- 0.01698*ET17JUN
(-4.91) [-0.870]
+ 0.01026*ET17JLY
(2.41) [0.554]
+ 0.01248*ET17SEP
(3.31) [0.639]
+ 0.01103*ET17NOV
(2.32) [0.582]
- 0.31936*D923
(-4.54)
- 0.39813*D989
(-5.32)
$AdjR^2$=0.8637 D.W.=2.222

YMH17 Yield of Major Rice in Si Sa Ket
TREND Time Trend from 1982 to 2000
ET17MAY Evapotranspiration of May in Si Sa Ket
ET17JUN Evapotranspiration of June in Si Sa Ket
ET17JLY Evapotranspiration of July in Si Sa Ket
ET17SEP Evapotranspiration of September in Si Sa Ket
ET17NOV Evapotranspiration of November in Si Sa Ket
D923 Dummy Variable, 1 in 1992 to 1993, 0 otherwise
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-1-1-15. Yield function of major rice in Chaiyaphum

YMH18 = + 4.09209
(4.54)
- 0.01267*ET18MAY
(-4.11) [-0.573]
- 0.01186*ET18JUN
(-2.63) [-0.571]
- 0.00952*ET18AUG
(-2.03) [-0.458]
+ 0.01531*ET18SEP
(2.66) [0.673]
+ 0.00780*ET18OCT
(1.73) [0.405]
- 0.01677*ET18NOV
(-3.54) [-0.774]
+ 0.46670*D83
(3.03)
+ 0.59224*D96
(4.08)
+ 0.82541*D00
(5.68)
$AdjR^2$=0.8812 D.W.=1.895

YMH18 Yield of Major Rice in Chaiyaphum
ET18MAY Evapotranspiration of May in Chaiyaphum
ET18JUN Evapotranspiration of June in Chaiyaphum
ET18AUG Evapotranspiration of August in Chaiyaphum
ET18SEP Evapotranspiration of September in Chaiyaphum
ET18OCT Evapotranspiration of October in Chaiyaphum
ET18NOV Evapotranspiration of November in Chaiyaphum
D83 Dummy Variable, 1 in 1983, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise
D00 Dummy Variable, 1 in 2000, 0 otherwise

4-5-1-1-1-16. Yield function of major rice in Nakhon Ratchasima

YMH19 = + 4.97683
(6.96)
+ 0.05049*TREND
(9.31)
- 0.00997*ET19APR
(-7.57) [-0.320]
+ 0.00394*ET19MAY
(2.48) [0.202]
- 0.00376*ET19JLY
(-1.54) [-0.204]
+ 0.00984*ET19SEP
(2.90) [0.483]
- 0.01299*ET19OCT
(-5.40) [-0.747]
- 0.03524*ET19NOV
(-6.06) [-1.925]
+ 0.64573*D825
(7.78)
+ 0.26546*D89
(3.50)
+ 0.35398*D98
(3.75)
$AdjR^2$= 0.8924 D.W.=1.686

YMH19 Yield of Major Rice in Nakhon Ratchasima
TREND Time Trend from 1982 to 2000
ET19APR Evapotranspiration of April in Nakhon Ratchasima
ET19MAY Evapotranspiration of May in Nakhon Ratchasima
ET19JLY Evapotranspiration of July in Nakhon Ratchasima
ET19SEP Evapotranspiration of September in Nakhon Ratchasima
ET19OCT Evapotranspiration of October in Nakhon Ratchasima
ET19NOV Evapotranspiration of November in Nakhon Ratchasima
D825 Dummy Variable, 1 in 1982 to 1985, 0 otherwise
D89 Dummy Variable, 1 in 1989, 0 otherwise

D98 Dummy Variable, 1 in 1998, 0 otherwise

4-5-1-1-2. Yield function of major rice in North region

YMH_N= - 0.30514
(-0.51)
+ 0.02299*TREND
(5.53)
+ 0.00734*ETNJUN
(3.23) [0.212]
- 0.00838*ETNAUG
(-3.35) [-0.230]
+ 0.01499*ETNSEP
(3.36) [0.395]
- 0.01050*ETNOCT
(-3.43) [-0.295]
+ 0.02736*ETNNOV
(4.47) [0.711]
+ 0.00876*ETNDEC
(3.87) [0.164]
- 0.29898*D90
(-3.52)
- 0.20411*D979
(-3.50)
+ 0.33102*SHIFT00
(3.32)

$AdjR^2$=0.8611 D.W.=2.626

YMH_N	Yield of Major Rice in North region
ETNJUN	Evapotranspiration of June in North region
ETNAUG	Evapotranspiration of August in North region
ETNSEP	Evapotranspiration of September in North region
ETNOCT	Evapotranspiration of October in North region
ETNNOV	Evapotranspiration of November in North region
ETNDEC	Evapotranspiration of December in North region
D90	Dummy Variable, 1 in 1990, 0 otherwise
D979	Dummy Variable, 1 in 1997 to 1999, 0 otherwise
SHIFT00	Dummy Variable, 1 after 2000, 0 otherwise

4-5-1-1-3. Yield function of major rice in South region

YMH_S = - 0.62642
(-1.63)
+ 0.03423*TREND
(10.98)
+ 0.01348*ETSJUN
(4.32) [0.509]
+ 0.01658*ETSOCT
(5.47) [0.609]
- 0.00532*ETSDEC
(-3.13) [-0.251]
- 0.32229*D90
(-4.92)
- 0.21043*D92
(2.95)

AdjR2=0.9200 D.W.=1.631

YMH_S	Yield of Major Rice in South region
TREND	Time Trend from 1982 to 2000
ETSJUN	Evapotranspiration of June in South region
ETSOCT	Evapotranspiration of October in South region
ETSDEC	Evapotranspiration of December in South region
D90	Dummy Variable, 1 in 1990, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

4-5-1-1-4. Yield function of major rice in Central region

YMH_C = + 0.95407
(3.69)
+ 0.04902*TREND
(19.18)
+ 0.01224*ETCNOV
(4.53) [0.306]
- 0.74002*D90
(-12.03)

$AdjR^2$=0.9709 D.W.=2.695

YMH_C	Yield of Major Rice in Central region
TREND	Time Trend from 1982 to 2000
ETCNOV	Evapotranspiration of November in Central region
D90	Dummy Variable, 1 in 1990, 0 otherwise

4-5-1-2. Yield function of second rice

4-5-1-2-1. Yield function of second rice in North East region

4-5-1-2-1-1. Yield function of second rice in Nakhon Phanom

YSH01 = + 1.76190
(11.59)
+ 0.01774*TREND
(2.80)
- 0.00912*ET01MAR
(-2.61) [-0.105]
+ 0.01272*ET01APR
(5.48) [0.259]
- 0.40577*D91
(-2.38)
+ 0.59741*D97
(3.44)

$AdjR^2$=0.8456 D.W.=1.772

YSH01	Yield of Second Rice in Nakhon Phanom
TREND	Time Trend from 1982 to 2000
ET01MAR	Evapotranspiration of March in Nakhon Phanom
ET01APR	Evapotranspiration of April in Nakhon Phanom
D91	Dummy Variable, 1 in 1991, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

4-5-1-2-1-2. Yield function of second rice in Sakon Nakhon

YSH02 = - 1.14095
(-1.74)
- 0.01760*TREND
(-2.26)
+ 0.02715*ET02NOV(t-1)
(3.32) [0.955]
- 0.04772*ET02DEC(t-1)

(-4.54) [-0.815]
+ 0.03309*ET02JAN
(2.44) [0.255]
+ 0.01097*ET02MAR
(3.40) [0.154]
- 0.00430*ET02APR
(-2.27) [-0.104]
+ 0.02966*ET02MAY
(7.30) [1.195]
+ 1.03905*D86
(6.14)
- 0.72469*D90
(-4.22)
+ 1.24464*D91
(6.79)

$AdjR^2$=0.8683 D.W.=2.534

YSH02	Yield of Second Rice in Sakon Nakhon
ET02NOV	Evapotranspiration of November in Sakon Nakhon
ET02DEC	Evapotranspiration of December in Sakon Nakhon
ET02JAN	Evapotranspiration of January in Sakon Nakhon
ET02MAR	Evapotranspiration of March in Sakon Nakhon
ET02APR	Evapotranspiration of April in Sakon Nakhon
ET02MAY	Evapotranspiration of May in Sakon Nakhon
D86	Dummy Variable, 1 in 1986, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise
D91	Dummy Variable, 1 in 1991, 0 otherwise

4-5-1-2-1-3. Yield function of second rice in Nong Khai

YSH03 = + 3.76808
(6.19)
+ 0.02507*TREND
(3.61)
- 0.04723*ET03NOV(t-1)
(-7.19) [-1.232]
+ 0.03150*ET03JAN
(3.84) [0.245]
- 0.01500*ET03FEB
(-2.76) [-0.112]
+ 0.01446*ET03MAR
(4.34) [0.173]
- 0.00870*ET03APR
(-3.62) [-0.162]
+ 0.01958*ET03MAY
(5.00) [0.622]
- 0.85520*D87
(-5.27)
- 0.93102*D934
(-5.98)
- 0.82979*D00
(-4.42)

$AdjR^2$=0.9031 D.W.=2.060

YSH03	Yield of Second Rice in Nong Khai
TREND	Time Trend from 1982 to 2000
ET03JAN	Evapotranspiration of January in Nong Khai
ET03FEB	Evapotranspiration of February in Nong Khai
ET03MAR	Evapotranspiration of March in Nong Khai
ET03APR	Evapotranspiration of April in Nong Khai
ET03MAY	Evapotranspiration of May in Nong Khai
ET03NOV	Evapotranspiration of November in Nong Khai
D87	Dummy Variable, 1 in 1987, 0 otherwise
D934	Dummy Variable, 1 in 1993 to 1994, 0 otherwise
D00	Dummy Variable, 1 in 2000, 0 otherwise

4-5-1-2-1-4. Yield function of second rice in Udon Thani

YSH04 = + 0.20609
(0.41)
+ 0.01645*TREND
(2.35)
+ 0.05106*ET04NOV(t-1)
(5.45) [1.563]
- 0.04324*ET04DEC(t-1)
(-4.73) [-0.666]
- 0.01080*ET04FEB
(-1.94) [-0.078]
+ 0.33744*D889
(2.73)
+ 0.90961*D90
(5.58)
+ 0.88404*D99
(4.97)

$AdjR^2$=0.8657 D.W.=2.216

YSH04	Yield of Second Rice in Udon Thani
TREND	Time Trend from 1982 to 2000
ET04FEB	Evapotranspiration of February in Udon Thani
ET04NOV	Evapotranspiration of November in Udon Thani
ET04DEC	Evapotranspiration of December in Udon Thani
D889	Dummy Variable, 1 in 1988 to 1989, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

4-5-1-2-1-5. Yield function of second rice in Loei

YSH06 = + 3.00217
(5.07)
- 0.03449*ET06NOV(t-1)
(-3.38) [-0.953]
+ 0.03746*ET06DEC(t-1)
(5.08) [0.649]
+ 0.01461*ET06MAR
(4.06) [0.165]
+ 0.89519*D92
(4.24)
+ 1.03827*D96
(4.76)
- 0.43222*D989
(-2.49)

$AdjR^2$=0.8740 D.W.=2.306

YSH06	Yield of Second Rice in Loei
ET06MAR	Evapotranspiration of March in Loei
ET06NOV	Evapotranspiration of November in Loei
ET06DEC	Evapotranspiration of December in Loei
D92	Dummy Variable, 1 in 1992, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise

D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-2-1-6. Yield function of second rice in Yasothon

YSH08 = + 4.03983
(3.37)
- 0.04115*ET08NOV(t-1)
(-3.05) [-1.262]
+ 0.05793*ET08DEC(t-1)
(4.22) [0.757]
- 0.01455*ET08FEB
(-2.29) [-0.070]
+ 0.02063*ET08MAY
(7.06) [0.627]
- 0.02036*ET08JUN
(-2.90) [-0.641]
+ 1.02254*D92
(6.32)
+ 0.99383*D96
(7.03)
+ 0.86071*D98
(6.10)

AdjR^2=0.8998 D.W.=1.968

YSH08	Yield of Second Rice in Yasothon
ET08FEB	Evapotranspiration of February in Yasothon
ET08MAY	Evapotranspiration of May in Yasothon
ET08JUN	Evapotranspiration of June in Yasothon
ET08NOV	Evapotranspiration of November in Yasothon
ET08DEC	Evapotranspiration of December in Yasothon
D92	Dummy Variable, 1 in 1992, 0 otherwise
D96	Dummy Variable, 1 in 1996, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

4-5-1-2-1-7. Yield function of second rice in Ubon Ratchathani

YSH09 = + 2.79164
(4.91)
+ 0.04823*T8292
(6.86)
- 0.01509*ET09NOV(t-1)
(-2.93) [-0.705]
- 0.01497*ET09JAN
(-3.36) [-0.175]
+ 0.01133*ET09MAR
(3.01) [0.118]
+ 0.00717*ET09JUN
(2.12) [0.317]
- 0.73377*D91
(-7.01)
- 0.61404*D98
(-4.81)

AdjR^2=0.8744 D.W.=2.070

YSH09	Yield of Second Rice in Ubon Ratchathani
T8292	Time Trend from 1982 to 1992, 0 before 1982, 0 after 1992
ET09JAN	Evapotranspiration of January in Ubon Ratchathani
ET09MAR	Evapotranspiration of March in Ubon Ratchathani
ET09JUN	Evapotranspiration of June in Ubon Ratchathani
ET09NOV	Evapotranspiration of November in Ubon Ratchathani
D91	Dummy Variable, 1 in 1991, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

4-5-1-2-1-8. Yield function of second rice in Kalasin

YSH11 = + 4.85052
(6.95)
+ 0.04600*TREND
(5.18)
+ 0.03074*ET11DEC(t-1)
(3.01) [0.308]
- 0.01383*ET11FEB
(-1.87) [-0.056]
- 0.03550*ET11JUN
(-5.08) [-0.924]
+ 0.34197*D890
(2.46)
- 1.06759*D94
(-4.20)

AdjR^2=0.8742 D.W.=1.958

YSH11	Yield of Second Rice in Kalasin
TREND	Time Trend from 1982 to 2000
ET11FEB	Evapotranspiration of February in Kalasin
ET11JUN	Evapotranspiration of June in Kalasin
ET11DEC	Evapotranspiration of December in Kalasin
D890	Dummy Variable, 1 in 1989 to 1990, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

4-5-1-2-1-9. Yield function of second rice in Khon Kaen

YSH12 = + 1.09285
(1.66)
+ 0.07713*TREND
(8.45)
- 0.01717*ET12NOV(t-1)
(-2.33) [-0.421]
+ 0.06347*ET12JAN
(4.54) [0.294]
- 0.01858*ET12MAR
(-4.79) [-0.163]
- 0.00643*ET12APR
(-2.38) [-0.092]
+ 0.02822*ET12JUN
(4.65) [0.747]
+ 0.78400*D85
(4.40)
- 1.51149*D93
(-7.50)
- 0.89488*D956
(-5.96)

AdjR^2=0.8636 D.W.=1.640

YSH12	Yield of Second Rice in Khon Kaen
TREND	Time Trend from 1982 to 2000
ET12JAN	Evapotranspiration of January in Khon Kaen
ET12MAR	Evapotranspiration of March in Khon Kaen
ET12APR	Evapotranspiration of April in Khon Kaen
ET12JUN	Evapotranspiration of June in Khon Kaen

ET12NOV	Evapotranspiration of November in Khon Kaen
D85	Dummy Variable, 1 in 1985, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D956	Dummy Variable, 1 in 1995 to 1996, 0 otherwise

4-5-1-2-1-10. Yield function of second rice in Maha Sarakham

YSH13 = + 4.50255
(6.80)
+ 0.0775*TREND
(9.13)
- 0.02489*ET13MAR
(-4.23) [-0.188]
+ 0.00807*ET13APR
(2.12) [0.107]
- 0.00468*ET13MAY
(-1.30) [0.100]
- 0.02173*ET13JUN
(-2.97) [-0.514]
+ 0.88063*D890
(6.18)
+ 1.03944*D98
(3.99)
AdjR^2=0.8735 D.W.=2.057

YSH13	Yield of Second Rice in Maha Sarakham
TREND	Time Trend from 1982 to 2000
ET13MAR	Evapotranspiration of March in Maha Sarakham
ET13APR	Evapotranspiration of April in Maha Sarakham
ET13MAY	Evapotranspiration of May in Maha Sarakham
ET13JUN	Evapotranspiration of June in Maha Sarakham
D890	Dummy Variable, 1 in 1989 to 1990, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

4-5-1-2-1-11. Yield function of second rice in Roi Et

YSH14 = - 2.87485
(-4.49)
+ 0.06625*ET14NOV(t-1)
(8.24) [1.714]
+ 0.02756*ET14MAR
(6.59) [0.224]
- 1.1150*D82
(-7.71)
- 1.15959*D87
(-7.51)
+ 0.58066*D912
(5.09)
AdjR^2=0.9177 D.W.=2.361

YSH14	Yield of Second Rice in Roi Et
ET14MAR	Evapotranspiration of March in Roi Et
ET14NOV	Evapotranspiration of November in Roi Et
D82	Dummy Variable, 1 in 1982, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise
D912	Dummy Variable, 1 in 1991 to 1992, 0 otherwise

4-5-1-2-1-12. Yield function of second rice in Buri Ram

YSH15 = + 3.88415
(5.20)
- 0.03807*ET15DEC(t-1)
(-3.50) [-0.634]
+ 0.12514*ET15JAN
(5.02) [0.796]
- 0.03341*ET15FEB
(-2.53) [-0.195]
- 0.01729*ET15MAR
(-2.64) [-0.150]
+ 0.02078*ET15MAY
(3.79) [0.651]
- 0.03028*ET15JUN
(-3.24) [-0.998]
- 0.86525*D87
(-3.45)
- 0.92406*D89
(-3.57)
+ 0.79307*D93
(3.12)
AdjR^2=0.8071 D.W.=1.876

YSH15	Yield of Second Rice in Buri Ram
ET15JAN	Evapotranspiration of January in Buri Ram
ET15FEB	Evapotranspiration of February in Buri Ram
ET15MAR	Evapotranspiration of March in Buri Ram
ET15MAY	Evapotranspiration of May in Buri Ram
ET15JUN	Evapotranspiration of June in Buri Ram
ET15DEC	Evapotranspiration of December in Buri Ram
D87	Dummy Variable, 1 in 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise

4-5-1-2-1-13. Yield function of second rice in Surin

YSH16 = + 5.49422
(3.74)
+ 0.03696*TREND
(2.99)
- 0.05185*ET16NOV(t-1)
(-3.02) [-1.950]
+ 0.02561*ET16DEC(t-1)
(3.88) [0.431]
+ 0.03191*ET16FEB
(3.85) [0.209]
- 0.01606*ET16MAR
(-2.62) [-0.151]
- 0.56121*D82
(-3.10)
+ 0.65824*D91
(4.35)
- 1.31875*D96
(-7.69)
- 1.07867*SHIFT98
(-7.17)
AdjR^2=0.9110 D.W.=1.784

YSH16	Yield of Second Rice in Surin
TREND	Time Trend from 1982 to 2000
ET16FEB	Evapotranspiration of January in Surin
ET16MAR	Evapotranspiration of January in Surin

ET16NOV Evapotranspiration of January in Surin
ET16DEC Evapotranspiration of January in Surin
D82 Dummy Variable, 1 in 1982, 0 otherwise
D91 Dummy Variable, 1 in 1991, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise
SHIFT98 Dummy Variable, 1 after 1998, 0 otherwise

4-5-1-2-1-14. Yield function of second rice in Si Sa Ket

YSH17 = - 0.89927
(-1.83)
+ 0.05499*ET17DEC(t-1)
(4.94) [0.966]
- 0.04007*ET17JAN
(-2.24) [-0.296]
- 0.04265*ET17FEB
(-3.80) [-0.245]
+ 0.04484*ET17MAR
(9.11) [0.372]
+ 0.00801*ET17APR
(4.55) [0.156]
+ 0.01193*ET17JUN
(2.99) [0.463]
- 0.63630*D87
(-5.27)
+ 0.30943*D91
(2.87)
- 0.52736*D989
(-6.38)
AdjR^2=0.9356 D.W.=2.224

YSH17 Yield of Second Rice in Si Sa Ket
ET17JAN Evapotranspiration of January in Si Sa Ket
ET17FEB Evapotranspiration of February in Si Sa Ket
ET17MAR Evapotranspiration of March in Si Sa Ket
ET17APR Evapotranspiration of April in Si Sa Ket
ET17JUN Evapotranspiration of June in Si Sa Ket
ET17DEC Evapotranspiration of December in Si Sa Ket
D87 Dummy Variable, 1 in 1987, 0 otherwise
D91 Dummy Variable, 1 in 1991, 0 otherwise
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-1-2-1-15. Yield function of second rice in Chaiyaphum

YSH18 = + 6.00024
(9.81)
+ 0.06028*T8292
(4.73)
- 0.02309*ET18DEC(t-1)
(-2.26) [-0.358]
+ 0.05427*ET18JAN
(2.88) [0.314]
- 0.02342*ET18FEB
(-3.17) [-0.155]
- 0.00850*ET18MAR
(-2.18) [-0.092]
- 0.00648*ET18MAY
(-1.48) [-0.192]
- 0.02481*ET18JUN
(-3.65) [-0.784]
+ 0.36519*D856
(2.30)
+ 0.98348*D93
(4.22)
+ 0.80015*D97
(3.78)
AdjR^2=0.8592 D.W.=2.380

YSH18 Yield of Second Rice in Chaiyaphum
T8292 Time Trend from 1982 to 1992, 0 before 1982, 0 after 1992
ET18JAN Evapotranspiration of January in Chaiyaphum
ET18FEB Evapotranspiration of February in Chaiyaphum
ET18MAR Evapotranspiration of March in Chaiyaphum
ET18MAY Evapotranspiration of May in Chaiyaphum
ET18JUN Evapotranspiration of June in Chaiyaphum
ET18DEC Evapotranspiration of December in Chaiyaphum
D856 Dummy Variable, 1 in 1985 to 1986, 0 otherwise
D93 Dummy Variable, 1 in 1993, 0 otherwise
D97 Dummy Variable, 1 in 1997, 0 otherwise

4-5-1-2-1-16. Yield function of second rice in Nakhon Ratchasima

YSH19 = + 1.50479
(6.27)
+ 0.00871*ET19DEC(t-1)
(2.37) [0.143]
+ 0.00491*ET19APR
(2.28) [0.089]
+ 0.00752*ET19MAY
(2.57) [0.217]
+ 0.72592*D89
(5.30)
+ 1.09139*D92
(7.40)
- 0.33658*D96
(-2.41)
AdjR^2=0.8578 D.W.=2.631

YSH19 Yield of Second Rice in Nakhon Ratchasima
ET19APR Evapotranspiration of April in Nakhon Ratchasima
ET19MAY Evapotranspiration of May in Nakhon Ratchasima
ET19DEC Evapotranspiration of December in Nakhon Ratchasima
D89 Dummy Variable, 1 in 1989, 0 otherwise
D92 Dummy Variable, 1 in 1992, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise

4-5-1-2-2. Yield function of second rice in North region

YSH_N = + 2.26145
(12.89)
+ 0.14069*T8292
(19.72)
- 0.14707*T9600
(-7.21)
+ 0.00790*ETNJAN
(1.95) [0.063]

+ 0.02075*ETNFEB
(3.26) [0.119]
+ 0.005186*ln(ETNMAR)
(2.08) [0.029]
- 0.573257*D87(-6.14)

$AdjR^2$=0.9669 D.W.=2.064

YSH_N Yield of Second Rice in North region
T8292 Time Trend from 1982 to 1992, 1 before 1982, 11 after 1992
T9600 Time Trend from 1996 to 2000, 1 before 1996
ETNJAN Evapotranspiration of January in North region
ETNFEB Evapotranspiration of February in North region
ETNMAR Evapotranspiration of March in North region
D87 Dummy Variable, 1 in 1987, 0 otherwise

4-5-1-2-3. Yield function of second rice in South region

YSH_S = + 2.82790
(9.35)
+ 0.19791*T8789
(9.99)
- 0.00471*ETSDEC(t-1)
(-2.59) [-0.172]
- 0.00411*ETSFEB
(-3.47) [-0.101]
+ 0.00316*ETSMAR
(2.70) [0.070]
- 0.00287*ETSAPR
(-2.81) [-0.080]
+ 0.00672*ETSMAY
(3.46) [0.233]
- 0.00383*ETSJUN
(-1.14) [-0.136]
+ 0.382326*D82
(4.69)
- 0.57866*D90
(-9.50)
- 0.34906*D926
(-9.98)

$AdjR^2$=0.9629 D.W.=2.302

YSH_S Yield of Second Rice in South region
T8789 Time Trend from 1987 to 1989, 1 before 1987, 3 after 1989
ETSFEB Evapotranspiration of February in South region
ETSMAR Evapotranspiration of March in South region
ETSAPR Evapotranspiration of April in South region
ETSMAY Evapotranspiration of May in South region
ETSJUN Evapotranspiration of June in South region
ETSDEC Evapotranspiration of December in South region
D82 Dummy Variable, 1 in 1982, 0 otherwise
D90 Dummy Variable, 1 in 1990, 0 otherwise
D926 Dummy Variable, 1 in 1992 to 1996, 0 otherwise

4-5-1-2-4. Yield function of second rice in Central region

YSH_C = + 3.46934
(48.39)
+ 0.05174*TREND
(11.15)
+ 0.00581*ETCMAR
(2.36) [-0.040]
- 0.33076*D87
(-3.18)
- 1.87457*D90
(16.68)
+ 0.35704*D96
(3.34)

$AdjR^2$=0.9699 D.W.=2.094

YSH_C Yield of Second Rice in Central region
TREND Time Trend from 1982 to 2000
ETCMAR Evapotranspiration of March in Central region
D87 Dummy Variable, 1 in 1987, 0 otherwise
D90 Dummy Variable, 1 in 1990, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise

4-5-2. Planted area functions

4-5-2-1. Planted area function of major rice

4-5-2-1-1. Planted area function of major rice in North East region

4-5-2-1-1-1. Planted area function of major rice in Nakhon Phanom

APM01= - 57036
(-0.80)
+ 0.49673*APM01(t-1)
(3.34)
+ 5.66909*[FPR(t-1)/CPI(t-1)/100]
(2.06) [0.153]
- 460.38753* ET01MAY(t-1)
(-4.10) [-0.189]
+ 751.20376* ET01JLY(t-1)
(2.13) [0.331]
+ 1223.51665* ET01OCT(t-1)
(3.71) [0.631]
- 1336.95339*ET01NOV(t-1)
(-3.02) [-0.529]
+ 2137.33188*ET01DEC(t-1)
(2.84) [0.410]
- 30740*D823
(-4.98)
- 23189*D92
(-3.88)

$AdjR^2$=0.9016 D.W.=2.246

APM01 Planted Area of Major Rice in Nakhon Phanom
FPR Farm Price of Thai Rice (baht per KG)
CPI Consumer Price Index (1998=100)
ET01MAY Evapotranspiration of May in Nakhon Phanom
ET01JLY Evapotranspiration of July in Nakhon Phanom
ET01OCT Evapotranspiration of October in Nakhon Phanom
ET01NOV Evapotranspiration of November in Nakhon Phanom
ET01DEC Evapotranspiration of December in Nakhon Phanom
D823 Dummy Variable, 1 in 1982 to 1983, 0 otherwise
D92 Dummy Variable, 1 in 1992, 0 otherwise

4-5-2-1-1-2. Planted area function of major rice in Sakon Nakhon

APM02= + 325123
(2.72)
+ 0.59106*APM02(t-1)
(3.28)
+ 21.16978*[FPR(t-1)/CPI(t-1)/100]
(3.88) [0.457]
+ 981.21360*ET02APR(t-1)
(3.25) [0.192]
- 1636.77096*ET02MAY(t-1)
(-2.87) [-0.545]
- 2858.21242*ET02AUG(t-1)
(-4.47) [-0.913]
+ 3884.42246*ET02SEP(t-1)
(6.48) [1.355]
- 4901.40208*ET02NOV(t-1)
(-4.53) [-1.434]
+ 37671*D88
(2.19)
+ 46493*D91
(2.30)
+ 69480*D95
(3.78)

$AdjR^2$=0.7443 D.W.=1.812

APM02	Planted Area of Major Rice in Sakon Nakhon
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET02APR	Evapotranspiration of April in Sakon Nakhon
ET02MAY	Evapotranspiration of May in Sakon Nakhon
ET02AUG	Evapotranspiration of August in Sakon Nakhon
ET02SEP	Evapotranspiration of September in Sakon Nakhon
ET02NOV	Evapotranspiration of November in Sakon Nakhon
D88	Dummy Variable, 1 in 1988, 0 otherwise
D91	Dummy Variable, 1 in 1991, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise

4-5-2-1-1-3. Planted area function of major rice in Nong Khai

APM03= + 230472
(4.87)
+ 0.21182*APM03(t-1)
(2.40)
+ 13.68872*[FPR(t-1)/CPI(t-1)/100]
(6.51) [0.446]
- 882.44676*ET03MAY(t-1)
(-6.89) [-0.460]
+ 1683.74236*ET03JUN(t-1)
(5.90) [0.840]
- 2526.12207*ET03SEP(t-1)
(-8.41) [-1.316]
+ 1680.74831*ET03OCT(t-1)
(7.80) [0.948]
- 4733.56802*ET03NOV(t-1)
(-11.53) [-2.030]
+ 4137.42883*ET03DEC(t-1)
(11.30) [1.022]
+ 52651*D90
(8.70)
- 18520*D93
(-2.82)
- 92658*D97
(-12.21)

$AdjR^2$=0.9438 D.W.=2.397

APM03	Planted Area of Major Rice in Nong Khai
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET03MAY	Evapotranspiration of May in Nong Khai
ET03JUN	Evapotranspiration of June in Nong Khai
ET03SEP	Evapotranspiration of September in Nong Khai
ET03OCT	Evapotranspiration of October in Nong Khai
ET03NOV	Evapotranspiration of November in Nong Khai
ET03DEC	Evapotranspiration of December in Nong Khai
D90	Dummy Variable, 1 in 1990, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

4-5-2-1-1-4. Planted area function of major rice in Udon Thani

APM04 = + 257903
(4.48)
+ 0.20507*APM04(t-1)
(2.03)
+ 10.00143*[FPR(t-1)/CPI(t-1)/100]
(1.84) [0.127]
+ 1017.70684*ET04MAR(t-1)
(3.29) [-0.070]
- 1255.39328*ET04APR(t-1)
(-5.17) [-0.132]
+ 1621.82874*ET04MAY(t-1)
(5.73) [0.316]
- 855.06144*ET04JUN(t-1)
(-1.99) [-0.168]
- 122204*D82
(-7.59)
+ 38527*D00
(2.32)

$AdjR^2$=0.8748 D.W.=2.270

APM04	Planted Area of Major Rice in Udon Thani
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET04MAR	Evapotranspiration of March in Udon Thani
ET04APR	Evapotranspiration of April in Udon Thani
ET04MAY	Evapotranspiration of May in Udon Thani
ET04JUN	Evapotranspiration of June in Udon Thani
D82	Dummy Variable, 1 in 1982, 0 otherwise
D00	Dummy Variable, 1 in 2000, 0 otherwise

4-5-2-1-1-5. Planted area function of major rice in Loei

APM06 = - 94713
(-3.97)
+ 0.62760*APM06(t-1)
(5.50)
+ 4.77205*[FPR(t-1)/CPI(t-1)/100]

(3.23) [0.436]
+ 589.44534*ET06SEP(t-1)
(3.84) [0.767]
+ 505.59908*ET06OCT(t-1)
(3.33) [0.721]
+ 18958*D85
(4.86)
+ 7332*D93
(2.10)
+ 9301*SHIFT00
(2.23)
AdjR^2=0.8869 D.W.=2.078

APM06	Planted Area of Major Rice in Loei
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET06SEP	Evapotranspiration of September in Loei
ET06OCT	Evapotranspiration of October in Loei
D85	Dummy Variable, 1 in 1985, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
SHIFT00	Dummy Variable, 1 after 2000, 0 otherwise

4-5-2-1-1-6. Planted area function of major rice in Yasothon

APM08 = + 200244
(6.45)
+ 0.16365*APM08(t-1)
(1.56)
+ 6.05595*[FPR(t-1)/CPI(t-1)/100]
(2.98) [0.203]
+ 243.19072*ET08APR(t-1)
(2.19) [0.061]
- 452.47485*ET08MAY(t-1)
(-3.24) [-0.223]
- 1022.97716*ET08JLY(t-1)
(-4.80) [-0.543]
- 400.05764*ET08AUG(t-1)
(-1.81) [-0.206]
+ 635.83002*ET08SEP(t-1)
(3.12) [0.339]
- 71917*D82
(-11.14)
+ 34551*D94
(5.05)
+ 18432*D99
(2.47)
AdjR^2=0.8991 D.W.=1.609

APM08	Planted Area of Major Rice in Yasothon
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET08APR	Evapotranspiration of April in Yasothon
ET08MAY	Evapotranspiration of May in Yasothon
ET08JLY	Evapotranspiration of July in Yasothon
ET08AUG	Evapotranspiration of August in Yasothon
ET08SEP	Evapotranspiration of September in Yasothon
D82	Dummy Variable, 1 in 1982, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

4-5-2-1-1-7. Planted area function of major rice in Ubon Ratchathani

APM09 = - 76398
(-1.03)
+ 0.89135*APM09 (t-1)
(8.71)
+ 15.51384*[FPR(t-1)/CPI(t-1)/100]
(3.69) [0.144]
- 403.52314*ET09MAY(t-1)
(-1.90) [-0.057]
- 958.50868*ET09AUG(t-1)
(-2.38) [-0.143]
+ 2583.35305*ET09SEP(t-1)
(5.07) [0.389]
+ 863.17759*ET09OCT(t-1)
(2.41) [0.154]
- 1521.19193*ET09NOV(t-1)
(-2.68) [-0.236]
- 63632*D82
(-6.03)
- 26533*D913
(-4.58)
+ 76450*D94
(5.51)
AdjR^2=0.9446 D.W.=2.095

APM09	Planted Area of Major Rice in Ubon Ratchathani
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET09MAY	Evapotranspiration of May in Ubon Ratchathani
ET09AUG	Evapotranspiration of August in Ubon Ratchathani
ET09SEP	Evapotranspiration of September in Ubon Ratchathani
ET09OCT	Evapotranspiration of October in Ubon Ratchathani
ET09NOV	Evapotranspiration of November in Ubon Ratchathani
D82	Dummy Variable, 1 in 1982, 0 otherwise
D913	Dummy Variable, 1 in 1991 to 1993, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

4-5-2-1-1-8. Planted area function of major rice in Kalasin

APM11 = + 56220
(0.98)
+ 0.24723*APM11(t-1)
(2.24)
+ 21.91551*[FPR(t-1)/CPI(t-1)/100]
(3.97) [0.678]
- 1706.00635*ET11JUN(t-1)
(-3.45) [-0.832]
+ 1313.66003*ET11SEP(t-1)
(2.54) [0.625]
+ 810.50056*ET11OCT(t-1)
(2.28) [0.448]
- 2465.92084*ET11DEC(t-1)
(-3.74) [-0.465]
- 95808*D82
(-8.65)
+ 35211*D87
(2.92)

$AdjR^2$=0.8977 D.W.=1.894

APM11	Planted Area of Major Rice in Kalasin
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET11JUN	Evapotranspiration of June in Kalasin
ET11SEP	Evapotranspiration of September in Kalasin
ET11OCT	Evapotranspiration of October in Kalasin
ET11DEC	Evapotranspiration of December in Kalasin
D82	Dummy Variable, 1 in 1982, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise

4-5-2-1-1-9. Planted area function of major rice in Khon Kaen

APM12 = - 134423
(-1.46)
+ 0.23600*APM12(t-1)
(1.54)
+ 17.43296*[FPR(t-1)/CPI(t-1)/100]
(3.14) [0.328]
+ 1394.37618*TREND
(1.70)
+ 2484.46307*ET12OCT(t-1)
(3.85) [0.800]
+ 76341*D834
(6.81)
+ 41616*D89
(2.16)
+ 69709*D00
(4.35)

$AdjR^2$=0.8562 D.W.=2.366

APM12	Planted Area of Major Rice in Khon Kaen
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
TREND	Time Trend from 1982 to 2000
ET12OCT	Evapotranspiration of October in Khon Kaen
D834	Dummy Variable, 1 in 1983 to 1984, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
D00	Dummy Variable, 1 in 2000, 0 otherwise

4-5-2-1-1-10. Planted area function of major rice in Maha Sarakham

APM13 = + 687180
(7.08)
+ 0.23836*APM13(t-1)
(2.33)
+ 10.82375*[FPR(t-1)/CPI(t-1)/100]
(2.03) [0.238]
- 723.13962*ET13APR(t-1)
(-2.10) [-0.130]
+ 1334.35315*ET13MAY(t-1)
(3.63) [0.389]
+ 2536.51034*ET13JUN(t-1)
(3.60) [0.821]
- 1202.71922*ET13JLY(t-1)
(-2.19) [-0.417]
- 4285.68386*ET13AUG(t-1)
(-5.71) [-1.465]
- 4291.66920*ET13SEP(t-1)
(-7.29) [-1.399]
- 84962*D86
(-4.62)
+ 37388*D990
(2.90)

$AdjR^2$=0.8695 D.W.=2.192

APM13	Planted Area of Major Rice in Maha Sarakham
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET13APR	Evapotranspiration of April in Maha Sarakham
ET13MAY	Evapotranspiration of May in Maha Sarakham
ET13JUN	Evapotranspiration of June in Maha Sarakham
ET13JLY	Evapotranspiration of July in Maha Sarakham
ET13AUG	Evapotranspiration of August in Maha Sarakham
ET13SEP	Evapotranspiration of September in Maha Sarakham
D86	Dummy Variable, 1 in 1989, 0 otherwise
D990	Dummy Variable, 1 in 1999 to 2000, 0 otherwise

4-5-2-1-1-11. Planted area function of major rice in Roi Et

APM14 = - 59874
(-0.70)
+ 0.40904*APM14(t-1)
(3.40)
+ 40.80481*[FPR(t-1)/CPI(t-1)/100]
(7.20) [0.575]
- 1060.27586*ET14MAY(t-1)
(-3.56) [-0.210]
+ 2232.47525*ET14JLY(t-1)
(3.98) [0.498]
- 1505.74858*ET14AUG(t-1)
(-2.14) [-0.326]
+ 796.79684*ET14OCT(t-1)
(1.66) [0.207]
- 92498*D84
(-4.76)
+ 39365*D85
(2.42)
+ 71147*D88
(3.49)

$AdjR^2$=0.8423 D.W.=1.926

APM14	Planted Area of Major Rice in Roi Et
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET14MAY	Evapotranspiration of May in Roi Et
ET14JLY	Evapotranspiration of July in Roi Et
ET14AUG	Evapotranspiration of August in Roi Et
ET14OCT	Evapotranspiration of October in Roi Et
D84	Dummy Variable, 1 in 1984, 0 otherwise
D85	Dummy Variable, 1 in 1985, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise

4-5-2-1-1-12. Planted area function of major rice in Buri Ram

APM15 = - 336450
(-1.81)
+ 0.52159*APM15(t-1)

(3.97)
+ 54.86962*[FPR(t-1)/CPI(t-1)/100]
(6.27) [0.715]
+ 3133.80343*TREND
(3.72)
- 854.62530*ET15APR(t-1)
(-2.92) [-0.094]
+ 6822.75234*ET15MAY(t-1)
(10.20) [1.270]
- 9528.72585*ET15AUG(t-1)
(-7.63) [-2.075]
- 7128.03099*ET15SEP(t-1)
(-9.60) [-1.399]
+ 6507.67104*ET15OCT(t-1)
(5.20) [1.481]
+ 2904.03314*ET15NOV(t-1)
(4.40) [0.590]
+ 6919.87444*ET15DEC(t-1)
(6.11) [0.690]
+ 216618*D84
(8.97)
- 78318*D86
(-3.49)
+ 50616*D93
(2.93)

$AdjR^2$=0.9299 D.W.=2.336

APM15	Planted Area of Major Rice in Buri Ram
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
TREND	Time Trend from 1982 to 2000
ET15APR	Evapotranspiration of April in Buri Ram
ET15MAY	Evapotranspiration of May in Buri Ram
ET15AUG	Evapotranspiration of August in Buri Ram
ET15SEP	Evapotranspiration of September in Buri Ram
ET15OCT	Evapotranspiration of October in Buri Ram
ET15NOV	Evapotranspiration of November in Buri Ram
ET15DEC	Evapotranspiration of December in Buri Ram
D84	Dummy Variable, 1 in 1984, 0 otherwise
D86	Dummy Variable, 1 in 1986, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise

4-5-2-1-1-13. Planted area function of major rice in Surin

APM16= + 266712
(1.92)
+ 0.69840*APM16(t-1)
(8.81)
+ 36.19530*[FPR(t-1)/CPI(t-1)/100]
(5.12) [0.481]
- 3403.65471*ET16APR(t-1)
(-6.77) [-0.360]
+ 5495.16008*ET16MAY(t-1)
(9.23) [1.060]
- 4382.96428*ET16JUN(t-1)
(-5.15) [-0.862]
+ 3222.46877*ET16JLY(t-1)
(3.48) [0.692]
+ 2837.27333*ET16AUG(t-1)
(3.42) [0.619]
- 3201.25189*ET16OCT(t-1)
(-3.58) [-0.764]
- 3482.64124*ET16NOV(t-1)
(-2.28) [-0.708]
- 5804.47477*ET16DEC(t-1)
(-5.05) [-0.528]
+ 118036*D823
(8.51)
- 78289*D93
(-4.06)
+ 123196*D00
(6.78)

$AdjR^2$=0.9623 D.W.=2.366

APM16	Planted Area of Major Rice in Surin
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET16APR	Evapotranspiration of April in Surin
ET16MAY	Evapotranspiration of May in Surin
ET16JUN	Evapotranspiration of June in Surin
ET16JLY	Evapotranspiration of July in Surin
ET16AUG	Evapotranspiration of August in Surin
ET16OCT	Evapotranspiration of October in Surin
ET16NOV	Evapotranspiration of November in Surin
ET16DEC	Evapotranspiration of December in Surin
D823	Dummy Variable, 1 in 1982 to 1983, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise
D00	Dummy Variable, 1 in 2000, 0 otherwise

4-5-2-1-1-14. Planted area function of major rice in Si Sa Ket

APM17= - 665675
(-2.71)
+ 0.22264*APM17(t-1)
(1.31)
+ 36.97384*[FPR(t-1)/CPI(t-1)/100]
(4.28) [0.481]
+ 4041.36742*TREND
(2.98)
- 472.37718*ET17MAY(t-1)
(-1.54) [-0.110]
- 2872.11128*ET17JUN(t-1)
(-3.06) [-0.682]
+ 4017.48029*ET17JLY(t-1)
(3.76) [1.005]
+ 1658.21640*ET17AUG(t-1)
(1.61) [0.408]
+ 4533.44519*ET17SEP(t-1)
(4.58) [1.089]
+ 3749.95561*ET17OCT(t-1)
(3.97) [1.068]
- 5086.39557*ET17NOV(t-1)
(-3.44) [-1.253]
+ 3902.32737*ET17DEC(t-1)
(3.25) [0.421]
+ 59252*D85
(2.94)
+ 171277*D92

(6.21)
- 85476*D980
(-5.65)
$AdjR^2$=0.8454 D.W.=2.385

APM17	Planted Area of Major Rice in Si Sa Ket
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
TREND	Time Trend from 1982 to 2000
ET17MAY	Evapotranspiration of May in Si Sa Ket
ET17JUN	Evapotranspiration of June in Si Sa Ket
ET17JLY	Evapotranspiration of July in Si Sa Ket
ET17AUG	Evapotranspiration of August in Si Sa Ket
ET17SEP	Evapotranspiration of September in Si Sa Ket
ET17OCT	Evapotranspiration of Ocober in Si Sa Ket
ET17NOV	Evapotranspiration of November in Si Sa Ket
ET17DEC	Evapotranspiration of December in Si Sa Ket
D85	Dummy Variable, 1 in 1985, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise
D980	Dummy Variable, 1 in 1998 to 2000, 0 otherwise

4-5-2-1-1-15. Planted area function of major rice in Chaiyaphum

APM18= - 93877
(-0.94)
+ 0.39721*APM18(t-1)
(4.49)
+ 26.42655*[FPR(t-1)/CPI(t-1)/100]
(3.68) [0.744]
- 5940.53421*T9299
(-4.23)
- 900.92307*ET18APR(t-1)
(-2.87) [-0.205]
+ 891.39063*ET18MAY(t-1)
(3.07) [0.373]
- 803.50716*ET18AUG(t-1)
(-1.63) [-0.359]
+ 1293.83482*ET18OCT(t-1)
(2.34) [0.624]
+ 51111*D83
(3.88)
- 54500*D845
(-5.77)
- 39337**D90
(-2.35)
$AdjR^2$=0.8516 D.W.=1.385

APM18	Planted Area of Major Rice in Chaiyaphum
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
T9299	Time Trend from 1992 to 1999, 0 before 1992, 0 after 1999
ET18APR	Evapotranspiration of April in Chaiyaphum
ET18MAY	Evapotranspiration of May in Chaiyaphum
ET18AUG	Evapotranspiration of August in Chaiyaphum
ET18OCT	Evapotranspiration of Ocotober in Chaiyaphum
D83	Dummy Variable, 1 in 1983, 0 otherwise
D845	Dummy Variable, 1 in 1984 to 1985, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise

4-5-2-1-1-16. Planted area function of major rice in Nakhon Ratchasima

APM19= - 894888
(-3.46)
+ 0.70340*APM19(t-1)
(7.81)
+ 32.87640*[FPR(t-1)/CPI(t-1)/100]
(3.53) [0.396]
- 999.44193*ET19MAY(t-1)
(-2.12) [-0.180]
+ 4430.01488*ET19JUN(t-1)
(3.74) [0.806]
+ 2052.08192*ET19OCT(t-1)
(2.25) [0.414]
+ 4289.62393*ET19NOV(t-1)
(3.05) [0.821]
+ 95151*D88
(3.77)
- 119257*D90
(-3.97)
+ 96474*D93
(3.47)
$AdjR^2$=0.8760 D.W.=1.903

APM19	Planted Area of Major Rice in Nakhon Ratchasima
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET19MAY	Evapotranspiration of May in Nakhon Ratchasima
ET19JUN	Evapotranspiration of June in Nakhon Ratchasima
ET19OCT	Evapotranspiration of October in Nakhon Ratchasima
ET19NOV	Evapotranspiration of November in Nakhon Ratchasima
D88	Dummy Variable, 1 in 1988, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise
D93	Dummy Variable, 1 in 1993, 0 otherwise

4-5-2-1-2. Planted area function of major rice in North region

APM_N= + 344051
(0.87)
+ 0.72682*LAG(APM_N)
(4.83)
+ 29.84673*[(FPR/(CPI/100)](t-1)
(1.60) [0.083]
- 1979.04416*ETNAPR(t-1)
(-2.65) [-0.043]
- 6466.43149*ETNAUG(t-1)
(-3.71) [-0.247]
+ 8486.67984*ETNSEP(t-1)
(2.70) [0.314]
+ 319584 *D88
(6.14)
- 195605 *D89
(-2.76)
- 122122 *D92
(-2.67)

$AdjR^2$=0.7873 D.W.=1.247

APM_N	Harvested Area of Major Rice in North region
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ETNAPR	Evapotranspiration of April in North region
ETNAUG	Evapotranspiration of August in North region
ETNSEP	Evapotranspiration of September in North region
D88	Dummy Variable, 1 in 1988, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

4-5-2-1-3. Planted area function of major rice in South region

APM_S = - 70160
(-0.49)
+ 0.89397*APM_S(t-1)
(16.15)
+ 11.96174*[FPR/(CPI/100)](t-1)
(1.86) [0.151]
- 1361.18163*ETSMAY(t-1)
(-3.28) [-0.297]
+ 2187.11507*ETSJUN(t-1)
(2.37) [0.492]
+ 875.51807*ETSJUL(t-1)
(1.48) [0.205]
- 1888.96266*ETSOCT(t-1)
(-2.63) [-0.373]
- 967.83482*ETSNOV(t-1)
(-1.41) [-0.187]
+ 1195.89685*ETSDEC(t-1)
(2.94) [0.276]
+ 58243*D85
(3.06)
- 80662*D890
(-4.70)

$AdjR^2$=0.9703 D.W.=2.489

APM_S	Harvested Area of Major Rice in North region
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ETSMAY	Evapotranspiration of May in South region
ETSJUN	Evapotranspiration of JUNE in South region
ETSJLY	Evapotranspiration of JULY in South region
ETSOCT	Evapotranspiration of October in South region
ETSNOV	Evapotranspiration of November in South region
ETSDEC	Evapotranspiration of December in South region
D85	Dummy Variable, 1 in 1985, 0 otherwise
D890	Dummy Variable, 1 from 1989 to 1990, 0 otherwise

4-5-2-1-4. Planted area function of major rice in Central region

APM_C = + 1281911
(4.15)
- 50080*T8892
(-4.66)
+ 0.52558*APM_C(t-1)
(3.84)
+ 28.85434*[FPR/(CPI/100)](t-1)
(2.00) [0.089]
- 809.59811*ETCAPR(t-1)
(-1.50) [-0.026]
- 2721.19394*ETCMAY(t-1)
(-3.23) [-0.153]
+ 2021.77212*ETCOCT(t-1)
(1.82) [0.111]
- 3889.93395*ETCNOV(t-1)
(-2.85) [-0.172]
- 85669 *D834
(-2.73)
- 186982*D90
(-4.01)
- 196237*SHIFT93
(-3.30)

$AdjR^2$=0.9778 D.W.=2.448

APM_C	Harvested Area of Major Rice in Central region
T8892	Time Trend from 1988 to 1992, 0 before 1988, 0 after 1992
FPR	Farm Price of Thai Rice (baht per kg)
CPI	Consumer Price Index (1998=100)
ETCAPR	Evapotranspiration of April in Central region
ETCMAY	Evapotranspiration of May in Central region
ETCOCT	Evapotranspiration of October in Central region
ETCNOV	Evapotranspiration of November in Central region
D834	Dummy Variable, 1 from 1983 to 1984, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise
SHIFT93	Dummy Variable, 1 after 1993, 0 otherwise

4-5-2-2. Planted area function of second rice

4-5-2-2-1. Planted area function of second rice in North East region

4-5-2-2-1-1. Planted area function of second rice in Nakhon Phanom

APS01 = + 10674
(5.28)
+ 0.74477*APS01(t-1)
(7.00)
+ 0.12905*[FPR(t-1)/CPI(t-1)/100]
(0.73) [0.356]
- 109.04618*ET01NOV(t-2)
(-4.30) [-4.407]
+ 115.41304*ET01DEC(t-2)
(3.63) [2.253]
+ 20.11001*ET01APR(t-1)
(2.56) [0.484]
- 20.87385*ET01MAY(t-1)
(-2.33) [-0.875]
- 66.52683*ET01JUN(t-1)
(-3.62) [-2.899]
+ 1645.15186*D989
(3.96)

$AdjR^2$=0.8956 D.W.=2.247

APS01 Planted Area of Second Rice in Nakhon Phanom

FPR Farm Price of Thai Rice (baht per KG)
CPI Consumer Price Index (1998=100)
ET01APR Evapotranspiration of April in Nakhon Phanom
ET01MAY Evapotranspiration of May in Nakhon Phanom
ET01JUN Evapotranspiration of June in Nakhon Phanom
ET01NOV Evapotranspiration of November in Nakhon Phanom
ET01DEC Evapotranspiration of December in Nakhon Phanom
D989 Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-2-2-1-2. Planted are function of second rice in Sakon Nakhon

APS02 = - 7991.74998
(-8.34)
+ 0.47788*APS02(t-1)
(6.94)
+ 0.49060*[FPR(t-1)/CPI(t-1)/100]
(4.52) [1.984]
+ 51.00659*ET02FEB(t-1)
(5.91) [0.667]
+ 12.73450*ET02MAR(t-1)
(2.30) [0.285]
- 19.01202*ET02MAY(t-1)
(-2.79) [-1.185]
+ 76.76855*ET02JUN(t-1)
(7.10) [4.687]
- 1393.70226*D834
(-5.09)
+ 1911.31585*D88
(6.92)
AdjR^2=0.9530 D.W.=2.456

APS02 Planted Area of Second Rice in Sakon Nakhon
FPR Farm Price of Thai Rice (baht per KG)
CPI Consumer Price Index (1998=100)
ET02FEB Evapotranspiration of February in Sakon Nakhon
ET02MAR Evapotranspiration of March in Sakon Nakhon
ET02JUN Evapotranspiration of June in Sakon Nakhon
D834 Dummy Variable, 1 in 1983 to 1984, 0 otherwise
D88 Dummy Variable, 1 in 1988, 0 otherwise

4-5-2-2-1-3. Planted area function of second rice in Nong Khai

APS03 = - 1987.90745
(-1.24)
+ 0.40458*APS03(t-1)
(7.04)
+ 0.36758*[FPR(t-1)/CPI(t-1)/100]
(2.35) [0.671]
- 71.48689*ET03NOV(t-2)
(-3.05) [-1.714]
+ 66.07381*ET03DEC(t-2)
(3.34) [0.902]
+ 48.04893*ET03JUN(t-1)
(2.56) [1.343]
+ 632.34656*T9499
(10.82)
- 1008.27611*D901
(-3.10)
- 2518.71811*D94
(-4.93)
- 4752.70048*D97
(-9.82)
AdjR^2=0.9637 D.W.=1.633

APS03 Planted Area of Second Rice in Nong Khai
FPR Farm Price of Thai Rice (baht per KG)
CPI Consumer Price Index (1998=100)
ET03JUN Evapotranspiration of June in Nong Khai
ET03NOV Evapotranspiration of November in Nong Khai
ET03DEC Evapotranspiration of December in Nong Khai
T9499 Time trend from 1994 to 1999, 0 otherwise
D901 Dummy Variable, 1 in 1990 to 1991, 0 otherwise
D94 Dummy Variable, 1 in 1994, 0 otherwise
D97 Dummy Variable, 1 in 1997, 0 otherwise

4-5-2-2-1-4. Planted area function of second rice in Udon Thani

APS04 = - 8197.84994
(-7.36)
+ 0.02368*APS04(t-1)
(0.27)
+ 0.22650*[FPR(t-1)/CPI(t-1)/100]
(1.78) [0.603]
+ 196.94825*ET04NOV(t-2)
(9.37) [6.897]
- 283.71352*ET04DEC(t-2)
(-9.19) [-5.176]
+ 275.26268*ET04JAN(t-1)
(5.03) [2.146]
+ 25.11571*ET04APR(t-1)
(5.00) [0.554]
- 2445.32646*D82
(-6.47)
+ 989.09254*D96
(2.34)
- 2320.75745*D00
(-4.04)
AdjR^2=0.8994 D.W.=2.365

APS04 Planted Area of Second Rice in Udon Thani
FPR Farm Price of Thai Rice (baht per KG)
CPI Consumer Price Index (1998=100)
ET04JAN Evapotranspiration of January in Udon Thani
ET04APR Evapotranspiration of April in Udon Thani
ET04NOV Evapotranspiration of November in Udon Thani
ET04DEC Evapotranspiration of December in Udon Thani
D82 Dummy Variable, 1 in 1982, 0 otherwise
D96 Dummy Variable, 1 in 1996, 0 otherwise
D00 Dummy Variable, 1 in 2000, 0 otherwise

4-5-2-2-1-5. Planted area function of second rice in Loei

APS06 = - 1298.89276
(-5.27)
+ 0.22751*APS06(t-1)
(1.95)
+ 0.04119*[FPR(t-1)/CPI(t-1)/100]
(1.58) [0.879]
- 23.54613*ET06DEC(t-2)

(-4.99) [-4.089]
+ 46.82898*ET06JAN(t-1)
(6.17) [4.132]
+ 5.26211*ET06MAR(t-1)
(2.89) [0.626]
- 2.65433*ET06APR(t-1)
(-1.84) [-0.490]
+ 14.62046*ET06JUN(t-1)
(5.73) [4.833]
+ 154.75145*D92
(1.74)
- 324.02005*D98
(-3.44)

$AdjR^2$=0.8850 D.W.=2.376

APS06	Planted Area of Second Rice in Loei
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET06JAN	Evapotranspiration of January in Loei
ET06MAR	Evapotranspiration of March in Loei
ET06APR	Evapotranspiration of April in Loei
ET06JUN	Evapotranspiration of June in Loei
ET06DEC	Evapotranspiration of December in Loei
D92	Dummy Variable, 1 in 1992, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

4-5-2-2-1-6. Planted area function of second rice in Yasothon

APS08 = - 3094.03126
(-6.80)
+ 0.53993*APS08(t-1)
(10.97)
+ 0.30103*[FPR(t-1)/CPI(t-1)/100]
(5.15) [1.491]
+ 113.08309*ET08DEC(t-2)
(6.02) [3.509]
- 88.84498*ET08JAN(t-1)
(-2.92) [-1.004]
- 26.81450*ET08APR(t-1)
(-9.27) [-0.999]
+ 1251.20415*D84
(7.74)
+ 724.62758*D92
(3.85)
+ 1697.19520*D98
(8.50)

$AdjR^2$=0.9633 D.W.=1.504

APS08	Planted Area of Second Rice in Yasothon
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET08JAN	Evapotranspiration of January in Yasothon
ET08APR	Evapotranspiration of April in Yasothon
ET08DEC	Evapotranspiration of December in Yasothon
D84	Dummy Variable, 1 in 1984, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise

4-5-2-2-1-7. Planted area function of second rice in Ubon Ratchathani

APS09 = -16778
(2.93)
+ 0.35528*APS09(t-1)
(4.27)
+ 0.50425*[FPR(t-1)/CPI(t-1)/100]
(1.37) [0.473]
+ 310.01829*ET09NOV(t-2)
(6.02) [4.850]
-350.56930*ET09DEC(t-2)
(-7.61) [-2.751]
- 134.94665*ET09MAR(t-1)
(-5.07) [-0.467]
+156.76263*ET09APR(t-1)
(7.95) [1.097]
-188.37162*ET09MAY(t-1)
(-7.96) [-2.694]
+ 214.92390*ET09JUN(t-1)
(9.74) [3.176]
-4067.13257*D83
(-4.16)
-9466.71777*D87
(-8.21)
-3062.02409*D890
(-3.91)

$AdjR^2$=0.9248 D.W.=1.521

APS09	Planted Area of Second Rice in Ubon Ratchathani
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET09M AR	Evapotranspiration of March in Ubon Ratchathani
ET09APR	Evapotranspiration of April in Ubon Ratchathani
ET09MAY	Evapotranspiration of May in Ubon Ratchathani
ET09JUN	Evapotranspiration of June in Ubon Ratchathani
ET09NOV	Evapotranspiration of November in Ubon Ratchathani
ET09DEC	Evapotranspiration of December in Ubon Ratchathani
D83	Dummy Variable, 1 in 1983, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise
D890	Dummy Variable, 1 in 1989 to 1990, 0 otherwise

4-5-2-2-1-8. Planted area function of second rice in Kalasin

APS11 = + 24807
(5.41)
+ 0.85267*APS11(t-1)
(18.04)
+ 0.51460*[FPR(t-1)/CPI(t-1)/100]
(0.87) [0.309]
+ 3189.24007*ln(T87)
(12.91)
- 859.78676*ET11DEC(t-2)
(-9.00) [-3.147]
+ 1640.72617*ET11JAN(t-1)
(11.63) [2.119]
- 31.31688*ET11MAR(t-1)
(-1.34) [-0.095]
+ 77.12215*ET11APR(t-1)
(2.90) [0.392]
- 161.89174*ET11MAY(t-1)

(-6.43) [-1.410]
- 126.64582*ET11JUN(t-1)
(-3.14) [-1.199]
+ 4640.36286*D86
(3.21)
- 19145*D94
(-11.82)
- 23325*D99
(-14.24)
$AdjR^2$=0.9906 D.W.=2.527

APS11	Planted Area of Second Rice in Kalasin
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
LT87	Logarithm of time trend from 1987, 0 otherwise
ET11JAN	Evapotranspiration of January in Kalasin
ET11MAR	Evapotranspiration of March in Kalasin
ET11APR	Evapotranspiration of April in Kalasin
ET11MAY	Evapotranspiration of May in Kalasin
ET11JUN	Evapotranspiration of June in Kalasin
ET11DEC	Evapotranspiration of December in Kalasin
D86	Dummy Variable, 1 in 1986, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

4-5-2-2-1-9. Planted area function of second rice in Khon Kaen

APS12 = - 72551
(-6.79)
+ 0.48354*APS12(t-1)
(3.97)
+ 0.50818*[FPR(t-1)/CPI(t-1)/100]
(0.48) [0.273]
+ 921.53020*ET12NOV(t-2)
(7.66) [7.216]
+ 261.11113*ET12MAR(t-1)
(4.48) [0.753]
- 156.80801*ET12APR(t-1)
(-3.68) [-0.689]
- 7614.73365*D85
(-3.64)
- 8553.49095*D87
(-3.49)
+ 7360.77399*D89
(2.81)
+ 14057*D95
(3.91)
$AdjR^2$=0.8795 D.W.=1.847

APS12	Planted Area of Second Rice in Khon Kaen
FPR	Farm Price of Thai Rice (baht per kg)
CPI	Consumer Price Index (1998=100)
ET12MAR	Evapotranspiration of March in Khon Kaen
ET12APR	Evapotranspiration of April in Khon Kaen
ET12NOV	Evapotranspiration of November in Khon Kaen
D85	Dummy Variable, 1 in 1985, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise

4-5-2-2-1-10. Planted area function of second rice in Maha Sarakham

APS13 = - 37565
(-3.83)
+ 0.91330*APS13(t-1)
(10.15)
+ 0.83544*[FPR(t-1)/CPI(t-1)/100]
(0.77) [0.609]
+ 294.81708*ET13NOV(t-2)
(2.78) [3.077]
+ 382.10238*ET13JAN(t-1)
(2.04) [0.667]
- 298.89046*ET13FEB(t-1)
(-3.32) [-0.614]
+ 193.01579*ET13MAR(t-1)
(3.11) [0.666]
- 138.52959*ET13APR(t-1)
(-3.39) [-0.828]
+ 164.15449*ET13MAY(t-1)
(3.34) [1.590]
+ 3654.77905*D89
(1.36)
-12115*D94
(-4.25)
$AdjR^2$=0.9299 D.W.=2.006

APS13	Planted Area of Second Rice in Maha Sarakham
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET13JAN	Evapotranspiration of January in Maha Sarakham
ET13FEB	Evapotranspiration of February in Maha Sarakham
ET13MAR	Evapotranspiration of March in Maha Sarakham
ET13APR	Evapotranspiration of April in Maha Sarakham
ET13MAY	Evapotranspiration of May in Maha Sarakham
ET13NOV	Evapotranspiration of November in Maha Sarakham
D89	Dummy Variable, 1 in 1989, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

4-5-2-2-1-11. Planted area function of second rice in Roi Et

APS14 = -30287
(-3.57)
+ 0.36316*APS14(t-1)
(3.36)
+ 0.19654*[FPR(t-1)/CPI(t-1)/100]
(0.40) [0.225]
+ 468.41894*ET14NOV(t-2)
(3.37) [7.661]
- 818.83755*ET14DEC(t-2)
(-2.85) [-5.635]
+ 663.14523*ET14JAN(t-1)
(1.85) [1.824]
+ 144.23248*ET14FEB(t-1)
(2.07) [0.473]
+ 132.33002*ET14JUN(t-1)
(2.93) [2.286]
+ 2923.10947*D89
(2.27)
+ 10046*D92

(6.97)
- 3821.74466*D94
(-2.67)
$AdjR^2$=0.9309 D.W.=1.983

APS14	Planted Area of Second Rice in Roi Et
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET14JAN	Evapotranspiration of January in Roi Et
ET14FEB	Evapotranspiration of February in Roi Et
ET14JUN	Evapotranspiration of June in Roi Et
ET14NOV	Evapotranspiration of November in Roi Et
ET14DEC	Evapotranspiration of Necember in Roi Et
D89	Dummy Variable, 1 in 1989, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise
D94	Dummy Variable, 1 in 1994, 0 otherwise

4-5-2-2-1-12. Planted area function of second rice in Buri Ram

APS15 = -3238.14066
(-4.23)
+ 0.52715*APS15(t-1)
(8.18)
+ 0.13450*[FPR(t-1)/CPI(t-1)/100]
(2.18) [1.217]
+ 26.50944*ET15NOV(t-2)
(3.57) [3.721]
+ 9.74792*ET15FEB(t-1)
(1.53) [0.236]
+ 9.10498*ET15MAR(t-1)
(1.74) [9.105]
+ 1024.55174*D889
(8.48)
+ 989.19506*D92
(5.96)
$AdjR^2$=0.8414 D.W.=2.258

APS15	Planted Area of Second Rice in Buri Ram
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET15FEB	Evapotranspiration of February in Buri Ram
ET15MAR	Evapotranspiration of March in Buri Ram
ET15NOV	Evapotranspiration of November in Buri Ram
D889	Dummy Variable, 1 in 1988 to 1989, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

4-5-2-2-1-13. Planted area function of second rice in Surin

APS16 = - 6780.14533
(-5.81)
+ 0.63350*APS16(t-1)
(9.98)
+ 0.07752*[FPR(t-1)/CPI(t-1)/100]
(1.23) [0.533]
+ 145.56050*T8289
(7.36)
+ 133.81691*ln(T95)
(3.42)
+ 40.50127*ET16NOV(t-2)
(3.48) [4.241]
+ 36.22501*ET16JAN(t-1)
(3.18) [0.663]
+ 6.78879*ET16APR(t-1)
(2.07) [0.371]
+ 23.46808*ET16JUN(t-1)
(5.32) [2.385]
- 243.75092*D89
(-1.05)
+ 1096.64935*D923
(8.41)
$AdjR^2$=0.9594 D.W.=2.731

APS16	Planted Area of Second Rice in Surin
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
T8289	Time Trend from 1982 to 1989, 0 otherwise
LT95	Logarithm of Time Trend from 1995, 0 otherwise
ET16JAN	Evapotranspiration of January in Surin
ET16APR	Evapotranspiration of April in Surin
ET16JUN	Evapotranspiration of June in Surin
ET16NOV	Evapotranspiration of November in Surin
D89	Dummy Variable, 1 in 1989, 0 otherwise
D923	Dummy Variable, 1 in 1992 to 1993, 0 otherwise

4-5-2-2-1-14. Planted area function of second rice in Si Sa Ket

APS17 = - 5854.12296
(-3.77)
+ 0.26837*APS17(t-1)
(3.12)
+ 0.59373*[FPR(t-1)/CPI(t-1)/100]
(3.94) [1.746]
- 43.96068*ET17JAN(t-1)
(-1.71) [-0.385]
- 20.39977*ET17MAY(t-1)
(-2.46) [-0.911]
+ 66.11579*ET17JUN(t-1)
(4.37) [3.016]
+ 3220.64128*D846
(10.76)
+ 2240.93639*D88
(4.72)
+ 2035.05366*D92
(4.77)
$AdjR^2$=0.9199 D.W.=1.823

APS17	Planted Area of Second Rice in Si Sa Ket
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET17JAN	Evapotranspiration of January in Si Sa Ket
ET17MAY	Evapotranspiration of May in Si Sa Ket
ET17JUN	Evapotranspiration of June in Si Sa Ket
D846	Dummy Variable, 1 in 1984 to 1986, 0 otherwise
D88	Dummy Variable, 1 in 1988, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

4-5-2-2-1-15. Planted area function of second rice in Chaiyaphum

APS18 = - 4934.88547

(-3.10)
+ 0.33270*APS18(t-1)
(2.69)
+ 0.16210*[FPR(t-1)/CPI(t-1)/100]
(0.91) [0.720]
+ 21.48022*ET18NOV(t-2)
(1.43) [1.448]
- 88.04848*ET18JAN(t-1)
(-3.22) [-1.107]
+ 18.41744*ET18MAR(t-1)
(2.24) [0.455]
+ 24.49043*ET18APR(t-1)
(2.03) [0.880]
- 21.38045*ET18MAY(t-1)
(-2.06) [-1.412]
+ 49.12046*ET18JUN(t-1)
(3.25) [3.473]
+ 877.22287*D889
(3.16)
+ 2747.09344*D92
(5.79)

$AdjR^2$=0.8797 D.W.=1.921

APS18	Planted Area of Second Rice in Chaiyaphum
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET18JAN	Evapotranspiration of January in Chaiyaphum
ET18MAR	Evapotranspiration of March in Chaiyaphum
ET18APR	Evapotranspiration of April in Chaiyaphum
ET18MAY	Evapotranspiration of May in Chaiyaphum
ET18JUN	Evapotranspiration of June in Chaiyaphum
ET18NOV	Evapotranspiration of November in Chaiyaphum
D889	Dummy Variable, 1 in 1988 to 1989, 0 otherwise
D92	Dummy Variable, 1 in 1992, 0 otherwise

4-5-2-2-1-16. Planted area function of second rice in Nakhon Ratchasima

APS19 = - 32297
(-8.74)
+ 0.61102*APS19(t-1)
(8.11)
+ 0.35556*[FPR(t-1)/CPI(t-1)/100]
(1.43) [0.456]
+ 282.85892*ET19NOV(t-2)
(9.06) [5.737]
+ 80.58050*ET19DEC(t-2)
(-11.22) [0.868]
- 358.38272*ET19FEB(t-1)
(-11.82) [-1.432]
+ 241.14504*ET19MAR(t-1)
(10.40) [1.495]
+ 43.31809*ET19APR(t-1)
(3.23) [0.500]
- 125.50027*ET19MAY(t-1)
(-9.02) [-2.398]
+ 149.99681*ET19JUN(t-1)
(4.49) [2.903]
- 8996.55486*D90
(-11.22)
- 8920.60848*D98
(8.97)
+ 5938.94675*D00
(8.97)

$AdjR^2$=0.9880 D.W.=1.971

APS19	Planted Area of Second Rice in Nakhon Ratchasima
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ET19FEB	Evapotranspiration of February in Nakhon Ratchasima
ET19MAR	Evapotranspiration of March in Nakhon Ratchasima
ET19APR	Evapotranspiration of April in Nakhon Ratchasima
ET19MAY	Evapotranspiration of May in Nakhon Ratchasima
ET19JUN	Evapotranspiration of June in Nakhon Ratchasima
ET19NOV	Evapotranspiration of November in Nakhon Ratchasima
ET19DEC	Evapotranspiration of December in Nakhon Ratchasima
D90	Dummy Variable, 1 in 1990, 0 otherwise
D98	Dummy Variable, 1 in 1998, 0 otherwise
D00	Dummy Variable, 1 in 2000, 0 otherwise

4-5-2-2-2. Planted area function of second rice in North region

APS_N = - 190405
(-2.92)
+ 13897.4*TREND
(7.50)
+ 0.53896*APS_N(t-1)
(5.25)
+ 15.6997*[FPR/(CPI/100)](t-1)
(2.13) [0.257]
+ 15656.5*ETNJAN(t-1)
(11.48) [1.540]
- 15033.5*ETNFEB(t-1)
(-7.48) [-1.058]
+ 4129.81*ETNMAR(t-1)
(6.43) [0.290]
- 2378.73*ETNMAY(t-1)
(-5.74) [-0.579]
+ 194653 *D86
(7.05)
- 138917 *D912
(-8.67)

$AdjR^2$=0.9839 D.W.=1.615

APS_N	Harvested Area of Second Rice in North region
TREND	Time Trend from 1982 to 2000
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ETNJAN	Evapotranspiration of January in North region
ETNFEB	Evapotranspiration of February in North region
ETNMAR	Evapotranspiration of March in North region
ETNMAY	Evapotranspiration of May in North region
D86	Dummy Variable, 1 in 1986, 0 otherwise
D912	Dummy Variable, 1 in 1991 to 1992, 0 otherwise

4-5-2-2-3. Planted area function of second rice in South region

APS_S = + 38495.4
(2.85)
+ 0.52253*APS_S(t-1)
(5.20)
+ 2.59221*[FPR/(CPI/100)](t-1)
(2.05) [0.490]
- 354.600*ETSJAN(t-1)
(-3.13) [-1.293]
- 8558.75*D82
(-2.25)
- 15921.4*D902
(-5.58)
+ 17528.6*D99
(4.54)

$AdjR^2$=0.8531 D.W.=2.167

APS_S	Harvested Area of Second Rice in South region
FPR	Farm Price of Thai Rice (baht per KG)
CPI	Consumer Price Index (1998=100)
ETSJAN	Evapotranspiration of January in South region
D82	Dummy Variable, 1 in 1982, 0 otherwise
D902	Dummy Variable, 1 in 1990 to 1992, 0 otherwise
D99	Dummy Variable, 1 in 1999, 0 otherwise

4-5-2-2-4. Planted area function of second rice in Central region

APS_C = + 370279
(4.14)
+ 41541.3*ln(T94)
(4.51)
+ 0.32570*APS_C(t-1)
(2.36)
+ 23.7520*[FPR/(CPI/100)](t-1)
(2.06) [0.239]
+ 8489.08*ETCDEC(t-2)
(5.55) [1.055]
- 13446 *ETCJAN(t-1)
(-4.66) [-0.763]
+ 5303.54*ETCFEB(t-1)
(2.66) [0.211]
+ 1230.38*ETCAPR(t-1)
(2.07) [0.114]
- 5619.69*ETCMAY(t-1)
(-5.62) [-0.933]
+ 65595.8*D89
(1.70)
- 181487 *D91
(-5.30)

$AdjR^2$=0.8844 D.W.=2.331

APS_C	Harvested Area of Second Rice in Central region
LT94	Log Time Trend from 1994, 0 before 1994
FPR	Farm Price of Thai Rice (baht per kg)
CPI	Consumer Price Index (1998=100)
ETCJAN	Evapotranspiration of January in Central region
ETCFEB	Evapotranspiration of February in Central region
ETCAPR	Evapotranspiration of April in Central region
ETCMAY	Evapotranspiration of May in Central region
ETCDEC	Evapotranspiration of May in December region
D89	Dummy Variable, 1 in 1989, 0 otherwise
D91	Dummy Variable, 1 in 1991, 0 otherwise

4-5-3. Production
4-5-3-1. Production of major rice
4-5-3-1-1. Production of major rice in North East region

4-5-3-1-1-1. Production identity of major rice in Nakhon Phanom

QM01=	YMH01*(APM01-LM01)
QM01	Production of major rice in Nakhon Phanom (MT)
YMH01	Yield of major rice in Nakhon Phanom (MT/HA)
APM01	Planted area of major rice in Nakhon Phanom (HA)
LM01	Abandoned area of major rice in Nakhom Phanom (HA)

4-5-3-1-1-2. Production identity of major rice in Sakon Nakhon

QM02=	YMH02*(APM02-LM02)
QM02	Production of major rice in Sakon Nakhon (MT)
YMH02	Yield of major rice in Sakon Nakhon (MT/HA)
APM02	Planted area of major rice in Sakon Nakhon (HA)
LM02	Abandoned area of major rice in Sakon Nakhon (HA)

4-5-3-1-1-3. Production identity of major rice in Nong Khai

QM03=	YMH03*(APM03-LM03)
QM03	Production of major rice in Nong Khai (MT)
YMH03	Yield of major rice in Nong Khai (MT/HA)
APM03	Planted area of major rice in Nong Khai (HA)
LM03	Abandoned area of major rice in Nong Khai (HA)

4-5-3-1-1-4. Production identity of major rice in Udon Thani

QM04=	YMH04*(APM04-LM04)
QM04	Production of major rice in Udon Thani (MT)
YMH04	Yield of major rice in Udon Thani (MT/HA)
APM04	Planted area of major rice in Udon Thani (HA)
LM04	Abandoned area of major rice in Udon Thani (HA)

4-5-3-1-1-5. Production identity of major rice in Loei

QM06=	YMH06*(APM06-LM06)
QM06	Production of major rice in Loei (MT)
YMH06	Yield of major rice in Loei (MT/HA)
APM06	Planted area of major rice in Loei (HA)
LM06	Abandoned area of major rice in Loei (HA)

4-5-3-1-1-6. Production identity of major rice in Yasothon

QM08=	YMH08*(APM08-LM08)
QM08	Production of major rice in Yasothon (MT)
YMH08	Yield of major rice in Yasothon (MT/HA)
APM08	Planted area of major rice in Yasothon (HA)
LM08	Abandoned area of major rice in Yasothon (HA)

4-5-3-1-1-7. Production identity of major rice in Ubon Ratchathani

QM09= YMH09*(APM09-LM09)
QM09 Production of major rice in Ubon Ratchathani (MT)
YMH09 Yield of major rice in Ubon Ratchathani (MT/HA)
APM09 Planted area of major rice in Ubon Ratchathani (HA)
LM09 Abandoned area of major rice in Ubon Ratchathani (HA)

4-5-3-1-1-8. Production identity of major rice in Kalasin
QM11= YMH11*(APM11-LM11)
QM11 Production of major rice in Kalasin (MT)
YMH11 Yield of major rice in Kalasin (MT/HA)
APM11 Planted area of major rice in Kalasin (HA)
LM11 Abandoned area of major rice in Kalasin (HA)

4-5-3-1-1-9. Production identity of major rice in Khon Kaen
QM12= YMH12*(APM12-LM12)
QM12 Production of major rice in Khon Kaen (MT)
YMH12 Yield of major rice in Khon Kaen (MT/HA)
APM12 Planted area of major rice in Khon Kaen (HA)
LM12 Abandoned area of major rice in Khon Kaen (HA)

4-5-3-1-1-10. Production identity of major rice in Maha Sarakham
QM13= YMH13*(APM13-LM13)
QM13 Production of major rice in Maha Sarakham (MT)
YMH13 Yield of major rice in Maha Sarakham (MT/HA)
APM13 Planted area of major rice in Maha Sarakham (HA)
LM13 Abandoned area of major rice in Maha Sarakham (HA)

4-5-3-1-1-11. Production identity of major rice in Roi Et
QM14= YMH14*(APM14-LM14)
QM14 Production of major rice in Roi Et (MT)
YMH14 Yield of major rice in Roi Et (MT/HA)
APM14 Planted area of major rice in Roi Et (HA)
LM14 Abandoned area of major rice in Roi Et (HA)

4-5-3-1-1-12. Production identity of major rice in Buri Ram
QM15= YMH15*(APM15-LM15)
QM15 Production of major rice in Buri Ram (MT)
YMH15 Yield of major rice in Buri Ram (MT/HA)
APM15 Planted area of major rice in Buri Ram (HA)
LM15 Abandoned area of major rice in Buri Ram (HA)

4-5-3-1-1-13. Production identity of major rice in Surin
QM16= YMH16*(APM16-LM16)
QM16 Production of major rice in Surin (MT)
YMH16 Yield of major rice in Surin (MT/HA)
APM16 Planted area of major rice in Surin (HA)
LM16 Abandoned area of major rice in Surin (HA)

4-5-3-1-1-14. Production identity of major rice in Si Sa Ket
QM17= YMH17*(APM17-LM17)
QM17 Production of major rice in Si Sa Ket (MT)
YMH17 Yield of major rice in Si Sa Ket (MT/HA)
APM17 Planted area of major rice in Si Sa Ket (HA)
LM17 Abandoned area of major rice in Si Sa Ket (HA)

4-5-3-1-1-15. Production identity of major rice in Chaiyaphum
QM18= YMH18*(APM18-LM18)
QM18 Production of major rice in Chaiyaphum (MT)
YMH18 Yield of major rice in Chaiyaphum (MT/HA)
APM18 Planted area of major rice in Chaiyaphum (HA)
LM18 Abandoned area of major rice in Chaiyaphum (HA)

4-5-3-1-1-16. Production identity of major rice in Nakhon Ratchasima
QM19= YMH19*(APM19-LM19)
QM19 Production of major rice in Nakhon Ratchasima (MT)
YMH19 Yield of major rice in Nakhon Ratchasima (MT/HA)
APM19 Planted area of major rice in Nakhon Ratchasima (HA)
LM19 Abandoned area of major rice in Nakhon Ratchasima (HA)

4-5-3-1-1-17. Production identity of major rice for whole North East region
QM_NE= QM01 + QM02 + QM03 + QM04 + QM06 + QM08 + QM09 + QM11+ QM12 + QM13 + QM14 + QM15 + QM16 + QM17 + QM18 + QM19
QM_NE Production of major rice in North East region (MT)
QM01 Production of major rice in Nakhon Phanom (MT)
QM02 Production of major rice in Sakon Nakhon (MT)
QM03 Production of major rice in Nong Khai (MT)
QM04 Production of major rice in Udon Thani (MT)
QM06 Production of major rice in Loei (MT)
QM08 Production of major rice in Yasothon (MT)
QM09 Production of major rice in Ubon Ratchathani (MT)
QM12 Production of major rice in Khon Kaen (MT)
QM13 Production of major rice in Maha Sarakham (MT)
QM14 Production of major rice in Roi Et (MT)
QM15 Production of major rice in Buri Ram (MT)
QM16 Production of major rice in Surin (MT)
QM17 Production of major rice in Si Sa Ket (MT)
QM18 Production of major rice in Chaiyaphum (MT)
QM19 Production of major rice in Nakhon Ratchasima (MT)

4-5-3-1-2. Production of major rice in North region
QM_N= YMH_N*(APM_N - LM_N)
QM_N Production of major rice in North region (MT)
YMH_N Yield of major rice in North region (MT/HA)
APM_N Planted area of major rice in North region (HA)
LM_N Abandoned area of major rice in North region (HA)

4-5-3-1-3. Production of major rice in South region
QM_S= YMH_S*(APM_S - LM_S)
QM_S Production of major rice in South region (MT)
YMH_S Yield of major rice in South region (MT/HA)
APM_S Planted area of major rice in South region (HA)
LM_S Abandoned area of major rice in South region (HA)

4-5-3-1-4. Production of major rice in Central region

QM_C=	YMH_C*(APM_C - LM_C)
QM_C	Production of major rice in Central region (MT)
YMH_C	Yield of major rice in Central region (MT/HA)
APM_C	Planted area of major rice in Central region (HA)
LM_C	Abandoned area of major rice in Central region (HA)

4-5-3-1-5. Production of major rice for whole country

QM=	QM_NE + QM_N + QM_C + QM_S
QM	Production of major rice for whole country (MT)
QM_N	Production of major rice in North region (MT)
QM_C	Production of major rice in Central region (MT)
QM_S	Production of major rice in South region (MT)

4-5-3-2. Production of second rice

4-5-3-2-1. Production of second rice in North East region

4-5-3-2-1-1. Production identity of second rice in Nakhon Phanom

QS01=	YSH01*(APS01-LS01)
QS01	Production of second rice in Nakhon Phanom (MT)
YSH01	Yield of second rice in Nakhon Phanom (MT/HA)
APS01	Planted area of second rice in Nakhon Phanom (HA)
LS01	Abandoned area of second rice in Nakhom Phanom (HA)

4-5-3-2-1-2. Production identity of second rice in Sakon Nakhon

QS02=	YSH02*(APS02-LS02)
QS02	Production of second rice in Sakon Nakhon (MT)
YSH02	Yield of second rice in Sakon Nakhon (MT/HA)
APS02	Planted area of second rice in Sakon Nakhon (HA)
LS02	Abandoned area of second rice in Sakon Nakhon (HA)

4-5-3-2-1-3. Production identity of second rice in Nong Khai

QS03=	YSH03*(APS03-LS03)
QS03	Production of second rice in Nong Khai (MT)
YSH03	Yield of second rice in Nong Khai (MT/HA)
APS03	Planted area of second rice in Nong Khai (HA)
LS03	Abandoned area of second rice in Nong Khai (HA)

4-5-3-2-1-4. Production identity of second rice in Udon Thani

QS04=	YSH04*(APS04-LS04)
QS04	Production of second rice in Udon Thani (MT)
YSH04	Yield of second rice in Udon Thani (MT/HA)
APS04	Planted area of second rice in Udon Thani (HA)
LS04	Abandoned area of second rice in Udon Thani (HA)

4-5-3-2-1-5. Production identity of second rice in Loei

QS06=	YSH06*(APS06-LS06)
QS06	Production of second rice in Loei (MT)
YSH06	Yield of second rice in Loei (MT/HA)
APS06	Planted area of second rice in Loei (HA)
LS06	Abandoned area of second rice in Loei (HA)

4-5-3-2-1-6. Production identity of second rice in Yasothon

QS08=	YSH08*(APS08-LS08)
QS08	Production of second rice in Yasothon (MT)
YSH08	Yield of second rice in Yasothon (MT/HA)
APS08	Planted area of second rice in Yasothon (HA)
LS08	Abandoned area of second rice in Yasothon (HA)

4-5-3-2-1-7. Production identity of second rice in Ubon Ratchathani

QS09=	YSH09*(APS09-LS09)
QS09	Production of second rice in Ubon Ratchathani (MT)
YSH09	Yield of second rice in Ubon Ratchathani (MT/HA)
APS09	Planted area of second rice in Ubon Ratchathani (HA)
LS09	Abandoned area of second rice in Ubon Ratchathani (HA)

4-5-3-2-1-8. Production identity of second rice in Kalasin

QS11=	YSH11*(APS11-LS11)
QS11	Production of second rice in Kalasin (MT)
YSH11	Yield of second rice in Kalasin (MT/HA)
APS11	Planted area of second rice in Kalasin (HA)
LS11	Abandoned area of second rice in Kalasin (HA)

4-5-3-2-1-9. Production identity of second rice in Khon Kaen

QS12=	YSH12*(APS12-LS12)
QS12	Production of second rice in Khon Kaen (MT)
YSH12	Yield of second rice in Khon Kaen (MT/HA)
APS12	Planted area of second rice in Khon Kaen (HA)
LS12	Abandoned area of second rice in Khon Kaen (HA)

4-5-3-2-1-10. Production identity of second rice in Maha Sarakham

QS13=	YSH13*(APS13-LS13)
QS13	Production of second rice in Maha Sarakham (MT)
YSH13	Yield of second rice in Maha Sarakham (MT/HA)
APS13	Planted area of second rice in Maha Sarakham (HA)
LS13	Abandoned area of second rice in Maha Sarakham (HA)

4-5-3-2-1-11. Production identity of second rice in Roi Et

QS14=	YSH14*(APS14-LS14)
QS14	Production of second rice in Roi Et (MT)
YSH14	Yield of second rice in Roi Et (MT/HA)
APS14	Planted area of second rice in Roi Et (HA)
LS14	Abandoned area of second rice in Roi Et (HA)

4-5-3-2-1-12. Production identity of second rice in Buri Ram

QS15=	YSH15*(APS15-LS15)
QS15	Production of second rice in Buri Ram (MT)
YSH15	Yield of second rice in Buri Ram (MT/HA)
APS15	Planted area of second rice in Buri Ram (HA)
LS15	Abandoned area of second rice in Buri Ram (HA)

4-5-3-2-1-13. Production identity of second rice in Surin

QS16= YSH16*(APS16-LS16)
QS16 Production of second rice in Surin (MT)
YSH16 Yield of second rice in Surin (MT/HA)
APS16 Planted area of second rice in Surin (HA)
LS16 Abandoned area of second rice in Surin (HA)

4-5-3-2-1-14. Production identity of second rice in Si Sa Ket

QS17= YSH17*(APS17-LS17)
QS17 Production of second rice in Si Sa Ket (MT)
YSH17 Yield of second rice in Si Sa Ket (MT/HA)
APS17 Planted area of second rice in Si Sa Ket (HA)
LS17 Abandoned area of second rice in Si Sa Ket (HA)

4-5-3-2-1-15. Production identity of second rice in Chaiyaphum

QS18= YSH18*(APS18-LS18)
QS18 Production of second rice in Chaiyaphum (MT)
YSH18 Yield of second rice in Chaiyaphum (MT/HA)
APS18 Planted area of second rice in Chaiyaphum (HA)
LS18 Abandoned area of second rice in Chaiyaphum (HA)

4-5-3-2-1-16. Production identity of second rice in Nakhon Ratchasima

QS19= YSH19*(APS19-LS19)
QS19 Production of second rice in Nakhon Ratchasima (MT)
YSH19 Yield of second rice in Nakhon Ratchasima (MT/HA)
APS19 Planted area of second rice in Nakhon Ratchasima (HA)
LS19 Abandoned area of second rice in Nakhon Ratchasima (HA)

4-5-3-2-1-17. Production identity of second rice for whole North East region

Production identity of second rice in North East region
QS_NE= QS01 + QS02 + QS03 + QS04 + QS06 + QS08 + QS09 + QS11+ QS12 + QS13 + QS14 + QS15 + QS16 + QS17 + QS18 + QS19
QS_NE Production of second rice in North East region (MT)
QS01 Production of second rice in Nakhon Phanom (MT)
QS02 Production of second rice in Sakon Nakhon (MT)
QS03 Production of second rice in Nong Khai (MT)
QS04 Production of second rice in Udon Thani (MT)
QS06 Production of second rice in Loei (MT)
QS08 Production of second rice in Yasothon (MT)
QS09 Production of second rice in Ubon Ratchathani (MT)
QS11 Production of second rice in Kalasin (MT)
QS12 Production of second rice in Khon Kaen (MT)
QS13 Production of second rice in Maha Sarakham (MT)
QS14 Production of second rice in Roi Et (MT)
QS15 Production of second rice in Buri Ram (MT)
QS16 Production of second rice in Surin (MT)
QS17 Production of second rice in Si Sa Ket (MT)
QS18 Production of second rice in Chaiyaphum (MT)
QS19 Production of second rice in Nakhon Ratchasima (MT)

4-5-3-2-2. Production of second rice in North region

QS_N= YSH_N*(APS_N - LS_N)
QS_N Production of second rice in North region (MT)
YSH_N Yield of second rice in North region (MT/HA)
APS_N Planted area of second rice in North region (HA)
LS_N Abandoned area of second rice in North region (HA)

4-5-3-2-3. Production of second rice in South region

QS_S= YSH_S*(APS_S - LS_S)
QS_S Production of second rice in South region (MT)
YSH_S Yield of second rice in South region (MT/HA)
APS_S Planted area of second rice in South region (HA)
LS_S Abandoned area of second rice in South region (HA)

4-5-3-2-4. Production of second rice in Central region

QS_C= YSH_C*(APS_C - LS_C)
QS_C Production of second rice in Central region (MT)
YSH_C Yield of second rice in Central region (MT/HA)
APS_C Planted area of second rice in Central region (HA)
LS_C Abandoned area of second rice in Central region (HA)

4-5-3-2-5. Production of second rice for whole country

QS= QS_NE + QS_N + QS_C + QS_S
QS Production of second rice for whole country (MT)
QS_N Production of second rice in North region (MT)
QS_C Production of second rice in Central region (MT)
QS_S Production of second rice in South region (MT)

4-5-3-3. Total production in milled equivalent

Q= QM + QS
Q_ME= 0.667*(QM + QS)
Q Total production in paddy equivalent (MT)
Q_ME Total production in milled equivalent (MT)
QM Production of major rice for whole country (MT)
QS Production of second rice for whole country (MT)

4-5-4. Stock change function

STC = - 1084551
(-5.66)
+ 118669 *T86
(6.39)
- 301.624*[FPR/(CPI/100)-FPR(t-1)/(CPI(t-1)/100)]
(-2.60) [0.121]
+ 0.87899*[(Q_ME ñ Q_ME(t-1)]
(7.26) [1.408]
+ 1209462*D857
(4.10)

- 1529720*D89
(-4.05)
+ 2676806*D90
(4.67)

$AdjR^2$=0.85 D.W.=2.292

STC	Stock change of Rice (MT)
T86	Time Trend from 1986, 0 before 1986
FPR	Farm Price of Thai Rice (baht per kg)
CPI	Consumer Price Index(1998=100)
Q_ME	Total Production in milled equivalent (MT)
D857	Dummy Variable, 1 in 1985 to 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
D90	Dummy Variable, 1 in 1990, 0 otherwise

4-5-5. Export function

EXP = + 1450479
(1.31)
+ 73960*TREND
(2.88)
+ 0.13051*Q
(2.07) [0.526]
+ 1416706*D89
(3.60)
+ 1013411*D95
(2.64)
+ 889253*D989
(2.84)

$AdjR^2$=0.8685 D.W.=2.191

EXP	Exportation of Rice (MT)
TREND	Time Trend from 1982 to 2000
Q	Total Production in paddy equivalent (MT)
D89	Dummy Variable, 1 in 1989, 0 otherwise
D95	Dummy Variable, 1 in 1995, 0 otherwise
D989	Dummy Variable, 1 in 1998 to 1999, 0 otherwise

4-5-6. Domestic supply identity in milled equivalent

QD=	Q_ME + IMP - EXP - STC
QD	Domestic supply in milled equivalent (MT)
Q_ME	Total production in milled equivalent (MT)
IMP	Imports (MT)
EXP	Exports (MT)
STC	Stock change (Ending stock - Beginning stock) (MT)

4-5-7. Per capita consumption

QC=	QD / POP
QC	Per capita consumption (KG)
QD	Domestic supply in milled equivalent (MT)
POP	Population (thousand people)

4-5-8. Demand function

Demand Function of Rice for Average of Thai Rice

QC = + 329.064
(7.65)
- 1.77086*T8295
(-5.12)
- 0.00825*[RPRB/(CPI/100)]
(-2.85) [0.771]
- 1.32549*(GDP/POP)
(-11.22) [-0.320]
- 10.9487*D856
(-1.92)
- 29.8603*D87
(-4.08)
+ 23.7069*D89
(4.01)
+ 16.6143*D97
(2.47)

$AdjR^2$=0.9253 D.W.=2.186

QC	Consumption of Rice per capita (KG)
T8295	Time Trend from 1982 to 1995, 0 before 1982, 0 after 1995
RPRB	Retail Price of Rice (Baht/MT)
CPI	Consumer Price Index(1998=100)
GDP	Realized Gross Domestic Products
POP	Population
D856	Dummy Variable, 1 in 1985 to 1986, 0 otherwise
D87	Dummy Variable, 1 in 1987, 0 otherwise
D89	Dummy Variable, 1 in 1989, 0 otherwise
D97	Dummy Variable, 1 in 1997, 0 otherwise

4-5-9. Price linkage function

FPR = + 308.373
(1.01)
- 624.972*T9800
(-3.20)
+ 0.42693*RPRB
(12.93) [1.116]
- 783.421*D93
(-2.16)

$AdjR^2$=0.9125 D.W.=2.155

FPR	Farm Price of Thai Rice (baht per KG)
T9800	Time Trend from 1998 to 2000, 1 before 1998, 3 after 2000
RPRB	Retail Price of Rice (Baht/MT)
D93	Dummy Variable, 1 in 1993, 0 otherwise

Table 4-1. Elasticities of yield of major rice for evapotranspiration and trend

	Trend	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
NORTH-EAST										
Nakhon Phanon	0.049		-0.431		0.668	-0.404		0.500		
Sakon Nakhon		0.252	-0.922	-1.173	1.274	0.360	-0.313		0.302	
Nong Khai	0.012	0.112	-0.484			0.705		0.355		
Udon Thani		0.111		-0.288			0.391		-0.717	
Loei			-0.426		0.965				0.925	
Yasothon	0.027		0.248	-0.385	0.454		0.407	-0.795	-0.428	
Ubon Ratchathani	0.014	-0.091	0.338		-0.616	0.457				
Kalasin	0.033		0.121		-0.462	-0.361		-0.201	-0.428	
Khon Kaen				0.278	-0.253		-0.279	-0.227		
Maha Sarakham	0.046			-0.262						
Roi Et	0.043			-0.633	0.532					
Buri Ram	0.033	-0.110						-0.281		
Surin		0.109			0.390	0.407	0.325	-0.628		
Si Sa Ket	0.043		0.232	-0.870	0.554		0.639		0.582	
Chaiyaphum			-0.573	-0.571		-0.458	0.673	0.405	-0.774	
Nakhon Ratchasima	0.050	-0.320	0.202		-0.204		0.483	-0.747	-1.925	
NORTH	0.022			0.212		-0.230	0.395	-0.295	0.711	0.164
SOUTH	0.034			0.509				0.609		-0.251
CENTRAL	0.049								0.306	

Table 4-2. Elasticities of yield of second rice for evapotranspiration and trend

	Trend	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
NORTH-EAST									
Nakhon Phanon	0.018					-0.105	0.259		
Sakon Nakhon	-0.018	0.955	-0.815	0.255		0.154	-0.104	1.195	
Nong Khai	0.025	-1.232		0.245	-0.112	0.173	-0.162	0.622	
Udon Thani	0.016	1.563	-0.666		-0.078				
Loei		-0.953	0.649			0.165			
Yasothon		-1.262	0.757		-0.070			0.627	-0.641
Ubon Ratchathani		-0.705		-0.175		0.118			0.317
Kalasin	0.046		0.308		-0.056				-0.924
Khon Kaen	0.077	-0.421		0.294		-0.163	-0.092		0.747
Maha Sarakham	0.078					-0.188	0.107	0.100	-0.514
Roi Et		1.714				0.224			
Buri Ram			-0.634	0.796	-0.195	-0.150		0.651	-0.998
Surin	0.037	-1.950	0.431		0.209	-0.151			
Si Sa Ket			0.966	-0.296	-0.245	0.372	0.156		0.463
Chaiyaphum			-0.358	0.314	-0.155	-0.092		-0.192	-0.784
Nakhon Ratchasima			0.143				0.089	0.217	
NORTH				0.063	0.119	0.029			
SOUTH			-0.172		-0.101	0.070	-0.080	0.233	-0.136
CENTRAL	0.052					-0.040			

Table 4-3. Elasticities of planted area of major rice for farm price and evapotranspiration

	Trend	Area (t-1)	Price (t-1)	Evapotranspiration (t-1)									
				Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
NORTH-EAST													
Nakhon Phanon		0.497	0.153			-0.189		0.331			0.631	-0.529	0.410
Sakon Nakhon		0.591	0.457		0.192	-0.545			-0.913	1.355		-1.434	
Nong Khai		0.212	0.446			-0.460							
Udon Thani		0.205	0.127	-0.070	-0.132	0.316	-0.168						
Loei		0.628	0.436							0.767	0.721		
Yasothon		0.164	0.203		0.061	-0.223		-0.543	-0.206	0.339			
Ubon Ratchathani		0.891	0.144			-0.057			-0.143	0.389	0.154	-0.236	
Kalasin		0.247	0.678				-0.832			0.625	0.448		-0.465
Khon Kaen	0.047	0.236	0.328								0.800		
Maha Sarakham		0.238	0.238		-0.130	0.389	0.821	-0.417	-1.465	-1.399			
Roi Et		0.409	0.575			-0.210		0.498	-0.326		0.207		
Buri Ram	0.078	0.521	0.715		-0.094	1.270			-2.075	-1.399	1.481	0.590	0.690
Surin		0.698	0.481		-0.360	1.060	-0.862	0.692	0.619		-0.764	-0.708	-0.528
Si Sa Ket	0.112	0.223	0.481			-0.110	-0.682	1.005	0.408	1.089	1.068	-1.253	0.421
Chaiyaphum		0.397	0.744		-0.205	0.373			-0.359		0.624		
Nakhon Ratchasima		0.703	0.396			-0.180	0.806				0.414	0.821	
NORTH		0.727	0.083		-0.043				-0.247	0.314			
SOUTH		0.894	0.151			-0.297	0.492	0.205			-0.373	-0.187	0.276
CENTRAL		0.526	0.089		-0.026	-0.153					0.111	-0.172	

Table 4-4. Elasticities of planted area of second rice for farm price and evapotranspiration

	Trend	Area (t-1)	Price (t-1)	Evapotranspiration (t-1)							
				Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
NORTH-EAST											
Nakhon Phanon		0.745	0.356	-4.407	2.253				0.484	-0.875	-2.899
Sakon Nakhon		0.478	1.984				0.667	0.285		-1.185	4.687
Nong Khai		0.405	0.671	-1.714	0.902						1.343
Udon Thani		0.024	0.603	6.897	-5.176	2.146			0.554		
Loei		0.228	0.879		-4.089	4.132		0.626	-0.490		4.833
Yasothon		0.540	1.491		3.509	-1.004			-0.999		
Ubon Ratchathani		0.355	0.473	4.850	-2.751			-0.467	1.097	-2.694	3.176
Kalasin		0.853	0.309		-3.147	2.119		-0.095	0.392	-1.410	-1.199
Khon Kaen		0.484	0.273	7.216				0.753	-0.689		
Maha Sarakham		0.913	0.609	3.077		0.667	-0.614	0.666	-0.828	1.590	
Roi Et		0.363	0.225	7.661	-5.635	1.824	0.473				2.286
Buri Ram		0.527	1.217	3.721			0.236	9.105			
Surin	0.150	0.634	0.533	4.241		0.663			0.371		2.385
Si Sa Ket		0.268	1.746			-0.385				-0.911	3.016
Chaiyaphum		0.333	0.720	1.448		-1.107		0.455	0.880	-1.412	3.473
Nakhon Ratchasima		0.611	0.456	5.737	0.868		-1.432	1.495	0.500	-2.398	2.903
NORTH	0.411	0.539	0.257			1.540	-1.058	0.290		-0.579	
SOUTH		0.522	0.490			-1.293					
CENTRAL	0.015	0.326	0.239		1.055	-0.763	0.211		0.114	-0.933	

4-6. Simulation results

4-6-1. Results of estimation of yield functions

Table 4-1 and Table 4-2 show elasticities of yield for ET in wet and dry seasons. In the case of Nakhon Phanon, the elasticity of yield of major rice for ET in July is 0.668, indicating that if ET in July increases 1%; the yield of major rice in the province will increase 0.668%.

The planting period in major rice or rainy season rice is from May to August and the harvest period is from October to December. The planting period in second rice or dry season rice is from January to February and the harvest period is from May to June.

These results for major rice show that higher ET in July leads higher yield in many provinces of the North East region. The results suggest that the water supply available in the planting season is important for the growth of rice. The results of second rice also show that ET in December and January leads to a higher yield in many provinces. Therefore, the available water supply during transplanting season is quite critical for rice production.

4-6-2. Results of estimation of planted area functions

Planted area functions of major rice and second rice are specified as linear functions based on the adaptive expectation model. The explanatory variables are time trend, one-year lagged planted area, one-year lagged farm price, and one-year lagged ETs for each month. The elasticities evaluated on the average are shown in Table 4-3 and Table 4-4.

The planted area elasticities of major rice cultivation for ET in October are positive for many provinces. It suggests that if farmers expect an abundant water supply in the flowering season of major rice, they will increase their planted area for rainy season cultivation. Meanwhile, planted area elasticities of dry season cultivation for ET in November are very high. It suggests that the water supply just before the planting period is quite critical for second rice cultivation.

4-6-3. Simulation results of supply and demand model

The simulation term is from 2001 to 2015. The assumptions of the simulation are as follows; (1) the forecast growth value of CPI is the average annual growth between 1998 and 2002, (2) the growth value of real GDP is the average annual growth between 1998 and 2002, (3) the exchange rate is same as the number in 2002, (4) the growth value of population is the average annual growth between 1992 and 2002, (5) the linear trends of the yield functions are continued, (6) the trends of planted area functions are flat.

Figure 4-3 through Figure 4-6 show the simulation results for the production of major rice in the North East region, second rice in Central region, and two types of rice for Thailand as a whole.

The production of major rice in North East region is expected to stabilize around 9.6 million metric tons (mMT) after 2010. The production of second rice in the Central region will increase 210,000 metric tons (MT) from 2010 to 2015.

The production of major and second rice for whole Thailand will increase 594,000 MT and 378,000 MT respectively from 2010 to 2015. Productions of major rice in North and Central region will increase; however, production in the South region will decrease due to shrinking planted area. The production of second rice will increase in Central and North East regions and remain stable in the other two regions.

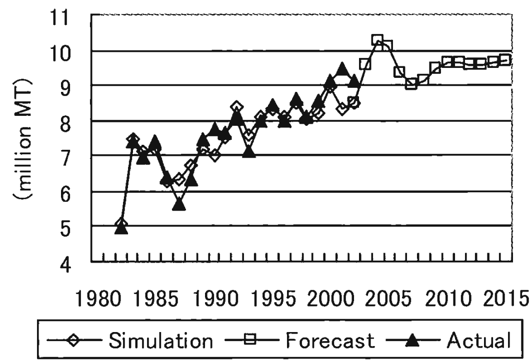

Fig. 4-3. Production of major rice in North East region

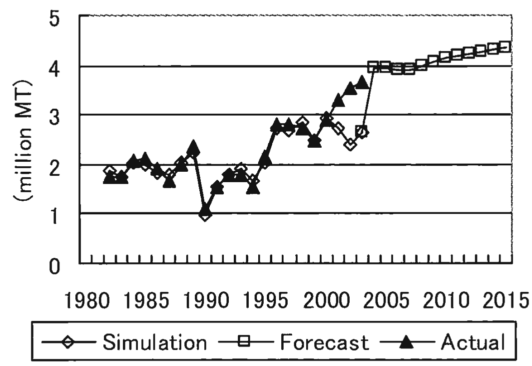

Fig. 4-4. Production of second rice in Central region

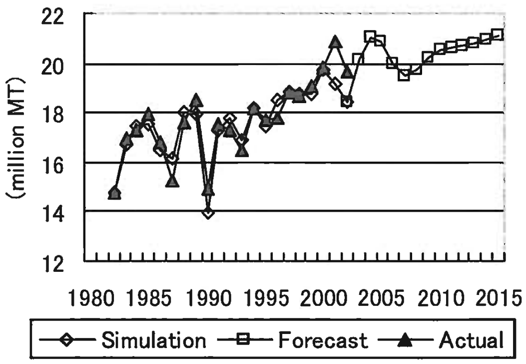

Fig. 4-5. Production of major rice for whole Thailand

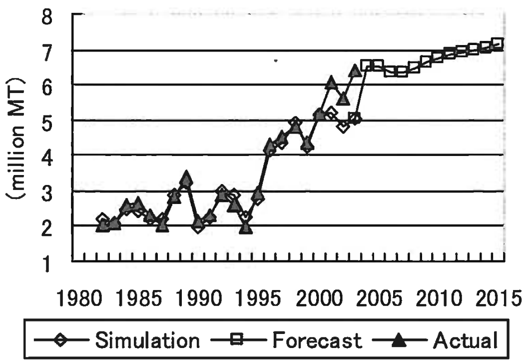

Fig. 4-6. Production of second rice for whole Thailand

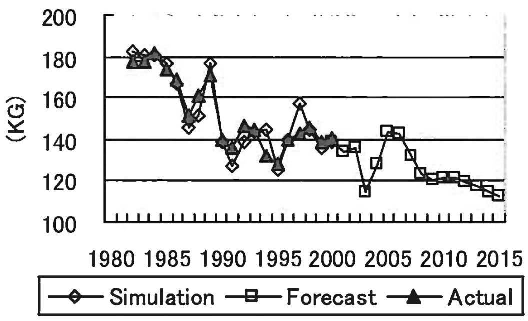

Fig. 4-7. Per capita consumption

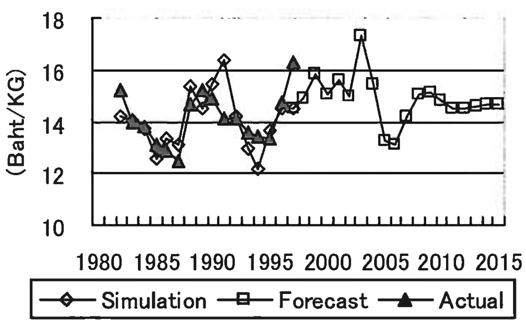

Fig. 4-8. Realized retail price

Figure 4-7 shows per capita rice consumption, which decreases from 121.3 kilogram (KG) in 2010 to 112.8 KG in 2015 due to a negative income elasticity, while total consumption expands with population. Figure 4-8 shows the simulation result of the equilibrium retail price. These prices are realized by CPI which is set to 100 in 1998. The farm price is estimated to be stable at around 14.6 Baht per KG.

4-7. Conclusions

A supply and demand model of rice in Thailand was developed for use in analyzing the impacts of changes in water supply in the provinces of the North East region and three other aggregate regions.

The supply and demand model can analyze changes in yield and planted area independently and consider supply responses and demand changes to the market price while bringing the market into equilibrium. The baseline analysis indicates that production of major rice steadily increases; however, productions in the rainy season in some regions is likely to decrease due to shrinking of planted area. The trends of production of second rice also vary widely for provinces in North East region, and the price elasticity of planted area determines the tendency of the production.

Nationwide per-capita income growth leads to a diversified diet, and rice consumption per capita will decrease as a result. This tendency is consistent with other countries in Indochina region. Stabilization of production is more important than an increase in production, while expansion of the export is also critical issue.

Chapter 5
Development of the Rice Econometric Model with Endogenous Water in Vietnam (REMEW-VIET)

5-1. Introduction

The international price of rice surged from \$385/metric ton (MT) in January 2008 to \$962/MT in May 2008. The drought in Australia and the sharp rise in demand for biofuels lead a higher price for wheat and maize. The price spikes of these crops contributed to the increase in rice prices; however, cold weather damage of rice in Vietnam was thought to be the primary factor in the price spike of rice.

Vietnam's share in world rice trade increased from 15.5% in 2007 to 20.2% in 2008. As Vietnams trade share has increased, the domestic price of rice in Vietnam in increasingly linked to the world price of rice. Modeling supply and demand for rice in this country is then critical for the evaluation of impacts of environmental changes on the world rice market.

5-2. Agricultural policies related to rice production

In the winter season from 2007 to 2008, most nursery rice was stunned decayed due to cold weather in the region. Concerned about domestic supplies, the Government of Vietnam banned the export of rice. Vietnamese rice exports are controlled by the Rice Export Management Committee which is headed by the Prime Minister.

IFPRI (1996) examined impacts of elimination of rice the export quota on the rice price and farm income using a spatial equilibrium model. They also examined the impacts of elimination of internal trade restrictions on the rice market. David (1994) summarized the price policies of agricultural products in 1990's.

5-3. Model

The model in Vietnam is regional model for eight regions and the basic structure of the model is same as those of other countries. There are three types of cultivation, i.e., spring, summer, and winter season rice. Transplanting of spring season rice occurs in December and the harvest occur from April to May. Transplanting period for summer season rice is from May to June and harvest runs from September to October. Transplanting occurs from September to October for winter season rice and the harvesting occurs during December in the Mekong Delta region. These cultivation periods are based on the cropping calendars in USDA(1994). The spring and summer season rice are cultivated in irrigated fields as a two season crop while the winter season rice is cultivated in rain-fed fields as single season crop. The generalized forms of the supply and demand model of rice are as follows:

Yield function of spring season:

$$YS^i = f_{YS}\,(T, ET_{DEC,t-1}^{\;i}, \dots, ET_{JLY,t}^{\;i}) \qquad (5\text{-}1)$$

Planted Area function of spring season:

$$AS^i_t = f_{AS}\,(FP_{t-1}, EYS^i_t, ET_{JAN\,t}^{\;i}) \qquad (5\text{-}2)$$

Planted Area function of spring season in the Mekong Delta region:

$$AS^{MDR}t = f_{ASM}\,(T, AS^{MDR}_{t-1}, FP_{t-1}, EYS^{MDR}_t, ET_{JAN\,t}^{\;i}, ET_{FEB\,t}^{\;i}) \qquad (5\text{-}3)$$

Production of spring season:

$$QS^i = YS^iAS^i,\ QS = \textstyle\sum_i QS^i \qquad (5\text{-}4)$$

Yield function of summer season:

$$YM_i = f_{YM}\,(T, ET_{MAR,t}^{\;i}, \dots, ET_{OCT,t}^{\;i}) \qquad (5\text{-}6)$$

Planted Area function of summer season:

$$AM^i_t = f_{AM}\,(FP_{t-1}, EYM^i_t, ET_{JAN\,t}^{\;i}, \dots, ET_{AUG\,t}^{\;i}) \qquad (5\text{-}7)$$

Planted Area function of summer season in the Mekong Delta region:

$$AM^{MDR}_t = f_{AMM}\,(T, FP_{t-1}, EYM^{MDR}_t, ET_{MAY\,t}^{\;i}) \qquad (5\text{-}8)$$

Production of summer season:

$$QM^i = YM^iAM^i,\ QM = \textstyle\sum_i QM^i \qquad (5\text{-}9)$$

Yield function of winter season:

$$YW^i = f_{YW}\,(T, ET_{JUN,t-1}^{\;i}, \dots, ET_{NOV,t}^{\;i}) \qquad (5\text{-}10)$$

Planted Area function of winter season:

$$AW^i_t = f_{AW}\,(T, FP_{t-1}, EYW^i_t, ET_{JUN\,t}^{\;i}, \dots, ET_{OCT\,t}^{\;i}) \qquad (5\text{-}11)$$

Planted Area function of winter season in the Mekong Delta region:

$$AW^{MDR}_t = f_{AWM}\,(T, FP_{t-1}, EYW^{MDR}_t, ET_{JUN\,t}^{\;i}, ET_{JLY\,t}^{\;i}) \qquad (5\text{-}12)$$

Production of winter season:

$$QW^i = YW^iAW^i,\ QW = \textstyle\sum_i QW^i \qquad (5\text{-}13)$$

Total production:

$$Q = 0.667(QS + QM + QW) \qquad (5\text{-}14)$$

Export function:

$$EXP = f\,(WP{*}EXR, Q) \qquad (5\text{-}15)$$

Stock change function:

$$STC = f\,(FP_{t,t-1}, Q_{t,t-1}) \qquad (5\text{-}16)$$

Total supply:

$$QD = Q + IMP - EXP - STC \qquad (5\text{-}17)$$

Demand function:

$$QD/POP = f\,(RP, GDP/POP) \qquad (5\text{-}18)$$

Price linkage function:

$FP = f(RP)$, (5-19)

where i is the region, t denotes that the data are measured at time t, T is a time trend, ET_{JAN}^{i} through ET_{DEC}^{i} are monthly evapotranspiration values for January through December, YS, AS, EYS, and QS are yield, planted area, expected yield, and production of spring season rice, YM, AM, EYM, and QM are yield, planted area, expected yield, and production of summer season rice, YW, AW, EYW, and QW are yield, planted area, expected yield, and production of winter season rice, Q is total rice production, IMP is imports, EXP is exports, STC is the annual change of stocks, i.e., ending stock minus beginning stock, QD is total supply, POP is population, GDP is gross domestic products, EXR is exchange rate, WP is the world price of rice (Thailand, 35% broken, FOB), FP is the producer price, RP is the retail price. All functions are specified as linear functions.

The planted area function is based on the naïve expectation model because Mekong Delta region, where is the main production region, located in lower Mekong River. Water harvesting and forecasting of water supply changes in the lower elevation regions are easier than those in upper regions, therefore the

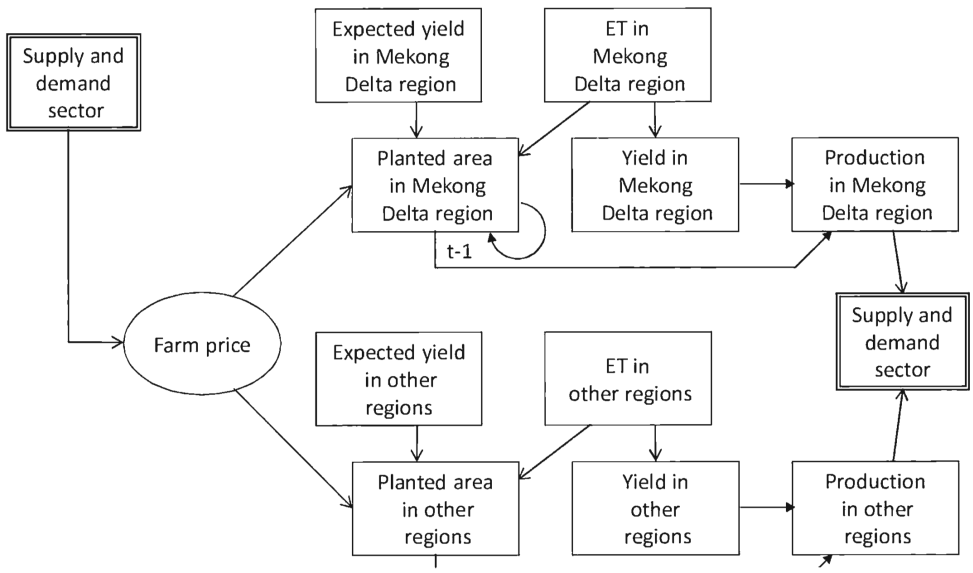

Fig. 5-1. Flowchart of the rice production sector of Vietnam rice model

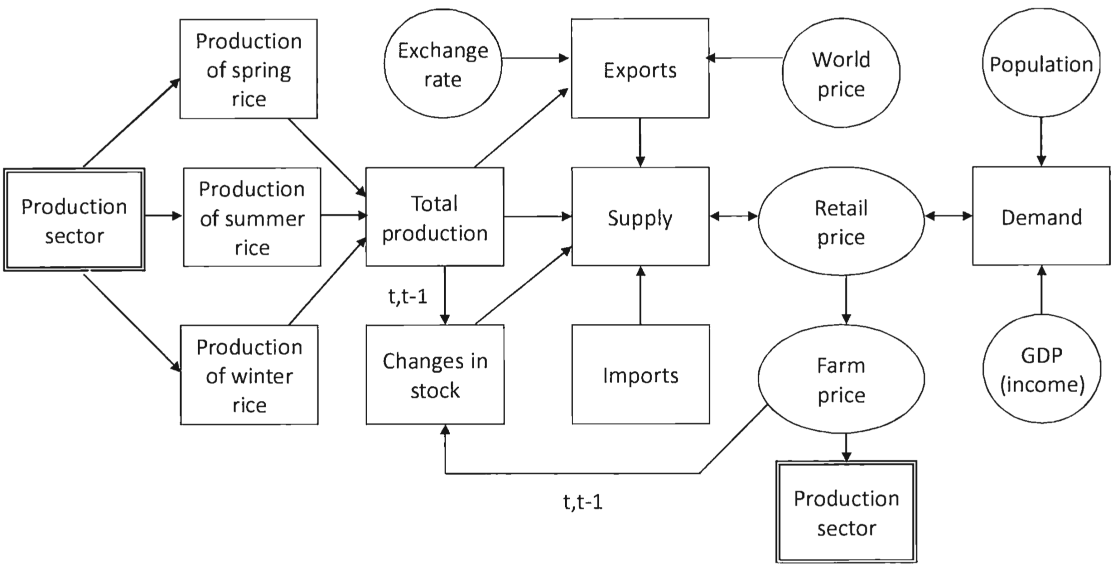

Fig. 5-2. Flowchart of supply and demand sector of Vietnam rice model

planted area functions of the Vietnamese model take a simpler form than those of the Laotian and Cambodian models.

5-4. Data

The time series data for each region for production and planted area for the three types of rice cultivation is provided by the General Statistics Office of the Statistical Publishing House of Vietnam. The rice farm price is obtained from FAO-STAT and the retail rice price is obtained from the USDA. These prices are national average prices for Vietnam. CPI, GDP, GDP deflator and population are from the ADB and the exchange rate and the world price of rice are numbers from the IMF. The estimation period for the yield and planted area functions in the Mekong Delta region, imports, stock change, and demand functions for the country as a whole are from 1985 to 2000 which starts in the earliest available year for CPI and ends in the last year of available ET values. Functions for yield and planted area in regions except the Mekong Delta region are estimated using pooled data from 1985 to 2000 for the seven regions.

5-5. Estimation results of all functions

The yield functions of spring, summer, and winter season rice are not estimated for each region due to the lack of time series data. Parameters are obtained by estimating one function which includes provincial dummies using pooled data. The data set of spring and winter season rice consists of eight regions for sixteen years, and those for summer rice consists of five regions for sixteen years.

The estimation periods of these yield functions are from 1985 to 2000 which starts in the earliest available year for statistics of production of the three seasons and ends in the last year of available ET values.

The planted area functions of the three types of rice are also estimated using pooled data; however, the planted area functions in the Mekong Delta region are estimated using only time series data because the trend of the planted area is quite different from other regions.

Finally, estimated results of export, stock change, demand, and price linkage function are shown. The estimation method of all functions is OLS.

5-5-1. Yield functions

5-5-1-1. Yield function of spring season rice

5-5-1-1-1. Yield function of spring season rice pooled

YS= 27.27637
(0.98)
+ 1.05535*TREND
(10.27)
+ 1.43780*TREND*DR81
(5.35)
- 0.41899*TREND*DR88
(-1.67)
- 4.58713*ln(ETDECt-1)
(-2.15)
+ .00279*ln(ETDECt-1)*DR88
(5.14)
+ 7.63748*ln(ETJAN)
(4.58)
- 10.7256*ln(ETJAN)*DR81
(-3.11)
+ 6.80434*ln(ETFEB)*DR81
(-2.73)
- 22.97368*ln(ETMAR)*DR86
(1.88)
+ 24.38146*ln(ETAPR)*DR86
(-2.52)
+ 11.35640*ln(ETMAY)
(2.73)
- 16.18149*ln(ETJUL)
(4.87)

Adj R^2 = 0.8321 DW=1.725

YS	Yield of spring rice
TREND	Linear time trend 1976=1
DR81	Treatment variable for Region 81, Red River Delta
DR86	Treatment variable for Region 86, Central Highlands
DR88	Treatment variable for Region 88, Mekong River Delta
ETDECt-1	Evapotranspiration value for December (previous calendar year)
ETJAN	Evapotranspiration value for January
ETFEB	Evapotranspiration value for February
ETMAR	Evapotranspiration value for March
ETAPR	Evapotranspiration value for April
ETMAY	Evapotranspiration value for May
ETJUL	Evapotranspiration value for April

5-5-1-1-2. Yield function of spring season rice in Red River Delta region

YS_RRD = + 27.2673
+ 2.49315 * TREND
- 4.58713 * ln(ETRRD_DECt-1)
- 3.08812 * ln(ETRRD_JAN)
+ 6.80434 * ln(ETRRD_FEB)
+ 11.35640 * ln(ETRRD_MAY)
- 16.18149 * ln(ETRRD_JLY)

YS_RRD	Yield of spring season rice in Red River Delta region
TREND	Linear time trend 1976=1
ETRRD_DECt-1	Evapotranspiration for December (previous calendar year) in Red River Delta region
ETRRD_JAN	Evapotranspiration for January in Red River Delta region
ETRRD_FEB	Evapotranspiration for February in

Red River Delta region

ETRRD_MAY Evapotranspiration for May in Red River Delta region

ETRRD_JLY Evapotranspiration for July in Red River Delta region

5-5-1-1-3. Yield function of spring season rice in North East region

YS_NE = +27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETNE_DECt-1)
+ 7.63748*ln(ETNE_JAN)
+ 11.35640*ln(ETNE_MAY)
- 16. 18149*ln(ETNE_JLY)

YS_NE Yield of spring rice in North East region

TREND Linear time trend 1976=1

ETNE_DECt-1 Evapotranspiration for December (previous calendar year) in North East region

ETNE_JAN Evapotranspiration for January in North East region

ETNE_MAY Evapotranspiration for May in North East region

ETNE_JLY Evapotranspiration for July in North East region

5-5-1-1-4. Yield function of spring season rice in North West region

YS_NW = + 27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETNW_DECt-1)
+ 7.63748*ln(ETNW_JAN)
+ 11.35640*ln(ETNW_MAY)
- 16. 18149*ln(ETNW_JLY)

YS_NW Yield of spring rice in North West region

TREND Linear time trend 1976=1

ETNW_DECt-1 Evapotranspiration for December (previous calendar year) in North West region

ETNW_JAN Evapotranspiration for January in North West region

ETNW_MAY Evapotranspiration for May in North West region

ETNW_JLY Evapotranspiration for July in North West region

5-5-1-1-5. Yield function of spring season rice in North Central region

YS_NC = + 27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETNC_DECt-1)
+ 7.63748*ln(ETNC_JAN)
+ 11.35640*ln(ETNC_MAY)
- 16. 18149*ln(ETNC_JLY)

YS_NC Yield of spring rice in North Central region

TREND Linear time trend 1976=1

ETNC_DECt-1 Evapotranspiration for December (previous calendar year) in North Central region

ETNC_JAN Evapotranspiration for January in North Central region

ETNC_MAY Evapotranspiration for May in North Central region

ETNC_JLY Evapotranspiration for July in North Central region

5-5-1-1-6. Yield function of spring season rice in South Central region

YS_SC = + 27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETSC_DECt-1)
+ 7.63748*ln(ETSC_JAN)
+ 11.35640*ln(ETSC_MAY)
- 16. 18149*ln(ETSC_JLY)

YS_SC Yield of spring rice in South Central region

TREND Linear time trend 1976=1

ETSC_DECt-1 Evapotranspiration for December (previous calendar year) in South Central region

ETSC_JAN Evapotranspiration for January in South Central region

ETSC_MAY Evapotranspiration for May in South Central region

ETSC_JLY Evapotranspiration for July in South Central region

5-5-1-1-7. Yield function of spring season rice in Central Highlands region

YS_CH = + 27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETCH_DECt-1)
+ 7.63748*ln(ETCH_JAN)
- 22.97368*ln(ETCH_MAR)
+ 24.38146*ln(ETCH_APR)
+ 11.35640*ln(ETCH_MAY)
- 16. 18149*ln(ETCH_JLY)

YS_CH Yield of spring rice in Central Highlands region

TREND Linear time trend 1976=1

ETCH_DECt-1 Evapotranspiration for December (previous calendar year) in Central Highlands region

ETCH_JAN Evapotranspiration for January in Central Highlands region

ETCH_MAR Evapotranspiration for March in Central Highlands region

ETCH_APR Evapotranspiration for April in Central Highlands region

ETCH_MAY Evapotranspiration for May in Central Highlands region

ETCH_JLY Evapotranspiration for July in Central Highlands region

5-5-1-1-8. Yield function of spring season rice in South East region

YS_SE = + 27.27637
+ 1.05535 * TREND
- 4.58713 * ln(ETSE_DECt-1)
+ 7.63748*ln(ETSE_JAN)
+ 11.35640*ln(ETSE_MAY)
- 16. 18149*ln(ETSE_JLY)

YS_SE Yield of spring rice in South East region

TREND Linear time trend 1976=1

ETSE_DECt-1 Evapotranspiration for December (previous calendar year) in South East region

ETSE_JAN Evapotranspiration for January in South East region

ETSE_MAY Evapotranspiration for May in South East region

ETSE_JLY Evapotranspiration for July in South East region

5-5-1-1-9. Yield function of spring season rice in Mekong River Delta region

YS_MRD = + 27.27637
+ 0.63636 * TREND
+ 0.41566 * ln(ETMRD_DECt-1)
+ 7.63748*ln(ETMRD_JAN)
+ 11.35640*ln(ETMRD_MAY)
- 16. 18149*ln(ETMRD_JLY)

YS_MRD Yield of spring rice in Mekong River Delta region
TREND Linear time trend 1976=1
ETMRD_DECt-1 Evapotranspiration for December (previous calendar year) in Mekong River Delta region
ETMRD_JAN Evapotranspiration for January in Mekong River Delta region
ETMRD_MAY Evapotranspiration for May in Mekong River Delta region
ETMRD_JLY Evapotranspiration for July in Mekong River Delta region

5-5-1-2. Yield function of summer season rice

5-5-1-2-1. Yield function of summer season rice pooled

YM= 57.36595
(4.03)
+ 178.23544*DR84
(2.52)
+ 0.13312*TREND
(2.02)
+ 5.11125*TREND*DR84
(5.37)
- 68.15874*ln(TREND)*DR84
(-4.26)
+ 0.38684*TREND*DR85
(7.32)
+ 0.11091*TREND*DR88
(2.35)
+ 2.65131*ln(ETMAR)
(2.16)
+ 24.22034*ln(ETMAY)*DR86
(2.80)
- 32.78468*ln(ETJUL)*DR84
(-3.23)
- 27.27385*ln(ETAUG)*DR84
(-4.05)
+ 43.10634*ln(ETSEP)*DR84
(3.43)
- 25.55856*ln(ETSEP)*DR86
(-3.03)
- 8.054090*ln(ETOCT)
(-2.56)

Adj R^2 = 0.9046 DW = 2.403

YM Yield of summer rice
TREND Linear time trend 1976=1
DR84 Treatment variable for Region 84, North Central Coast
DR85 Treatment variable for Region 85, South Central Coast
DR86 Treatment variable for Region 86, Central Highlands
DR88 Treatment variable for Region 88, Mekong River Delta
ETMAR Evapotranspiration value for March
ETMAY Evapotranspiration value for May
ETJUL Evapotranspiration value for July
ETAUG Evapotranspiration value for August
ETSEP Evapotranspiration value for September
ETOCT Evapotranspiration value for October

5-5-1-2-2. Yield function of summer season rice in North Central region

YM_NC = +235.60139
+ 5.24437*TREND
- 68.15874*ln(TREND)
+2.65131*ln(ETNC_MAR)
- 32.78468*ln(ETNC_JLY)
- 27.27386*ln(ETNC_AUG)
+ 43.10634*ln(ETNC_SEP)
- 8.05409*ln(ETNC_OCT)

YM_NC Yield of summer season rice in North Central region
TREND Linear time trend 1976=1
ETNC_MAR Evapotranspiration for March in North Central region
ETNC_JLY Evapotranspiration for July in North Central region
ETNC_AUG Evapotranspiration for August in North Central region
ETNC_SEP Evapotranspiration for September North Central region
ETNC_OCT Evapotranspiration for October in North Central region

5-5-1-2-3. Yield function of summer season rice in South Central region

YM_SC= +57.36595
+ 0.51996*TREND
+ 0.65131*ln(ETSC_MAR)
- 8.05409*ln(ETSC_OCT)

YM_SC Yield of summer season rice in South Central region
TREND Linear time trend 1976=1
ETSC_MAR Evapotranspiration for March in South Central region
ETSC_OCT Evapotranspiration for October in South Central region

5-5-1-2-4. Yield function of summer season rice in Central Highlands region

YM_CH= +57.36595
+ 0.13312*TREND
+ 2.65131*ln(ETCH_MAR)
+ 24.22034*ln(ETCH_MAY)
- 25.55856*ln(ETCH_SEP)
- 8.05409*ln(ETSC_OCT)

YM_CH Yield of summer season rice in Central Highlands region
TREND Linear time trend 1976=1

ETCH_MAR Evapotranspiration for March in Central Highlands region
ETCH_MAY Evapotranspiration for May in Central Highlands region
ETCH_SEP Evapotranspiration for September in Central Highlands region
ETCH_OCT Evapotranspiration for October in Central Highlands region

5-5-1-2-5. Yield function of summer season rice in South East region

YM_SE= +57.36595
+ 0.13312*TREND
+ 2.65131*ln(ETSE_MAR)
- 8.05409*ln(ETSE_OCT)

YM_SE Yield of summer season rice in South East region
TREND Linear time trend 1976=1
ETSE_MAR Evapotranspiration for March in South East region
ETSE_OCT Evapotranspiration for October in South East region

5-5-1-2-6. Yield function of summer season rice in Mekong River Delta region

YM_MRD= +57.36595
+ 0.24403*TREND
+ 2.65131*ln(ETMRD_MAR)
- 8.05409*ln(ETMRD_OCT)

YM_MRD Yield of summer season rice in Mekong River Delta region
TREND Linear time trend 1976=1
ETMRD_MAR Evapotranspiration for March in Mekong River Delta region
ETMRD_OCT Evapotranspiration for October in Mekong River Delta region

5-5-1-3. Yield function of winter season rice

5-5-1-3-1. Yield function of winter season rice pooled

YW= -21.19495
(-1.31)
- 305.42596*DR81
(-4.64)
- 45.80576*DR84
(-1.25)
+ 146.09079*DR85
(2.56)
+ 0.50778*TREND
(8.59)
+ 0.81935*TREND*DR81
(5.92)
+ 0.39529*TREND*DR82
(3.16)
+ 0.17788*TREND*DR84
(1.36)
- 0.39177*TREND*DR87
(-3.00)
- 18.78781*ln(ETJUN)*DR85
(-2.78)
-1.49071*ln(ETJUN)*DR86
(-9.14)
+ 39.4286*ln(ETJUL)*DR81
(3.57)
+ 6.65991*ln(ETJUL)*DR83
(1.53)
-9.93575*ln(ETAUG)*DR81
(-1.59)
-8.72378*ln(ETAUG)*DR83
(-1.99)
-21.24006*ln(ETAUG)*DR85
(-2.38)
+16.49354*ln(ETAUG)*DR87
(1.86)
+8.89444*ln(ETSEP)
(2.51)
+ 41.95199*ln(ETSEP)*DR81
(3.33)
-15.86032*ln(ETSEP)*DR87
(-1.78)
+12.77038*ln(ETOCT)*DR84
(1.75)
+8.23481*ln(ETOCT)*DR85
(1.41)
-9.36005*ln(ETNOV)*DR81
(-2.31)
-2.24949*ln(ETNOV)*DR82
(-3.94)
-5.37945*ln(ETNOV)*DR84
(-1.33)

Adj R^2 = 0.9060 DW = 1.98

YW Yield of winter rice
Trend Linear time trend 1976=1
DR81 Treatment variable for Region 81, Red River Delta
DR82 Treatment variable for Region 82, North East
DR83 Treatment variable for Region 83, North West
DR84 Treatment variable for Region 84, North Central Coast
DR85 Treatment variable for Region 85, South Central Coast
DR86 Treatment variable for Region 86, Central Highlands
DR87 Treatment variable for Region 87, South East
DR88 Treatment variable for Region 88, Mekong River Delta
ETJUN Evapotranspiration value for June
ETJUL Evapotranspiration value for July
ETAUG Evapotranspiration value for August
ETSEP Evapotranspiration value for September
ETOCT Evapotranspiration value for October
ETNOV Evapotranspiration value for November

5-5-1-3-2. Yield function of winter season rice in Red River Delta region

YW_RRD = - 326.62091
+ 1.32713 * TREND
+ 39.42860 * ln(ETRRD_JLY)
- 9.93575 * ln(ETRRD_AUG)
+ 50.84643 * ln(ETRRD_SEP)

- 9.36005 * ln(ETRRD_NOV)

YW_RRD Yield of winter season rice in Red River Delta region
TREND Linear time trend 1976=1
ETRRD_JLY Evapotranspiration for July in Red River Delta region
ETRRD_AUG Evapotranspiration for August in Red River Delta region
ETRRD_SEP Evapotranspiration for September in Red River Delta region
ETRRD_NOV Evapotranspiration for November in Red River Delta region

5-5-1-3-3. Yield function of winter season rice in North East region

YW_NE = - 21.19495
+ 0.90307 * TREND
+ 8.89444 * ln(ETNE_SEP)
- 2.24949 * ln(ETNE_NOV)

YW_NE Yield of winter season rice in North East region
TREND Linear time trend 1976=1
ETNE_SEP Evapotranspiration for September in North East region
ETNE_NOV Evapotranspiration for November in North East region

5-5-1-3-4. Yield function of winter season rice in North West region

YW_NW = - 21.19495
+ 0.50778 * TREND
+ 6.65991*ln(ETNW_JLY)
- 8.72378*ln(ETNW_AUG)
+ 8.89444 * ln(ETNW_SEP)

YW_NW Yield of winter season rice in North West region
TREND Linear time trend 1976=1
ETNW_JLY Evapotranspiration for July in North West region
ETNW_AUG Evapotranspiration for August in North West region
ETNW_SEP Evapotranspiration for September in North West region

5-5-1-3-5. Yield function of winter season rice in North Central region

YW_NC = - 67.00071
+ 0.68566 * TREND
+ 8.89444 * ln(ETNC_SEP)
+ 12.77038 * ln(ETNC_OCT)
- 5.37945 * ln(ETNC_NOV)

YW_NC Yield of winter season rice in North Central region
TREND Linear time trend 1976=1
ETNC_SEP Evapotranspiration for September in North Central region
ETNC_OCT Evapotranspiration for October in North Central region
ETNC_NOV Evapotranspiration for November in North Central region

5-5-1-3-6. Yield function of winter season rice in South Central region

YW_SC = - 124.89584
+ 0.50778 * TREND
- 18.78781 * ln(ETSC_JUN)
- 21.24006 * ln(ETSC_AUG)
+ 8.89444*ln(ETSC_SEP)
+8.23481*ln(ETSC_OCT)

YW_SC Yield of winter season rice in South Central region
TREND Linear time trend 1976=1
ETSC_JUN Evapotranspiration for June in South Central region
ETSC_AUG Evapotranspiration for August in South Central region
ETSC_SEP Evapotranspiration for September in South Central region
ETSC_OCT Evapotranspiration for October in South Central region

5-5-1-3-7. Yield function of winter season rice in Central Highlands region

YW_CH = - 21.19495
+ 0.50778 * TREND
- 1.49071 * ln(ETCH_JUN)
+ 8.89444*ln(ETCH_SEP)

YW_CH Yield of winter season rice in Central Highlands region
TREND Linear time trend 1976=1
ETCH_JUN Evapotranspiration for June in Central Highlands region
ETCH_SEP Evapotranspiration for September in Central Highlands region

5-5-1-3-8. Yield function of winter season rice in South East region

YW_SE = - 21.19495
+ 0.11601 * TREND
+ 16.49354 * ln(ETSE_AUG)
- 6.96588*ln(ETSE_SEP)

YW_SE Yield of winter season rice in South East region
TREND Linear time trend 1976=1
ETSE_AUG Evapotranspiration for August in South East region
ETSE_SEP Evapotranspiration for September in South East region

5-5-1-3-9. Yield function of winter season rice in Mekong River Delta region

YW_MRD =- 21.19495
+ 0.50778 * TREND
+ 8.89444*ln(ETMRD_SEP)

YW_MRD Yield of winter season rice in Mekong River Delta region
TREND Linear time trend 1976=1
ETMRD_SEP Evapotranspiration for September in Mekong River Delta region

5-5-2. Planted area functions

5-5-2-1. Planted area function of spring season rice

5-5-2-1-1. Planted area function of spring season rice pooled

(Less Mekong River Delta Region)

APS = 25.07395
(11.36)
+ 531.39551*DR81
(123.03)
+ 113.38698*DR82
(5.31)
+ 287.99908*DR84
(108.88)
+ 135.37101*DR85
(51.15)
-295.38267*DR87
(3.65)
+ 0.00055282 * ((RPPDt-1/NGDPD) * EYS) * SHIFT89
(3.12)
+ 0.00132 * ((RPPDt-1/NGDPD) * EYS) * SHIFT89 * DR81
(3.85)
+ 0.00085279 * ((RPPDt-1/NGDPD) * EYS) * SHIFT89 * DR82
(1.77)
- 0.00033167 * ((RPPDt-1/NGDPD) * EYS) * SHIFT89 * DR83
(-1.25)
+ 0.00232 * ((RPPDt-1/NGDPD) * EYS) * DR87
(3.40)
+ 8.89679 * ln(ETJAN) * DR82
(1.33)
+ 73.82035 * ln(ETJAN) * DR87
(3.86)

Adj R^2 = 0.9976 DW = 1.336

APS	Planted are of spring season rice
DR81	Treatment variable for Region 81, Red River Delta
DR82	Treatment variable for Region 82, North East
DR83	Treatment variable for Region 83, North West
DR84	Treatment variable for Region 84, North Central Coast
DR85	Treatment variable for Region 85, South Central Coast
DR87	Treatment variable for Region 87, South East
ETJAN	Evapotranspiration value for January
SHIFT89	Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator
EYS	Expected (trend) yield of spring season rice

5-5-2-1-2. Planted area function of spring season rice in Red River Delta region

APS_RRD = + 556.46946
+ 0.0018728 * RPPDt-1/(NGDPD/100) *EYS_RRD * SHIFT89

APS_RRD	Planted area of spring season rice in Red River Delta region
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator
EYS_RRD	Expected (trend) yield of spring season rice in Red River Delta region
SHIFT89	Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

5-5-2-1-3. Planted area function of spring season rice in North East region

APS_NE = + 138.46093
+ 0.00140561 * RPPDt-1/(NGDPD/100) * EYS_NE * SHIFT89
+8.89679 * ln(ETNE_JAN)

APS_NE	Planted area of spring season rice in North East region
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator
EYS_NE	Expected (trend) yield of spring season rice in North East region
SHIFT89	Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETNE_JAN	Evapotranspiration for January in North East region

5-5-2-1-4. Planted area function of spring season rice in North West region

APS_NW = + 25.07395
+ 0.00022115 * RPPDt-1/(NGDPD/100) * EYS_NW * SHIFT89

APS_NW	Planted area of spring season rice in North West region
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator
EYS_NW	Expected (trend) yield of spring season rice in North West region
SHIFT89	Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

5-5-2-1-5. Planted area function of spring season rice in North Central region

APS_NC = + 313.07303
+ 0.00055282 * RPPDt-1/(NGDPD/100) * EYS_NC * SHIFT89

APS_NC	Planted area of spring season rice in North Central region
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator
EYS_NC	Expected (trend) yield of spring season rice in North Central region
SHIFT89	Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

5-5-2-1-6. Planted area function of spring season rice in South Central region

APS_SC = + 160.44496
+ 0.00055282 * RPPDt-1/(NGDPD/100) * EYS_SC * SHIFT89

APS_SC	Planted area of spring season rice in North West region
RPPDt-1	Retail paddy price lagged (000dong/MT)
NGDPD	GDP Deflator

EYS_SC Expected (trend) yield of spring season rice in South Central region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

5-5-2-1-7. Planted area function of spring season rice in Central Highlands region

APS_CH = + 25.07395
+ 0.00055282 * RPPDt-1/(NGDPD/100)
* EYS_CH * SHIFT89

APS_CH Planted area of spring season rice in Central Highlands region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYS_CH Expected (trend) yield of spring rice in Central Highlands region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

5-5-2-1-8. Planted area function of spring season rice in South East region

APS_SE = - 270.30872
+ 0.00055282 * RPPDt-1/(NGDPD/100)
* EYS_SE * SHIFT89
+ 0.00232 * RPPDt-1/(NGDPD/100)
* EYS_SE
+ 73.82035 * ln(ETSE_JAN)

APS_SE Planted area of spring season rice in South East region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYS_SE Expected (trend) yield of spring rice in South East region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETSE_JAN Evapotranspiration for January in South East region

5-5-2-1-9. Planted area function of spring season rice in Mekong River Delta region

APS_MRD = - 618.98587
(-2.00)
+ 0.75036 * APS_MRDt-1
(4.96)
+ 16.35357 * TREND
(1.50)
+ 0.00310 * RPPDt-1/(NGDPD/100)
* EYS_MRD * SHIFT89
(2.96)
- 40.88202 * D94
(-2.43)
+ 85.58497 * ln(ETMRD_JAN)
(3.72)
+ 54.99330 * ln(ETMRD_FEB)
(1.00)

Adj R^2 = 0.9976 DW = 2.334

APS_MRD Planted area of spring season rice in Mekong River Delta region
APS_MRDt-1 Planted area lagged of spring season rice in Mekong River Delta region
TREND Linear time trend 1976=1
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYS_MRD Expected (trend) yield of spring rice in Mekong River Delta region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETMRD_JAN Evapotranspiration for January in Mekong River Delta region
ETMRD_FEB Evapotranspiration for February in Mekong River Delta region

5-5-2-2. Planted area function of summer season rice

5-5-2-2-1. Planted area function of summer season rice pooled
(Less Mekong River Delta Region)

APM = 338.21281
(2.36)
+ 262.30685*DR85
(-1.40)
- 126.79262*DR86
(-23.23)
- 1540.97457*DR87
(-6.32)
+ 0.00282 * ((RPPDt-1/NGDPD) * EYM)
* SHIFT89
(5.59)
+ 0.00232 * ((RPPDt-1/NGDPD)*EYM)
* SHIFT89 * DR85
(-3.70)
+ 0.0019 * ((RPPDt-1/NGDPD)*EYM)
* SHIFT89 * DR87
(2.11)
- 0.00378 * ((RPPDt-1/NGDPD)*EYM)
* DR87
(-3.06)
- 50.50563 * ln(ETJUL)
(-1.66)
+ 57.92589 * ln(ETJUL)*DR85
(1.45)
+ 35.9262 * ln(ETMAY) * DR87
(1.45)
+ 295.61269 * ln(ETAUG) * DR87
(5.12)

Adj R^2 = 0.9320 DW = 1.478

APM Planted area of summer season rice
DR85 Treatment variable for Region 85, South Central Coast
DR86 Treatment variable for Region 86, Central Highlands
DR87 Treatment variable for Region 87, South East
ETJAN Evapotranspiration value for January
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before

VNRPPt-1 Retail paddy price (000dong/MT)
VNGDPD GDP Deflator
EYM Expected (trend) yield of summer season rice

5-5-2-2-2. Planted area function of summer season rice in North Central region

APM_NC = - 338.21281
+ 0.00282 * RPPDt-1/(NGDPD/100)
* EYM_NC * SHIFT89
- 50.50563 * ln(ETNC_JLY)

APM_NC Planted area of summer season rice in North Central region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYM_NC Expected (trend) yield of summer season rice in North Central region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETNC_JLY Evapotranspiration for July in North Central region

5-5-2-2-3. Planted area function of summer season rice in South Central region

APM_SC = + 75.90596
+ 0.00050 * RPPDt-1/(NGDPD/100)
* EYM_SC * SHIFT89
+ 7.42026 * ln(ETSC_JLY)

APM_SC Planted area of summer season rice in South Central region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYM_SC Expected (trend) yield of summer season rice in South Central region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETSC_JLY Evapotranspiration for July in South Central region

5-5-2-2-4. Planted area function of summer season rice in Central Highlands region

APM_CH = + 211.42019
+ 0.00282 * RPPDt-1/(NGDPD/100)
* EYM_CH * SHIFT89
- 50.50563 * ln(ETCH_JLY)

APM_CH Planted area of summer season rice in Central Highlands region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYM_CH Expected (trend) yield of summer season rice in Central Highlands region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETCH_JLY Evapotranspiration for July in Central Highlands region

5-5-2-2-5. Planted area function of summer season rice in South East region

APM_SE = - 1202.76176
+ 0.00472 * RPPDt-1/(NGDPD/100)
* EYM_SE * SHIFT89
- 0.00378 * RPPDt-1/(NGDPD/100)
* EYM_SE
+ 35.92620 * ln(ETSE_MAY)
- 50.50563 * ln(ETSE_JLY)
+ 295.61269 * ln(ETSE_AUG)

APM_SE Planted area of summer season rice in South East region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYM_SE Expected (trend) yield of summer season rice in South East region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETSE_MAY Evapotranspiration for May in South East region
ETSE_JLY Evapotranspiration for July in South East region
ETSE_AUG Evapotranspiration for August in South East region

5-5-2-2-6. Planted area function of summer season rice in Mekong River Delta region

APM_MRD = - 2259.04485
(-3.86)
+ 89.48408 * TREND
(26.56)
+ 0.00845 * RPPDt-1/(NGDPD/100)
* EYM_MRD * SHIFT89
(1.72)
+ 402.13189 * ln(ETMRD_MAY)
(3.08)
+ 189.50938 * D99
(3.27)

Adj R^2 = 0.9877 DW = 1.521

APM_MRD Planted area of summer season rice in Mekong River Delta region
TREND Linear time trend 1976=1
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYM_MRD Expected (trend) yield of summer season rice in Mekong River Delta region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETMRD_MAY Evapotranspiration for May in Mekong River Delta region
D99 Dummy variable, D99=1 in 1999, otherwise 0

5-5-2-3. Planted area function of winter season rice

5-5-2-3-1. Planted area function of winter season rice pooled (Less Mekong River Delta Region)

APW = 390.12531
(6.37)
- 4.73004*TREND*DR84
(-8.26)
- 0.51195*TREND*DR86
(-3.82)
+ 1.76444*TREND*DR87
(4.33)
+ 0.00034398*((RPPDt-1/NGDPD)*EYW)

*SHIFT89
(1.56)
+ .00116*((RPPDt-1/NGDPD)*EYW)
*DR81
(2.13)
+ .00179*((RPPDt-1/NGDPD)*EYW)
*DR81
(1.51)
- 17.54514*ln(ETJUN)
(-1.72)
+ 93.45954*ln(ETJUL)*DR81
(72.99)
+ 74.1484*ln(ETJUL)*DR82
(3.71)
+ 36.67058*ln(ETJUL)*DR84
(23.06)
- 35.9352*ln(ETAUG)
(-4.03)
+ 33.97683*ln(ETAUG)*DR83
(2.43)
- 33.14568*ln(ETOCT)*DR83
(-1.57)
- 42.0415*ln(ETOCT)*DR83
(-2.92)
+ 18.80624*ln(ETOCT)*DR87
(11.39)

Adj R^2 = 0.9980 DW = 1.187

TREND Linear time trend 1976=1
DR81 Treatment variable for Region 81, Red River Delta
DR82 Treatment variable for Region 82, North East
DR83 Treatment variable for Region 83, North West
DR84 Treatment variable for Region 84, North Central Coast
DR86 Treatment variable for Region 86, Central Highlands
DR87 Treatment variable for Region 87, South East
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
RPPDt-1 Retail paddy price (000dong/MT)
NGDPD GDP Deflator
EYW Expected (trend) yield of winter season rice
ETJUN Evapotranspiration value for June
ETJUL Evapotranspiration value for July
ETAUG Evapotranspiration value for August
ETOCT Evapotranspiration value for October

5-5-2-3-2. Planted area function of winter season rice in Red River Delta region

APW_RRD = + 390.12531
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_RRD * SHIFT89
+ 0.00116 * RPPDt-1/(NGDPD/100)
*EYW_RRD
- 17.54514 * ln(ETRRD_JUN)
+ 93.45954 * ln(ETRRD_JLY)
- 35.93520 * ln(ETRRD_AUG)

APW_RRD Planted area of winter season rice in Red River Delta region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_RRD Expected (trend) yield of winter season rice in Red River Delta region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETRRD_JUN Evapotranspiration for June in Red River Delta region
ETRRD_JLY Evapotranspiration for July in Red River Delta region
ETRRD_AUG Evapotranspiration for August in Red River Delta region

5-5-2-3-3. Planted area function of winter season rice in North East region

APW_NE = + 390.12531
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_NE * SHIFT89
- 17.54514 * ln(ETNE_JUN)
+ 74.14840 * ln(ETNE_JLY)
- 35.93520 * ln(ETNE_AUG)
- 33.14568 * ln(ETNE_OCT)

APW_NE Planted area of winter season rice in North East region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_NE Expected (trend) yield of winter season rice in North East region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETNE_JUN Evapotranspiration for June in North East region
ETNE_JLY Evapotranspiration for July in North East region
ETNE_AUG Evapotranspiration for August in North East region
ETNE_OCT Evapotranspiration for October in North East region

5-5-2-3-4. Planted area function of winter season rice in North West region

APW_NW = + 390.12531
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_NW * SHIFT89
- 17.54514 * ln(ETNW_JUN)
- 1.95837 * ln(ETNW_AUG)
- 42.04150 * ln(ETNW_OCT)

APW_NW Planted area of winter season rice in North West region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_NW Expected (trend) yield of winter season rice in North West region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETNW_JUN Evapotranspiration for June in North West region
ETNW_JLY Evapotranspiration for July in North West region
ETNW_AUG Evapotranspiration for August in North West region
ETNW_OCT Evapotranspiration for October in North West region

5-5-2-3-5. Planted area function of winter season rice in North Central region

APW_NC = + 390.12531
- 4.73004 * TREND
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_NC * SHIFT89
+ 0.00179 * RPPDt-1/(NGDPD/100)
*EYW_NC
- 17.54514 * ln(ETNC_JUN)
+ 36.67058 * ln(ETNC_JLY)
- 35.93520 * ln(ETNC_AUG)

APW_NC Planted area of winter season rice in North Central region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_NC Expected (trend) yield of winter season rice in North Central region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETNC_JUN Evapotranspiration for June in North Central region
ETNC_JLY Evapotranspiration for July in North Central region
ETNC_AUG Evapotranspiration for August in North Central region

5-5-2-3-6. Planted area function of winter season rice in South East region

APW_SC = + 390.12531
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_SC * SHIFT89
- 17.54514 * ln(ETSC_JUN)
- 35.93520 * ln(ETSC_AUG)

APW_SC Planted area of winter season rice in South Central region
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_SC Expected (trend) yield of winter season rice in South Central region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETSC_JUN Evapotranspiration for June in South Central region
ETSC_AUG Evapotranspiration for August in South Central region

5-5-2-3-7. Planted area function of winter season rice in Central Highlands region

APW_CH = + 390.12531
- 0.51195 * TREND
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_CH * SHIFT89
- 17.54514 * ln(ETCH_JUN)
- 35.93520 * ln(ETCH_AUG)

APW_CH Planted area of winter season rice in Central Highlands region
TREND Linear time trend 1976=1
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_CH Expected (trend) yield of winter season rice in Central Highlands region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETCH_JUN Evapotranspiration for June in Central Highlands region
ETCH_AUG Evapotranspiration for August in Central Highlands region

5-5-2-3-8. Planted area function of winter season rice in South East region

APW_SE = + 390.12531
+ 1.76444 * TREND
+ 0.00034398 * RPPDt-1/(NGDPD/100)
*EYW_SE * SHIFT89
- 17.54514 * ln(ETSE_JUN)
- 35.93520 * ln(ETSE_AUG)
+ 18.80624 * ln(ETSE_OCT)

APW_SE Planted area of winter season rice in South East region
TREND Linear time trend 1976=1
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_SE Expected (trend) yield of winter season rice in South East region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETSE_JUN Evapotranspiration for June in South East region
ETSE_AUG Evapotranspiration for August in South East region
ETSE_OCT Evapotranspiration for October in South East region

5-5-2-3-9. Planted area function of winter season rice in Mekong River Delta region

APW_MRD = + 1606.51866
(2.21)
- 40.25703*TREND
(-14.62)
- 0.00526 * RPPDt-1/(NGDPD/100))
*EYW_MRD*SHIFT89
(-1.45)
+ 0.00714 * RPPDt-1/(NGDPD/100))
*EYW_MRD
(1.81)
+ 199.47094 * ln(ETMRD_JUN)
(1.67)
- 214.79842 * ln(ETMRD_JUL)
(-1.46)
- 72.42217 * D89
(-2.11)
- 47.92462 * D96
(-1.92)

Adj R^2 = 0.9865 DW = 1.574

APW_MRD Planted area of winter season rice in Mekong River Delta region
TREND Linear time trend 1976=1
RPPDt-1 Retail paddy price lagged (000dong/MT)
NGDPD GDP Deflator
EYW_MRD Expected (trend) yield of winter season rice in

Mekong River Delta region
SHIFT89 Intercept Shift, SHIFT89=1 in 1989 and beyond, zero before
ETMRD_JUN Evapotranspiration for June in Mekong River Delta region
ETMRD_AUG Evapotranspiration for August in Mekong River Delta region
ETMRD_OCT Evapotranspiration for October in Mekong River Delta region

5-5-3. Production identities

5-5-3-1. Production identities of spring season rice

5-5-3-1-1. Production identity of spring season rice in Red River Delta region

QS_RRD = (YS_RRD/10)*APS_RRD
QS_RRD Spring season rice production, Red River Delta (1000 metric tons)
YS_RRD Spring season rice yield, Red River Delta (100kg/hectare)
APS_RRD Spring season rice planted area, Red River Delta (1000 hectares)

5-5-3-1-2. Production identity of spring season rice in North East region

QS_NE = (YS_NE/10)*APS_NE
QS_NE Spring season rice production, North East (1000 metric tons)
YS_NE Spring season rice yield, North East (100kg/hectare)
APS_NE Spring season rice planted area, North East (1000 hectares)

5-5-3-1-3. Production identity of spring season rice in North West region

QS_NW = (YS_NW/10)*APS_NW
QS_NW Spring season rice production, North West (1000 metric tons)
YS_NW Spring season rice yield, North West (100kg/hectare)
APS_NW Spring season rice planted area, North West (1000 hectares)

5-5-3-1-4. Production identity of spring season rice in North Central region

QS_NC = (YS_NC/10)*APS_NC
QS_NC Spring season rice production, North Central Coast (1000 metric tons)
YS_NC Spring season rice yield, North Central Coast (100kg/hectare)
APS_NC Spring season rice planted area, North Central Coast (1000 hectares)

5-5-3-1-5. Production identity of spring season rice in South Central region

QS_SC = (YS_SC/10)*APS_SC
QS_SC Spring season rice production, South Central Coast (1000 metric tons)
YS_SC Spring season rice yield, South Central Coast (100kg/hectare)
APS_SC Spring season rice planted area, South Central Coast (1000 hectares)

5-5-3-1-6. Production identity of spring season rice in Central Highlands region

QS_CH = (YS_CH/10)*APS_CH
QS_CH Spring season rice production, Central Highlands (1000 metric tons)
YS_CH Spring season rice yield, Central Highlands (100kg/hectare)
APS_CH Spring season rice planted area, Central Highlands (1000 hectares)

5-5-3-1-7. Production identity of spring season rice in South East region

QS_SE Spring season rice production, South East (1000 metric tons)
QS_SE = (YS_SE/10)*APS_SE
YS_SE Spring season rice yield, South East (100kg/hectare)
APS_SE Spring season rice planted area, South East (1000 hectares)

5-5-3-1-8. Production identity of spring season rice in Mekong River Delta region

QS_MRD = (YS_MRD/10)*APS_MRD
YS_MRD Spring season rice yield, Mekong Delta (100kg/hectare)
QS_MRD Spring season rice production, Mekong Delta (1000 metric tons)
APS_MRD Spring season rice planted area, Mekong Delta (1000 hectares)

5-5-3-2. Production identities of summer season rice

5-5-3-2-1. Production identity of summer season rice in North Central region

QM_NC = (YM_NC/10)*APM_NC
QM_NC Summer season rice production, North Central Coast (1000 metric tons)
YM_NC Summer season rice yield, North Central Coast (100kg/hectare)
APM_NC Summer season rice planted area, North Central Coast (1000 hectares)

5-5-3-2-2. Production identity of summer season rice in South Central region

QM_SC = (YM_SC/10)*APM_SC
QM_SC Summer season rice production, South Central Coast (1000 metric tons)
YM_SC Summer season rice yield, South Central Coast (100kg/hectare)
APM_SC Summer season rice planted area, South Central Coast (1000 hectares)

5-5-3-2-3. Production identity of summer season rice in Central Highlands region

QM_CH = (YM_CH/10)*APM_CH

QM_CH Summer season rice production, Central Highlands (1000 metric tons)
YM_CH Summer season rice yield, Central Highlands (100kg/hectare)
APM_CH Summer season rice planted area, Central Highlands (1000 hectares)

5-5-3-2-4. Production identity of summer season rice in South East region

QM_SE = (YM_SE/10)*APM_SE
QM_SE Summer season rice production, South East (1000 metric tons)
YM_SE Summer season rice yield, South East (100kg/hectare)
APM_SE Summer season rice planted area, South East (1000 hectares)

5-5-3-2-5. Production identity of summer season rice in Mekong River Delta region

QM_MRD = (YM_MRD/10)*APM_MRD
QM_MRD Summer season rice production, Mekong Delta (1000 metric tons)
YM_MRD Summer season rice yield, Mekong Delta (100kg/hectare)
APM_MRD Summer season rice planted area, Mekong Delta (1000 hectares)

5-5-3-3. Production identities of winter season rice

5-5-3-3-1. Production identity of winter season rice in Red River Delta region

QW_RRD = (YW_RRD/10)*APW_RRD
YW_RRD Winter season rice yield, Red River Delta (100kg/hectare)
QW_RRD Winter season rice production, Red River Delta (1000 metric tons)
APW_RRD Winter season rice planted area, Red River Delta (1000 hectares)

5-5-3-3-2. Production identity of winter season rice in North East region

QW_NE = (YW_NE/10)*APW_NE
QW_NE Winter season rice production, North East (1000 metric tons)
YW_NE Winter season rice yield, North East (100kg/hectare)
APW_NE Winter season rice planted area, North East (1000 hectares)

5-5-3-3-3. Production identity of winter season rice in North West region

QW_NW = (YW_NW/10)*APW_NW
QW_NW Winter season rice production, North West (1000 metric tons)
YW_NW Winter season rice yield, North West (100kg/hectare)
APW_NW Winter season rice planted area, North West (1000 hectares)

5-5-3-3-4. Production identity of winter season rice in North Central region

QW_NC = (YW_NC/10)*APW_NC
QW_NC Winter season rice production, North Central Coast (1000 metric tons)
YW_NC Winter season rice yield, North Central Coast (100kg/hectare)
APW_NC Winter season rice planted area, North Central Coast (1000 hectares)

5-5-3-3-5. Production identity of winter season rice in South Central region

QW_SC = (YW_SC/10)*APW_SC
QW_SC Winter season rice production, South Central Coast (1000 metric tons)
YW_SC Winter season rice yield, South Central Coast (100kg/hectare)
APW_SC Winter season rice planted area, South Central Coast (1000 hectares)

5-5-3-3-6. Production identity of winter season rice in Central Highlands region

QW_CH = (YW_CH/10)*APW_CH
QW_CH Winter season rice production, Central Highlands (1000 metric tons)
YW_CH Winter season rice yield, Central Highlands (100kg/hectare)
APW_CH Winter season rice planted area, Central Highlands (1000 hectares)

5-5-3-3-7. Production identity of winter season rice in South East region

QW_SE = (YW_SE/10)*APW_SE
QW_SE Winter season rice production, South East (1000 metric tons)
YW_SE Winter season rice yield, South East (100kg/hectare)
APW_SE Winter season rice planted area, South East (1000 hectares)

5-5-3-3-8. Production identity of winter season rice in Mekong River Delta region

QW_MRD = (YW_MRD/10)*APW_MRD
QW_MRD Winter season rice production, Mekong Delta (1000 metric tons)
YW_MRD Winter season rice yield, Mekong Delta (100kg/hectare)
APW_MRD Winter season rice planted area, Mekong Delta (1000 hectares)

5-5-3-4. Production identities for regions

5-5-3-4-1. Production identity in Red River Delta region

QT_RRD = QS_RRD + QW_RRD
QS_RRD Spring Season Rice Production, Red River Delta (1000 metric tons)
QW_RRD Winter Season Rice Production, Red River Delta (1000 metric tons)

5-5-3-4-2. Production identity in North East region

QT_NE = QS_NE + QW_NE

QS_NE Spring Season Rice Production, North East (1000 metric tons)

QW_NE Winter Season Rice Production, North East (1000 metric tons)

5-5-3-4-3. Production identity in North West region

QT_NW = QS_NW + QW_NW

QS_NW Spring Season Rice Production, North West (1000 metric tons)

QW_NW Winter Season Rice Production, North West (1000 metric tons)

5-5-3-4-4. Production identity in North Central region

QT_NC = QS_NC + QM_NC + QW_NC

QS_NC Spring Season Rice Production, North Central Coast (1000 metric tons)

QM_NC Summer Season Rice Production, North Central Coast (1000 metric tons)

QW_NC Winter Season Rice Production, North Central Coast (1000 metric tons)

5-5-3-4-5. Production identity in South Central region

QT_SC = QS_SC + QM_SC + QW_SC

QS_SC Spring Season Rice Production, South Central Coast (1000 metric tons)

QM_SC Summer Season Rice Production, South Central Coast (1000 metric tons)

QW_SC Winter Season Rice Production, South Central Coast (1000 metric tons)

5-5-3-4-6. Production identity in Central Highlands region

QT_CH = QS_CH + QM_CH + QW_CH

QS_CH Spring Season Rice Production, Central Highlands (1000 metric tons)

QM_CH Summer Season Rice Production, Central Highlands (1000 metric tons)

QW_CH Winter Season Rice Production, Central Highlands (1000 metric tons)

5-5-3-4-7. Production identity in South East region

QT_SE = QS_SE + QM_SE + QW_SE

QS_SE Spring Season Rice Production, South East (1000 metric tons)

QM_SE Summer Season Rice Production, South East (1000 metric tons)

QW_SE Winter Season Rice Production, South East (1000 metric tons)

5-5-3-4-8. Production identity in Mekong River Delta region

QT_MRD = QS_MRD + QM_MRD + QW_MRD

QS_MRD Spring Season Rice Production, Mekong Delta (1000 metric tons)

QM_MRD Summer Season Rice Production, Mekong Delta (1000 metric tons)

QW_MRD Winter Season Rice Production, Mekong Delta (1000 metric tons)

5-5-3-5. Production identities for rice types

5-5-3-5-1. Production identity of spring season rice

QS = QS_RRD + QS_NE + QS_NW + QS_NC + QS_SC + QS_CH + QS_SE + QS_MRD

QS_RRD Spring Season Rice Production, Red River Delta (1000 metric tons)

QS_NE Spring Season Rice Production, North East (1000 metric tons)

QS_NW Spring Season Rice Production, North West (1000 metric tons)

QS_NC Spring Season Rice Production, North Central Coast (1000 metric tons)

QS_SC Spring Season Rice Production, South Central Coast (1000 metric tons)

QS_CH Spring Season Rice Production, Central Highlands (1000 metric tons)

QS_SE Spring Season Rice Production, South East (1000 metric tons)

QS_MRD Spring Season Rice Production, Mekong Delta (1000 metric tons)

5-5-3-5-2. Production identity of summer season rice

QM = QM_NC + QM_SC + QM_CH + QM_SE + QM_MRD

QM_NC Summer Season Rice Production, North Central Coast (1000 metric tons)

QM_SC Summer Season Rice Production, South Central Coast (1000 metric tons)

QMCH Summer Season Rice Production, Central Highlands (1000 metric tons)

QM_SE Summer Season Rice Production, South East (1000 metric tons)

QM_MRD Summer Season Rice Production, Mekong Delta (1000 metric tons)

5-5-3-5-3. Production identity of winter season rice

QW = QW_RRD + QW_NE + QW_NW + QW_NC + QW_SC + QW_CH + QW_SE + QW_MRD

QW_RRD Winter Season Rice Production, Red River Delta (1000 metric tons)

QW_NE Winter Season Rice Production, North East (1000 metric tons)

QW_NW Winter Season Rice Production, North West (1000 metric tons)

QW_NC Winter Season Rice Production, North Central Coast (1000 metric tons)

QW_SC Winter Season Rice Production, South Central Coast (1000 metric tons)

QW_CH Winter Season Rice Production, Central Highlands (1000 metric tons)

QW_SE Winter Season Rice Production, South East (1000 metric tons)

QW_MRD Winter Season Rice Production, Mekong Delta (1000 metric tons)

5-5-3-6. Production identity for whole country

Q = QS + QM + QW

QS Spring Season Rice Production, Vietnam (1000 metric tons)
QM Summer Season Rice Production, Vietnam (1000 metric tons)
QW Winter Season Rice Production, Vietnam (1000 metric tons)

5-5-3-7. Production identity for milled rice

QME = (1000*Q*0.6667)

QME Total rice production, milled equivalent (metric tons)
Q Total (All Seasons) Rice Production, Vietnam (1000 metric tons)

5-5-4. Rice export function

FEX = - 1626586
(-3.40)
+ 0.15504*QME
(4.26)
+ 605.98133*(WP*NEXGI) / (NGDPD/100)
(2.76)
+327.07807*(WP*NEXGI) / RRPD * SHIFT90
(1.51)
+1325.5420*(WP*NEXGI) / RRPD * SHIFT96
(4.32)
+ 1086048*D99
(3.44)

Adj R^2 = 0.9539 DW = 2.52

QME Rice production (milled equivalent)
WP Thai 35% broken price in $US as reported by USDA
NEXGI Exchange rate
NGDPD Gross Domestic Product Deflator
RRPD Retail rice price(units)
SHIFT90 Intercept Shift, SHIFT90=1 in 1990 and beyond, zero before
SHIFT96 Intercept Shift, SHIFT96=1 in 1996 and beyond, zero before
D99 Dummy variable, D99=1 in 1999, otherwise 0

5-5-5. Rice stock change function

STC = - 263803
(-1.42)
+ 0.55952*(QME-QMEt-1)
(2.89)
-10644*((RRPD/(NGDPD/**100**))-lag(NRRP/(NGDPD/**100**)))*SHIFT96
(-2.43)
+ 2587487*SHIFT01
(6.61)

Adj R^2 = 0.7103 DW = 2.294

QME Rice production (milled equivalent)
RRPD Retail rice price (1000dong/metric tons)
NGDPD Gross Domestic Product Deflator
SHIFT01 Intercept Shift, SHIFT01=1 in 2001 and beyond, zero before

5-5-6. Supply identity

Total supply

QD = QME + IMPME – EXPME – STCME

QD Total supply
QME Total rice production, milled equivalent (metric tons)
IMPME Rice imports, milled equivalent (metric tons)
EXPME Rice exports, milled equivalent (metric tons)
STCME Stock change, milled equivalent (metric tons)

5-5-7. Consumption identity

Consumption per capita

QC = QD / POP / 1000

QC Rice consumption per capita (kilo gram/person)
QD Rice supply (metric tons)
POP Population (million people)

5-5-8. Rice demand function

QC*1000 = 182382
(21.79)
+ 25789*D86
(5.95)
- 18.15899*(RRPD/(NGDPD/100)
(-50.73)
+ 103217*(NGDPRGI/POP)
(2.32)
+ 6609.72483*SHIFT96
(2.26)
- 6252.26201*(Y89+Y90)
(-2.92)

Adj R^2 = 0.9684 DW = 1.877

RRPD Retail rice price (1000dong/metric ton)
NGDPD Gross Domestic Product Deflator
NGDPRGI Gross Domestic Product (real)
POP Population (million person)
D86 Dummy variable, D86=1 in 1986, otherwise 0

5-5-9. Price linkage function

RPME = - 533.20297
(-2.47)
+ 1.47755*RPPD
(30.02)
+ 249.9007*log(TREND)
(2.61)

Adj R^2 = 0.9968 DW = 1.271

RRPD Retail paddy rice price (1000dong/metric ton)
RPME Retail milled rice price (1000dong/metric ton)
TREND Linear time trend 1975=1

Table 5-1. Elasticities of yield of spring season rice for evapotranspiration and trend

Region	Trend	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.
Red River Delta	1.007	-0.106	-0.071	0.157			0.262		-0.374
North East	0.619	-0.154	0.256				0.380		-0.542
North West	0.585	-0.145	0.242				0.360		-0.513
North Central	0.551	-0.137	0.228				0.339		-0.483
South Central	0.524	-0.130	0.217				0.322		-0.459
Central Highlands	0.443	-0.110	0.183		-0.551	0.585	0.272		-0.388
South East	0.539	-0.134	0.223				0.331		-0.472
Mekong River Delta	0.230	0.009	0.158				0.234		-0.334

Table 5-2. Elasticities of yield of summer season rice for evapotranspiration and trend

Region	Trend	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
North Central	0.852	0.096				-1.184	-0.985	1.556	-0.291
South Central	0.225	0.066							-0.199
Central Highlands	0.384	0.473		3.991				-4.212	-1.327
South East	0.073	0.083							-0.252
Mekong River Delta	0.121	0.075							-0.229

Table 5-3. Elasticities of yield of winter season rice for evapotranspiration and trend

Region	Trend	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Red River Delta	0.613		1.041	-0.262	1.342		-0.247
North East	0.579				0.326		-0.082
North West	0.453		0.339	-0.445	0.453		
North Central	0.553				0.410	0.558	-0.248
South Central	0.338	-0.716		-0.809	0.339	0.314	
Central Highlands	0.416	-0.070			0.416		
South East	0.080			0.653	-0.276		
Mekong River Delta	0.315				0.316		

Table 5-4. Elasticities of planted area of spring season rice

Region	Trend	Price (t-1)	ET	
			Jan.	Feb.
Red River Delta		0.035		
North East		0.060	0.050	
North West		0.065		
North Central		0.015		
South Central		0.030		
Central Highlands		0.193		
South East		0.445	1.045	
Mekong River Delta	0.305	0.040	0.091	0.059

Table 5-5. Elasticities of planted area of summer season rice

Region	Trend	Price (t-1)	ET May	ET Jun.	ET Jly.	ET Aug.
North Central		0.164			-0.419	
South Central		0.044			0.064	
Central Highlands		3.689			-31.94	
South East		-0.027	0.375		-0.527	3.087
Mekong River Delta	1.316	0.063	0.338			

Table 5-6. Elasticities of planted area of winter season rice

Region	Trend	Price (t-1)	ET Jun.	ET Jly.	ET Aug.	ET Sep.	ET Oct.
Red River Delta		0.030	-0.029	0.157	-0.060		
North East		0.007	-0.051	0.216	-0.105		-0.096
North West		0.015	-0.158		-0.018		-0.379
North Central	-0.339	0.062	-0.072	0.150	-0.147		
South Central		0.016	-0.122		-0.250		
Central Highlands	-0.066	0.014	-0.130		-0.265		
South East	0.118	0.008	-0.067		-0.138		0.072
Mekong River Delta	-0.828	0.036	0.234	-0.252			

5-6. Simulation results

5-6-1. Results of estimation of yield functions

Table 5-1 through Table 5-3 show elasticities of yield for ET of spring, summer, and winter season rice respectively.

The planting of spring season rice occurs from December to February and harvesting occurs from June to July. The planting and harvest time of summer season rice is May to June and September to October. The summer season rice is cultivated only in southern regions because typhoons hit the northern regions during the harvesting period. Winter season rice follows spring season rice in the northern regions, and planting occurs during June to July and harvest time is September to October.

The estimation results for spring season rice show that higher ET in January and May leads higher yield. These results suggest that water supply during the planting and flowering period is important for the growth of spring season rice, and if water supply decreases 1% in May in Mekong River Delta region, yield will decrease 0.234%. The results of summer rice show that higher ET in March leads higher yield. The water supply during the flowering season is not as critical due to high precipitation in July and August. The results for winter season rice show that higher ET in September, which is the flowering time, is important for the growth of the rice, and if ET decreases 1% in September in Red River Delta region, yield will decrease 1.342%.

5-6-2. Results of estimation of planted area functions

Planted area function of spring, summer, and winter season rice are specified as linear functions based on a naïve expectation model. The explanatory variables are time trend, one-year lagged price, and current ET for each month. The elasticities evaluated at the average are shown in Table 5-4 through Table 5-6.

The elasticities of planted area of spring season rice for ET are null in most regions; however, in the South East region it is quite sensitive, i.e., if ET increases 1% in January in the region, the planted area will increase 1.045%. The elasticities of planted area of summer rice for ET in May in Southern regions are high. These results suggest that if the water supply increases during the planting season of spring and summer season rice, the planted area will increase in southern regions. Results for winter season rice differ from other two season rices. The elasticities of planted area of winter season rice for ET are negative in June and August. These results suggest that the excess supply of water during the rainy season will decrease the planted area of winter season rice.

5-6-3. Simulation results of supply and demand model

The simulation term is from 2003 to 2015. The assumptions of the simulation are as follows; (1) the growth value of GDP deflator for the simulation period is the average annual growth between 1999 and 2004, (2) the growth value of real GDP is the average annual growth between 1996 and 2003, (3) the growth value of the exchange rate is the average annual growth between 1998 and 2004, (4) the growth value of population is the average annual growth between 1996 and 2003, (5) the linear trend of the yield functions are continued, (6) the trend of planted area functions are flat.

Figure 5-3 and Figure 5-4 show the simulation results for the production of spring and summer season rices in Mekong River Delta region, and Figure 5-5 through Figure 5-7 show the simulation results of the production of spring, summer, and winter season rices for the country as a whole.

The production of spring rice in Mekong River Delta region will increase 524 thousand metric tons (MT) from 2010 to 2015. On the other hand, the production of summer rice in the region will be stable at around 7.5 million MT (mMT). Summer rice production in the Mekong River Delta region drastically increased from 7.7 mMT in 2003 to 8.6 mMT in 2004; however, the model did not follow the change.

The production of spring, summer, and winter season rice will increase 1.6 mMT, 0.4 mMT, and 0.9 mMT respectively.

Figure 5-8 shows per capita rice consumption, and it will be stable around 200 kilogram (KG) Figure 5-9 shows the simulation result of the equilibrium real price. These prices are converted to real currency units using a CPI whose value is 100 in 1989. The farm price is estimated to be stable at around 200 thousand Dong per KG.

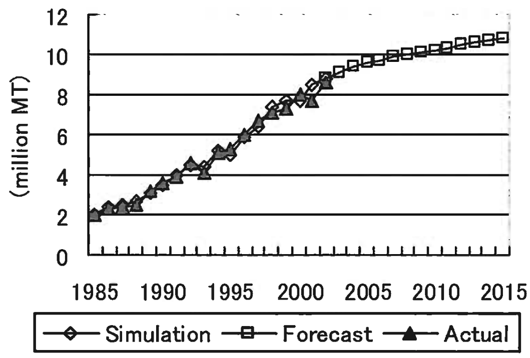

Fig. 5-3. Production of spring season rice in Mekong River Delta region

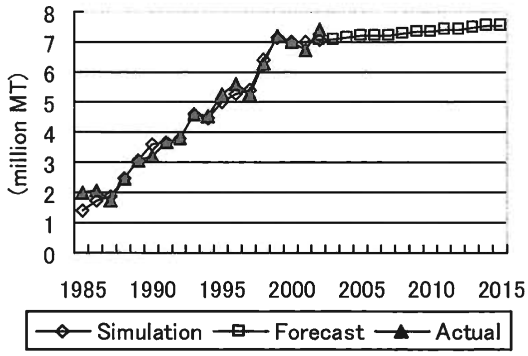

Fig. 5-4. Production of summer season rice in Mekong River Delta region

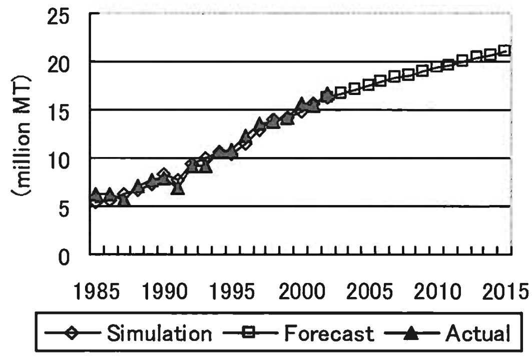

Fig. 5-5. Production of spring season rice for whole country

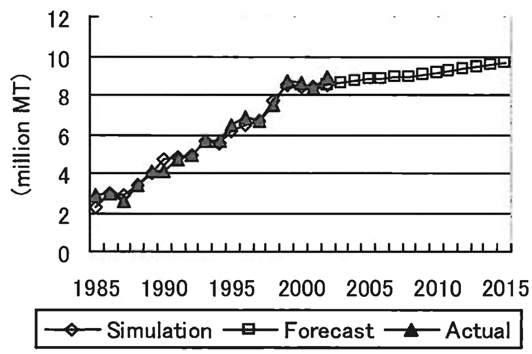

Fig. 5-6. Production of summer rice for whole country

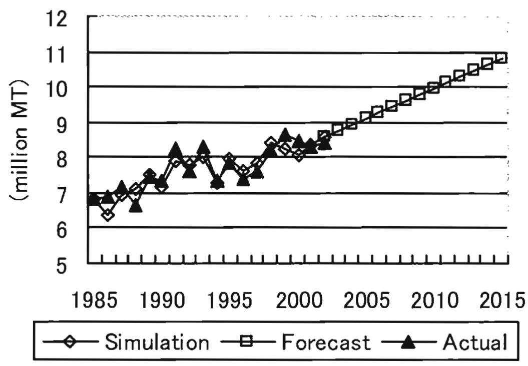

Fig. 5-7. Production of winter rice for whole country

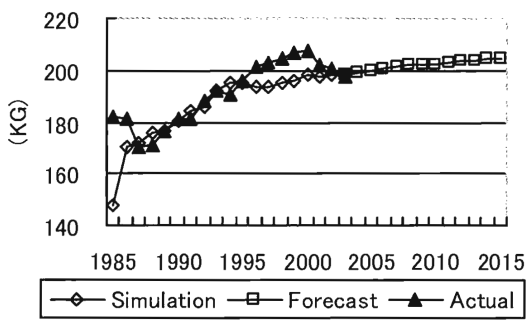

Fig. 5-8. Per capita consumption

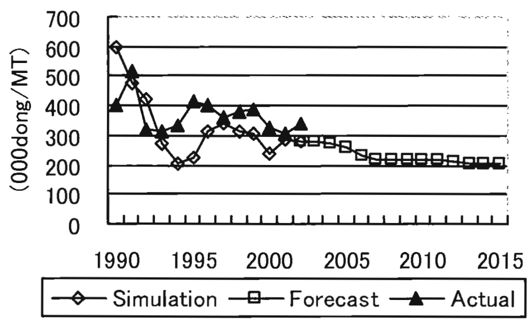

Fig. 5-9. Realized retail price (base year: 1989)

5-7. Conclusions

The supply and demand model presented can analyze changes in yield and planted area independently and consider supply responses and demand changes to the market price for rice while equating supply and demand. The baseline analysis indicates that productions of all season rice steadily increases due to an increase in yield. The planted area for the country as a whole has been decreasing in recent years and is a trend that is expected to continue in the outlook.

The cold weather and the insect disease outbreak in Vietnam are significant contributors to the sharp increase in the world price of rice in 2008. Not only high yield but climate change tolerant varieties of rice are necessary for stable rice farm management.

Chapter 6
Development of the Rice Econometric Model with Endogenous Water in Lower Mekong Countries (REMEW-MEKONG)

6-1. Introduction

Land, labor, and capital are three main inputs for agricultural economic analyses, and though it is often disregarded in econometric analysis, water is one of important inputs for crop production. Climate change caused by global warming may lead to the activation of the water cycle and expanded fluctuations of the water supply to cultivated land. Accounting for problems caused by changes of water accounting, researchers of hydrology and climatology have analyzed relationships between changes in the global water cycle and crop production. The changes will affect not only the supply of crops but also the demand prices change in the market. Therefore, econometric analyses related to water cycle changes are important to aid the design of agricultural policy.

A supply and demand model for rice in the lower Mekong river countries i.e., Laos, Cambodia, Thailand, and Vietnam, which includes among other factors evapotranspiration as a water supply variable impacting regional yields and planted areas, is developed to aid in the design of agricultural policies and planning. Impacts are analyzed deterministically by drawing on regional data and maps for relationship between water cycle changes and production of rice considering local rice markets.

6-2. Model

Supply and demand models for rice in Laos, Cambodia, Thailand, and Vietnam which includes a water supply variable are developed. Planted area, yield, and production for each province or region can be analyzed with these models. Monthly evapotranspiration (ET) is used as an explanatory variable, which is a proxy for available water supplies in yield and planted area functions. Models of Laos and Cambodia are provincial models, the model of Vietnam is a regional model, and the model of Thailand can analyze production for each province in the North-East region, but the other provinces are aggregated into three regions. Areas of province are close to those of small river basins, thus, it is sufficient to analyze the impacts of water cycle changes for the Mekong River basin. Models of these four countries are developed independently and the world price of rice is exogenous for Laos, Cambodia, and Vietnam. These four models are jointed through the world price, i.e., retail price of rice in Thailand. Figure 6-1 shows the relationship among these supply and demand models of rice in the four countries.

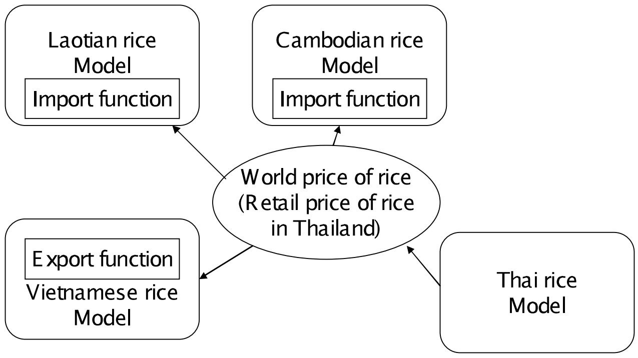

Fig. 6-1. Flowchart of REMEW-MEKONG

6-2-1. Supply and demand model of rice in Lao PDR

The supply and demand model for rice in Laos consists of yield functions, planted area functions, production identities, supply identities, an import function, a stock change function, a demand function, and a price linkage function. There are seventeen provinces and three cultivation types, i.e., wet season rice, dry season rice, and upland rice. Yield and planted area functions of wet season and upland rice are estimated for each province and those of dry season rice are estimated for the main provinces such as Vientiane and Savannakhet provinces and aggregate regions. The generalized forms of these functions are as follows:

Yield function of wet season:

$LYW^{i} = f_{LYW}\,(T, LETMAY^{i}_{,t}, \dots , LET_{NOV}{}^{i}_{,t}),$ (6-1)

Planted Area function of wet season:

$LYW^{i}_{t} = f_{LAW}\,(LAW^{i}_{,t\text{-}1}, LFP_{t\text{-}1}, LET_{MAY}{}^{i}_{,t\text{-}1}, \dots, LET_{NOV}{}^{i}_{,t\text{-}1}),$ (6-2)

Production of wet season:

$LQW^{i} = LYW^{i}LAW^{i}$, LQW = ${}_{i}LQW^{i}$, (6-3)

Yield function of dry season:

$LYD^{i} = f_{LYD}\,(T, LET_{NOV}{}^{i}_{,t\text{-}1}, \dots , LET_{MAY}{}^{i}_{,t}),$ (6-4)

Planted Area function of dry season:

$LAD^{i}_{t} = f_{LAD}\,(LAD^{i}_{,t\text{-}1}, LFP_{t\text{-}1}, LET_{NOV}{}^{i}_{,t\text{-}2}, \dots , LET_{MAY}{}^{i}_{,t\text{-}1}),$ (6-5)

Production of dry season:

$LQD^{i} = LYD^{i}LAD^{i}$, $LQD = {}_{i}LQD^{i}$, (6-6)

Yield function of upland:

$LYU^{i} = fLYU\,(T, LET_{MAY}{}^{i}, \dots , LET_{NOV}{}^{i}),$ (6-7)

Planted Area function of upland:
$LAU^i_t = f_{LAU}\,(LAU^i_{,t\text{-}1}, LFP_{t\text{-}1}, \ln LET^{\ i}_{MAY\ ,t\text{-}1}, \dots ,$
$\ln LET^{\ i}_{NOV\ ,t\text{-}1}),$ (6-8)
Production of upland:
$LQU^i = LYU^i LAU^i\ , LQU = \ {}_i LQU^i,$ (6-9)
Total production:
$LQ = 0.667(LQW + LQD + LQU),$ (6-10)
Import function:
$LIMP = f\,(WP{*}LEXR, \mathbf{LQ}),$ (6-11)
Stock change function:
$LSTC = f_{LSTC}\,(LFP_{t,t\text{-}1}, LQ_{t,t\text{-}1}),$ (6-12)
Total supply:
$LQS = LQ + LIMP - LSTC,$ (6-13)
Demand function:
$LQS/LPOP = f_{LQS}\,(LRP, LGDP/LPOP),$ (6-14)
Price linkage function:
$LFP = f_{LFP}\,(LRP),$ (6-15)
where *i* is the province, *t* denotes that the data are measured at time *t*, *T* is time trend, LET_{MAY} through LET_{NOV} are evapotranspiration values for May through November, *LYW*, *LAW*, and *LQW* are yield, planted area, and production of wet season rice, *LYD*, *LAD*, and *LQD* are yield, planted area, and production of dry season rice, *LYU*, *LAU*, and *LQU* are yield, planted area, and production of upland rice, *LQ* is total production in milled equivalent, *LIMP* is imports, *LSTC* is the annual change in stocks, *LPOP* is population, *LGDP* is gross domestic products, *WP* is the world price of rice (Thailand, 5% broken, FOB), *EXR* is exchange rate, *LFP* is the producer price of rice, and *LRP* is the retail price of rice. All functions are specified as linear functions.

6-2-2. Supply and demand model of rice in Cambodia

The structure of the supply and demand model for rice in Cambodia is same as that of the Lao model. There are twenty two provinces and two cultivation types, i.e., wet and dry season rice. Yield and planted area functions for the wet season are estimated for each province and those for the dry season are estimated for twelve provinces where irrigated fields exist. The generalized forms of these functions are as follows:

Yield function of wet season:
$CYW^i = f_{CYW}\,(T, CET^{\ i}_{MAY\ t}, \dots , CET^{\ i}_{JLY\ t}),$ (6-16)
Planted Area function of wet season:
$CAPW^i_t = f_{CAPW}\,(CAPW^i_{t\text{-}1}, CFP_{t\text{-}1}, CET^{\ i}_{MAY\ t,t\text{-}1},$
$CET^{\ i}_{JUN\ t,t\text{-}1})$ (6-17)
Harvested area of wet season:
$CAHW^i_t = CAPW^i_t - CABW^i_t$
$= CAPW^i_t(1\text{-}CRABW^i_t)$ (6-18)
Production of wet season:
$CQW^i = CYW^i CAHW^i\ ,$
$CQW = \ {}_i CQW^i,$ (6-19)
Yield function of dry season:
$CYD^i = f_{CYD}\,(T, CETJAN^i_t, \dots , CET^{\ i}_{MAY\ t}),$ (6-20)
Planted Area function of dry season:
$CAPD^i_t = f_{CAPD}\,(CAPDi_{t\text{-}1}, CFP_{t\text{-}1}, \ln CET^{\ i}_{DEC\ t\text{-}1,t\text{-}2},$
$\ln CET^{\ i}_{JAN\ t,t\text{-}1})$ (6-21)
Harvested area of dry season:
$CAHD^i_t = CAPD^i_t - CABD^i_t$
$= CAPD^i_t(1\text{-}CRABD^i_t)$ (6-22)
Production of dry season:
$CQD^i = CYD^i CAHD^i\ , CQD = \ {}_i CQD^i_t,$ (6-23)
Total production:
$CQ = 0.667(CQW + CQD),$ (6-24)
Import function:
$CIMP = f_{CIMP}\,(WP{*}CEXR, CQ),$ (6-25)
Stock change function:
$CSTC = f_{CSTC}\,(CFP_{t,t\text{-}1}, CQ_{t,t\text{-}1}),$ (6-26)
Total supply:
$CQS = CQ + CIMP - CSTC,$ (6-27)
Demand function:
$CQS/CPOP = fCQS\,(CFP, CGDP/CPOP),$ (6-28)
where *i* is the province, *t* denotes that the data are measured at time *t*, *T* is a time trend, $CET^{\ i}_{JAN}$ through $CET^{\ i}_{DEC}$ are evapotranspiration values for January through December, *CYW*, *CAPW*, *CAHW*, *CABW*, and *CQW* are yield, planted area, harvested area, abandoned area, and production of wet season rice, *CYD*, *CAPD*, *CAHD*, *CABD*, and *CQD* are yield, planted area, harvested area, abandoned area, and production of dry season rice, *CQ* is total production, *CIMP* is imports, *CEXP* is exports, *CSTC* is the annual change of stocks, i.e., ending stock minus beginning stock, *CQS* is total supply, *CPOP* is population, *CGDP* is gross domestic products, *CEXR* is the exchange rate, *WP* is the world price of rice (Thailand, 5% broken, FOB), *FP* is the producer price. All functions are specified as linear functions.

The planted area functions are specified based on an adaptive expectation model and ET is exogenous for the Cambodian model. In this case, ET takes both current and lagged values. On the other hand, it is assumed that ET is the expected value in the planted area function of the Lao model, and ET takes only the lagged value similar to the use of the lagged farm price. Laos is located further up in the drainage of the Mekong River basin than is Cambodia, and more accurate forecasting of water supply changes in the upper region may be required by farmers than in the lower region. Therefore, ET is expected variable in Laotian model and exogenous variable in Cambodian model.

Planted area differs from harvested area by abandoned or damaged area. Data of the retail price of rice is not available; therefore, the farm price is used in the demand function.

6-2-3. Supply and demand model of rice in Thailand

The supply and demand model of rice in Thailand focuses on the North-East region because the region is part of the Mekong River basin which this modeling effort focuses on. Yield and planted area functions are estimated for each province in the North-East region and those in the North, Central, and South regions are estimated as regional aggregates. There are nineteen provinces in the North East region. There are two cultivation types, i.e., main season or rainy season and second season or dry season cultivations. The generalized forms of the model are as follows:

Yield function of main season:

$TYW^i = f\,(T, TET^i_{MAR\,t}, \ldots , TET^i_{DEC\,t})$, (6-29)

Planted Area function of main season:

$TAPW^i_t = f\,(TAPW^i_{t\text{-}1}, TFP_{t\text{-}1}, TET^i_{MAR\,t\text{-}1}, \ldots ,$
$TET^i_{DEC\,t\text{-}1})$ (6-30)

Harvested area of main season:

$TAHW^i_t = TAPW^i_t - TABW^i_t = TAPW^i_t(1\text{-}TRABW^i_t)$ (6-31)

Production of main season:

$TQW^i = TYW^iTAHW^i\ , TQW = \ _iTQW^i$, (6-32)

Yield function of second season:

$TYD^i = f\,(T, TET^i_{NOV\,t\text{-}1}, \ldots , TET^i_{JUN\,t})$, (6-33)

Planted Area function of second season:

$TAPD^i_t = f\,(TAPD^i_{t\text{-}1}, TFP_{t\text{-}1}, TET^i_{NOV\,t\text{-}2}, \ldots ,$
$TET^i_{JUN\,t\text{-}1})$ (6-34)

Harvested area of second season:

$TAHD^i_t = TAPD^i_t - TABD^i_t = TAPD^i_t\ (1\text{-}TRABD^i_t)$ (6-35)

Production of second season:

$TQD^i = TYD^iTAHD^i\ , TQD = \ _iTQD^i_t$, (6-36)

Total production:

$TQ = 0.667(TQW + TQD)$, (6-37)

Export function:

$TEXP = f\,(T, TQ)$, (6-38)

Stock change function:

$TSTC = f\,(T, TFP_{t,t\text{-}1}, TQ_{t,t\text{-}1})$, (6-39)

Total supply:

$TQS = TQ + TIMP - TEXP - TSTC$, (6-40)

Demand function:

$TQS/TPOP = f\,(TRP, TGDP/TPOP)$, (6-41)

Price linkage function:

$TFP = f\,(TRP)$, (6-42)

where i is the province in the North-East region and that of region in other regions, t denotes that the data are measured at time t, T is a time trend, TET_{JAN}^i through TET_{DEC}^i are evapotranspiration values for January through December, *TYW*, *TAPW*, *TAHW*, *TABW*, and *TQW* are yield, planted area, harvested area, abandoned area, and production of main season rice, *TYD*, *TAPD*, *TAHD*, *TABD*, and *TQD* are yield, planted area, harvested area, abandoned area, and production of second season rice, *TQ* is total production, *TIMP* is imports, *TEXP* is exports, *TSTC* is the annual change of stocks, i.e., ending stock minus beginning stock, *TQS* is total supply, *TPOP* is population, *TGDP* is gross domestic products, *TEXR* is exchange rate, *TFP* is the producer price, *TRP* is the retail price. The retail price is fed to the other three countries' models through price linkage functions. "Bangkok 5% broken" is fed to in the Laotian and Cambodian models and "Bangkok 35% broken" is fed to the Vietnamese model. All functions are specified as linear functions.

6-2-4. Supply and demand model of rice in Vietnam

The model in Vietnam is divided into eight regions for supply and the basic structure of the model is same as those of other countries. There are three types of cultivation, i.e., spring, summer, and winter season rice. Spring season rice transplanting occurs in December and the harvest occurs during April and May. For summer season rice transplanting occurs from May to June and harvesting from September to October. Finally, transplanting of winter season rice occurs in September to October and harvesting occurs in December in the Mekong Delta region. Spring and Summer rice are cultivated in irrigated fields as a two season crop and winter rice is cultivated in rain-fed fields as a single season crop. The generalized forms of the supply and demand model of rice are as follows:

Yield function of spring season:

$VYS^i = f\,(T, VET^i_{DEC\,,t\text{-}1}, \ldots , VET^i_{JLY\,,t})$, (6-43)

Planted Area function of spring season:

$VAS^i_t = f\,(VFP_{t\text{-}1}, VEYS^i_t, VET^i_{JAN\,t})$, (6-44)

Planted Area function of spring season in the Mekong River Delta region:

$VAS^{MRD}_t = f\,(T, VASMRD_{t\text{-}1}, VFP_{t\text{-}1}, VEYSMRD_t,$
$VET^i_{JAN\,t}, VET^i_{FEB\,t})$, (6-45)

Production of spring season:

$VQS^i = VYS^iVAS^i\ , VQS = \ _iVQS^i$, (6-46)

Yield function of summer season:

$VYMi = f\,(T, VET^i_{MAR\,,t}, \ldots , VET^i_{OCT\,,t})$, (6-47)

Planted Area function of summer season:

$VAM^i_t = f\,(VFP_{t\text{-}1}, VEYM^i_t, VET^i_{JAN\,t}, \ldots ,$
$VET^i_{AUG\,t})$ (6-48)

Planted Area function of summer season in the Mekong Delta region:

$VAM^{MRD}_t = f\,(T, VFP_{t\text{-}1}, VEYM^{MRD}_t, VET^i_{MAY\,t})$, (6-49)

Production of summer season:

$VQM^i = VYM^iVAM^i\ , VQM = \ _iVQM^i$, (6-50)

Yield function of winter season:

$VYW^i = f\,(T, VET^i_{JUN\,,t\text{-}1}, \ldots , VET^i_{NOV\,,t})$, (6-51)

Planted Area function of winter season:

$VAW^{i}_{t} = f\,(T, VFP^{i}_{,t\text{-}1}, VEYW^{i}_{t}, VET_{JUN\,t}^{\;i}, \ldots ,$
$VET_{OCT\,t}^{\;i})$ (6-52)

Planted Area function of winter season in the Mekong River Delta region:

$VAWMRD^{i} = f\,(T, VFP_{t\text{-}1}, VEYW_{MRD}^{\;i}, VET_{JUN}^{\;i}{}_{t},$
$VET_{JLY}^{\;i}{}_{t}),$ (6-53)

Production of winter season:

$VQW^{i} = VYW^{i}VAW^{i}\ , VQW = \quad {}_{i}VQW^{i},$ (6-54)

Total production:

$VQ = 0.667(VQS + VQM + VQW),$ (6-55)

Export function:

$VEXP = f\,(WP{*}VEXR, VQ),$ (6-56)

Stock change function:

$VSTC = f\,(VFP_{t,t\text{-}1}, VQ_{t,t\text{-}1}),$ (6-57)

Total supply:

$VQS = VQ + VIMP - VEXP - VSTC,$ (6-58)

Demand function:

$VQS/VPOP = f\,(VRP, VGDP/VPOP),$ (6-59)

Price linkage function:

$VFP = f\,(VRP),$ (6-60)

where *i* is the region, *t* denotes that the data are measured at time *t*, *T* is a time trend, $VET_{JAN}^{\;i}$ through $VET_{DEC}^{\;i}$ are evapotranspiration values for January through December, *VYS*, *VAS*, *VEYS*, and *VQS* are yield, planted area, expected yield, and production of spring season rice, *VYM*, *VAM*, *VEYM*, and *VQM* are yield, planted area, expected yield, and production of summer season rice, *VYW*, *VAW*, *VEYW*, and *VQW* are yield, planted area, expected yield, and production of winter season rice, *VQ* is total production, *VIMP* is imports, *VEXP* is exports, *VSTC* is the annual change of stocks, i.e., ending stock minus beginning stock, *VQS* is total supply, *VPOP* is population, *VGDP* is gross domestic products, *VEXR* is exchange rate, *VWP* is the world price of rice (Thailand, 35% broken, FOB), *VFP* is the producer price, *VRP* is the retail price. All functions are specified as linear functions.

The planted area function is based on the naïve expectation model because Mekong Delta region, where is the main production region, locates in lower Mekong River. Water harvesting and forecasting of water supply changes in lower regions are easier than those in upper regions, therefore the planted area functions of the Vietnamese model take a simpler form than those of the Laotian and Cambodian models.

The number of functions of the Laotian, Cambodian, Vietnamese, and Thai rice models are 78, 65, 46, and 80 respectively, i.e., total 269 functions. The number of identities of these models are 43, 36, 36, and 45 respectively, i.e., total 160 identities.

6-3. Data

6-3-1. Evapotranspiration

Evapotranspiration is used as a water supply variable for crops. The ET for a basin is obtained from the following identity:

ET = Irrigation + Rainfall + Capillary rise
+ Subsurface flow in – Runoff
– Deep percolation – Subsurface flow out
(6-61)

The equation suggests that ET is equivalent to the available water for crops, then, it is used as a water variable in the model of this study. However, if the target region is large such as a entire country, the cost of the survey will be very high. Therefore, the ET is approximately calculated from climatologic data have been presented over fifty years. The actual ET (*ETa*) is equal to the reference ET (*ETo*) times the crop coefficient (*Kc*) and the stress coefficient (*Ks*). The estimation method of ETo of IMPACT-WATER, as applied in the IFPRI world food model which was the first world food model to consider water accounting, is the Penman method (Doorenbos and Kassam [2]), however, Penman-Monteith method (Allen et al. [1]) which considers aerodynamics of leaves is used for calculating ET in our study. Ishigooka *et al*. [5] provides the ET data for every province and month. The climatic data for the calculation are 0.5 degree grid data and these are averaged for each province.

6-3-2. Data of Laotian rice model

The time series data for production and planted area for each province is provided by the Department of Planning in the Ministry of Agriculture and Forestry of Laos. The farm price for rice is obtained from FAO-STAT and the retail price of rice is obtained from the National Statistics Center of the Committee for Planning and Cooperation of Laos. These prices are a national average prices for Laos. Consumer Price Index (CPI), GDP, and population are from the Asian Development Bank (ADB) and the exchange rate and the world price of rice are data from the IMF. The estimation period for yield, planted area, import, stock change, and demand functions is from 1980 to 2000 which starts in the earliest available year for CPI and ends in the last year of available ET values.

6-3-3. Data of Cambodian rice model

Availability of statistics on rice production in Cambodia is limited, as the nation was a planned economy until 1993 following the Pol Pot regime from 1976 to 1979. Data on rice production which is divided into wet and dry season are available from 1995. The short data period, along with data quality, is one of restrictions in estimating and validating the supply and demand model of rice. The time series data for production, planted area, and harvested area for the two seasons of rice production for each province are provided by the Department of Planning, Statistics and International Cooperation in the Ministry of Agriculture, Forestry and Fisheries of Cambodia. The farm price for rice is obtained from FAO-STAT and the price is a national average for Cambodia. CPI, GDP, and population are from the ADB and exchange rate and the world price of rice (Bangkok broken 5%, FOB) are numbers from IMF. The production data are available from 1995, and the yield and planted area functions are estimated using pooled data from 1995 to 2000 for each province. Import, stock, and demand functions are estimated using time series data which are available from 1983 to 2001. The yield and planted area functions of both seasons are not estimated for each province due to the lack of time series data, parameters are obtained by estimating one function which includes provincial dummies using pooled data for nineteen provinces over six years. The estimation periods of these yield and planted area functions are from 1995 to 2000 which starts in the earliest available year for statistics of production of the two seasons and ends in the last year of available ET values.

6-3-4. Data of Thai rice model

The time series data for production and planted area of the two types of rice cultivations for each province is provided by the Center for Agricultural Information at the Office of Agricultural Economics of the Ministry of Agriculture and Co-operatives of Thailand. The farm price for rice is obtained from FAO-STAT and the retail price of rice is obtained from the IRRI, which is available from 1961 to 1997 and then carries the same values forward after 1997. These prices are a national average for Thailand. CPI, GDP, and population are from the ADB and the exchange rate and the world price of rice are numbers from the IMF. The estimation period for yield and planted area functions for each province in the North East region and aggregated other regions, imports, stock change, and demand functions for the whole country are from 1982 to 2000 which starts in the earliest available year for statistics of production and ends in the last year of available ET values.

6-3-5. Data of Vietnamese rice model

The time series data for each region for production and planted area of the three types of rice cultivation is provided by the General Statistics Office of the Statistical Publishing House of Vietnam. The farm price for rice is obtained from FAO-STAT and the retail price of rice is obtained from the USDA. These prices are a national average for Vietnam. GDP, GDP deflator and population are from the ADB and the exchange rate and the world price of rice are data from the IMF. The estimation period for the yield and planted area functions in the Mekong Delta region, imports, stock change, and demand functions for whole country are from 1985 to 2000 which starts in the earliest available year for GDP deflator and ends in the last year of available ET values. Functions for yield and planted area in seven regions outside the Mekong Delta region are estimated using pooled data from 1985 to 2000.

6-4. Results and simulation

The simulation term is from 2001 to 2015. The assumptions of the simulation are as follows; (1) the growth value of population is the average annual growth between 1996 and 2003, (2) the growth value of real GDP is the average annual growth between 1996 and 2003, (3) the growth value of exchange rate is the average annual growth between 1999 and 2004, (4) the assumed growth value of deflators such as CPI is the average annual growth between 1998 and 2000, (5) monthly ET values are the average values for each month between 1998 and 2000, (6) the linear trend of the yield functions are continued, (7) the linear trend of area functions takes same numbers of the 2000 during the simulation period. The results of simulations in Laos and Cambodia are reported in Furuya and Meyer [3] and Furuya and Meyer [4].

Evaluating affects of water supply changes on the rice market, a scenario to decrease the ET value by 20% in 2014 and 2015 are contrasted with the baseline case showing a decreasing rate of yield and planted area in the wet season and dry season. Results of wet season cultivation in Laos and Cambodia, winter season cultivation in Vietnam, and the main rice cultivation in Thailand are classified as wet season cultivation in the results, and results of dry season cultivation in Laos and Cambodia, spring season cultivation in Vietnam, and second rice cultivation in Thailand are classified as dry season cultivation in this simulation.

Figure 6-2 and Figure 6-3 show the impacts of decrease by 20% of ET values in May and June on yield of wet season cultivation in 2015. The yield will decrease in the region in correlation to the degree of shading and yield will increase in the region where the color is white. These figures suggest that if the water supply in May decreases, the yield of wet season rice will decrease dramatically in the south and west part of the Indochina peninsula, and if the water supply in June decreases, yield of wet season rice will increase in the southern part of the peninsula. The water supply in May greatly affects the yield of wet season rice in the southern part of the region which is centered on Cambodia.

Figure 6-4 and Figure 6-5 show the impacts of 20% decrease in the ET value in May and June on the planted area. Note that the planted area of the following year will increase when the current price of rice increases. These figures suggest that if the water supply in May decreases, planted area will increase in the western side of the Annamite Mountains and will decrease around the Kholat Plateau. On the other hand, if the water supply in June decreases, planted area will decrease in the Mekong Delta region. These results indicate that abundant water supplies in May leads to an expansion of planted area in regions of the middle section of the Mekong River basin and a water shortage in June leads to a decrease in planted area in the lower section of the river.

Figure 6-6 and Figure 6-7 show the impacts of 20% decrease in the ET in November and December on rice yields in the dry season. These figures suggest that if the water supply decreases in November, yield will dramatically decrease in the eastern part of the Indochina peninsula and increase in the north central part of the region. Alternatively, if the water supply decreases in December, yield will decrease in the north central portion. Impacts of water supply changes on yield are intricate in the North East region in Thailand and the North region in Lao and rice cultivation in these regions are probably vulnerable to water cycle changes.

Figure 6-8 and Figure 6-9 show the impacts of a 20% decrease in the ET value in November and December on the planted area of rice in the dry season. These figures suggest that if the water supply decreases in November, farmers in west part of the region will increase their planted area because an increase in the price farmers receive for their rice will encourage them to try to expand their production. If the water supply decreases in December, the planted area will decrease around the Kholat Plateau.

There are some regions where the planted area increases when the water supply decrease in the planting season. This is probably because the water supply may be in excess in these regions and a decrease in the supply of water will move the accumulated supply of water closer to optimum amounts. Note that the planted area responds to the price of rice and if productions in other regions decrease, farmers in the region will increase their planted area in the following year. Results of the model provide not only impacts of water supply changes on the production per area, but also clearly show impacts of it through the rice market on the total production.

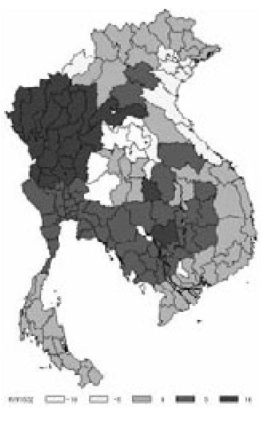

Fig. 6-2. Impact of ET changes in May on yield in the wet season

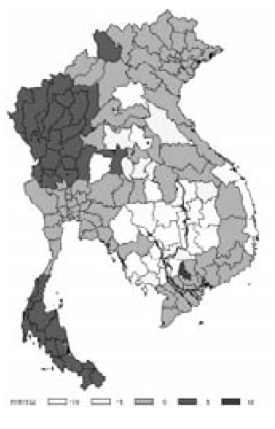

Fig. 6-3. Impact of ET changes in June on yield in the wet season

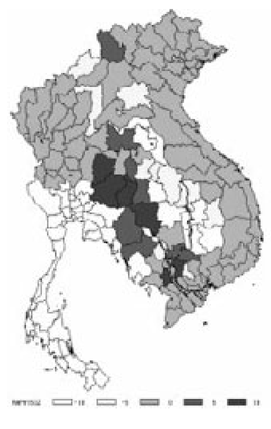

Fig. 6-4. Impact of ET changes in May on planted area in the wet season

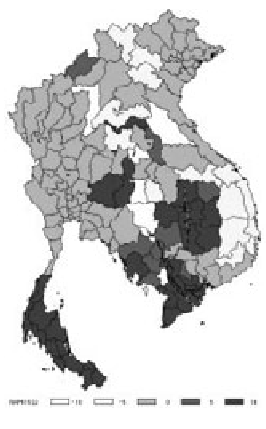

Fig. 6-5. Impact of ET changes in June on planted area in the wet season

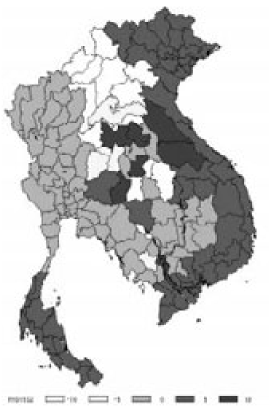

Fig. 6-6. Impact of ET changes in November on yield in the dry season

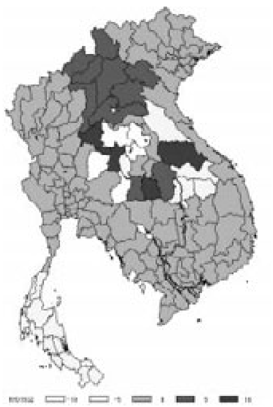

Fig. 6-7. Impact of ET changes in December on yield in the dry season

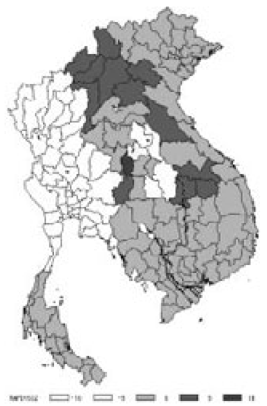

Fig. 6-8. Impact of ET changes in November on planted area in the dry season

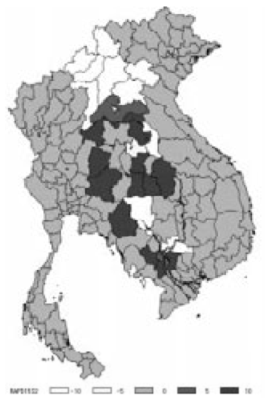

Fig. 6-9. Impact of ET changes in December on planted area in the dry season

6-5. Conclusions

A Supply and demand model of rice in four countries in the lower Mekong River basin is developed and the impacts of the water cycle changes are evaluated by using an economic model. The model can analyze changes in production for each province which areas are close to small river basin in the Mekong River basin. The developed supply and demand model of rice in Laos and Cambodia is the first attempt in the world and the rice economic model is also unparalleled in considering water supply changes. This model highlights the regions where changes of the water supply have serious impacts on the production of rice. The results consider the supply response of farmers to price changes. In particular, famers in the western part of the Indochina peninsula will decrease their planted area of rice when the water supply decreased in May, i.e., the transplanting season. The policies mitigating impacts of water cycle changes on agricultural production, such as introduction of a new water management method, will be evaluated by joining models of water accounting model, crop model, and this economic model.

Chapter 7
Analyses using Stochastic Models

7-1. Introduction

A stable water supply for wet season and upland rice cultivation is necessary for food security and lowering risk to farm management. The evaluation of water supply changes on rice yields and the resulting market responses from fluctuations in production are an essential theme of agricultural development in lower Mekong river countries. This chapter analyzes the supply and demand of rice in Laos and Cambodia, focusing on the impacts of fluctuations of water supply on rice production and producer risk.

7-2. Analytical method

7-2-1. Stochastic model

The ET variable is exogenous to the supply and demand model, entering into yield and area functions. To evaluate the impacts of changes in the water supply on rice markets, the ET value must be endogenized in a model which then recursively feeds into the greater supply and demand model. The following basic seasonal ET models with a lagged dependent value using monthly data are estimated as follows:

$$ET^i_t = f(ET^i_{t-1}, D_{FEB}, \dots, D_{DEC}) \qquad (7\text{-}1)$$

where D_{FEB} through D_{DEC} are the dummy variables for February through December.

The equations are specified as linear function of seasonal treatment dummies and equation errors retained when comparing the estimates to the actual data. The empirical distributions and correlations across regions of the resulting errors are maintained and employed to obtaining a set of random ET variables consistent with history. With the use of the joint distribution, consistent with the historical error correlation matrix for provinces and random draws on a normal distribution, correlated uniform deviates for each province are created through the standard normal cumulative distribution. These random numbers are transformed into draws on the empirical error distributions which maintain their historical correlated relationship and distributions. This process creates 500 sets of error draws which are then inserted back into the ET model and used to create 500 simulated future ET paths. The procedure for creating correlated random ET variables is based on the program of Richardson, Klose and Gray (2000) and the system is shown in Figure 7-1 and Figure 7-2. The distributions of the error terms can be expanded to simulate increased variation in future ET distributions.

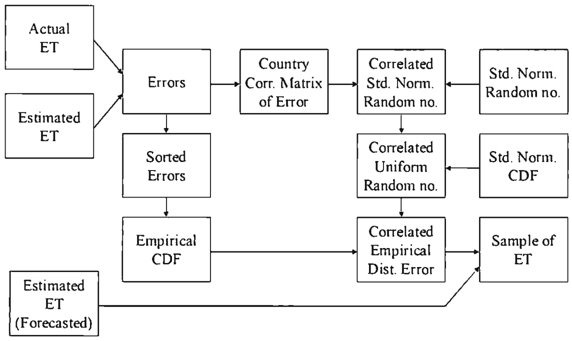

Fig.7-1. Creating correlated random ET variables

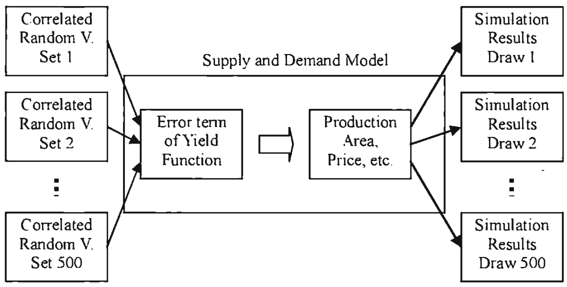

Fig. 7-2. Simulation of stochastic model

7-2-2. Risk neutral farm model

To evaluate the changes in water supply and the resulting price change risk, a risk neutral model for a simulated producer is used. Sadoulet and de Janvry (1995) constructed a risk neutral farm model based on the model of Newbery and Stiglitz (1981) and that is modified for the standard deviation of price in this paper.

$$\text{max.} \quad E[\pi] = E[pq] - wx$$
$$= E[p]E[q] + \text{cov}(p,q) - wx \qquad (7\text{-}2)$$
$$\text{s.t.} \quad q = \theta f(x) \qquad (7\text{-}3)$$

where π is the profit, p is the producer price which is a random variable, q is production, w is the input price, x is one of the input quantities, χ is the random variable; which has the following expected value and variance,

$$E[\theta] = 1, \quad \text{var}[\theta] = \sigma_\theta^{\ 2},$$

and cov(p,q) is the covariance of price p and production q. If there is a negative correlation between price and production, the expected profit in equation (7-2) will be lower than the case without price fluctuation. The correlation coefficient between price p and random variable θ under the assumption of a linear relationship is as follows:

$$corr(p,\theta)=\frac{\mathrm{cov}(p,\theta)}{\sqrt{\mathrm{var}(p)\,\mathrm{var}(\theta)}} \qquad (7\text{-}4)$$

Multiplying non-random variable $f(x)$ by the definition of the correlation coefficient (7-4), the following equation is obtained:

$$corr(p,\theta)=\frac{E[p\theta f(x)]-E[p]E[\theta f(x)]}{f(x)\sqrt{\mathrm{var}(p)}\sqrt{\mathrm{var}(\theta)}}$$

$$=\frac{\mathrm{cov}(p,\theta f(x))}{f(x)\sqrt{\mathrm{var}(p)}\sqrt{\mathrm{var}(\theta)}}=\frac{\mathrm{cov}(p,q)}{f(x)\sigma_p\sigma_\theta} \qquad (7\text{-}5)$$

where the variance of price is σ_p^2 The covariance between price and production is written as follows:

$$\mathrm{cov}(p,q)=corr(p,\theta)\sigma_p\sigma_\theta f(x) \qquad (7\text{-}6)$$

The first order condition of the expected profit maximization problem, i.e., (7-2) and (7-3), for input x is as follows:

$$\frac{\partial E[\pi]}{\partial x}=\frac{\partial(E[p]E[q]+\mathrm{cov}(p,q))}{\partial f(x)}\frac{\partial f(x)}{\partial x}-w$$

$$=\left(E[p]+\frac{\partial\,\mathrm{cov}(p,q)}{\partial f(x)}\right)\frac{\partial f(x)}{\partial x}-w=0 \qquad (7\text{-}7)$$

Substituting equation (7-6) into equation (7-7), the following equation is obtained:

$$[E[p]+corr(p,\theta)\sigma_p\sigma_\theta]f'(x)=w \qquad (7\text{-}8)$$

The price of equation (7-8), i.e., ($E[p]$ + $corr(p,\theta)$ $\sigma_p\sigma_\theta$)is the action certainty equivalent price and the difference between it and market price, i.e., mark-up; $corr(p,\theta)$ $\sigma_p\sigma_\theta$, is used for the evaluation of price risk.

7-3. Simulation results of stochastic model

7-3-1. Results of Laotian model

7-3-1-1. Results of stochastic supply and demand model

The 500 sets of results of the simulation for correlated random ET values are distributed consistent with the historical fluctuations in the variable. To evaluate the expansion in fluctuations of water supply, the case of a 20% increase in the error distribution of ET is examined by expanding the original 500 sets of error terms.

Table 7-1 and Table 7-2 shows the coefficient of variation (C.V.) of production of wet season, dry season, and upland rice for the nation as a whole and wet season rice for each province. These numbers are the average values of the simulation results between 2005 and 2015. These results show that the variation in production for upland rice is quite high and that for wet season rice in the southern region, such as Champasack province, is higher than that in other regions. Figure 7-3 shows a map of the variation by province. The third column in these tables shows the coefficient of variation of production in the case of the expansion of the random errors of ET. The results show that if the fluctuation of ET expands, the rate of increase of the variation of production of wet season rice will be higher than that of upland rice, and provinces in the central region will have a higher level of variation in production than other regions. Figure 7-4 shows a map of the rate of increase of the coefficient of variation of wet season rice production.

Table 7-1. C.V. of production for type of rice

Type of rice Cultivation	Baseline	ET error 20% up	Rate of Increase
Wet season	0.0507	0.0609	20.1
Dry season	0.0727	0.0870	19.7
Upland	0.3226	0.3848	19.3

Table 7-2. C.V. of production of wet season rice

Province	Baseline	ET error 20% up	Rate of increase
Phongsaly	0.0624	0.0746	19.6
Luangnamtha	0.1006	0.1192	18.5
Oudomxay	0.0860	0.1027	19.4
Bokea	0.0641	0.0770	20.1
Luangprabang	0.0562	0.0689	22.6
Huaphanh	0.0675	0.0812	20.3
Xayabury	0.1555	0.1877	20.7
Vientiane Mun.	0.0525	0.0641	22.1
Xiengkhuang	0.0662	0.0801	21.0
Vientiane	0.1099	0.1327	20.7
Borikhamxay	0.0906	0.1102	21.6
Khammuane	0.1464	0.1774	21.2
Savannakhet	0.1155	0.1377	19.2
Saravane	0.1049	0.1253	19.4
Sekong	0.1485	0.1765	18.9
Champasack	0.1994	0.2389	19.8
Attapeu	0.1733	0.2082	20.1

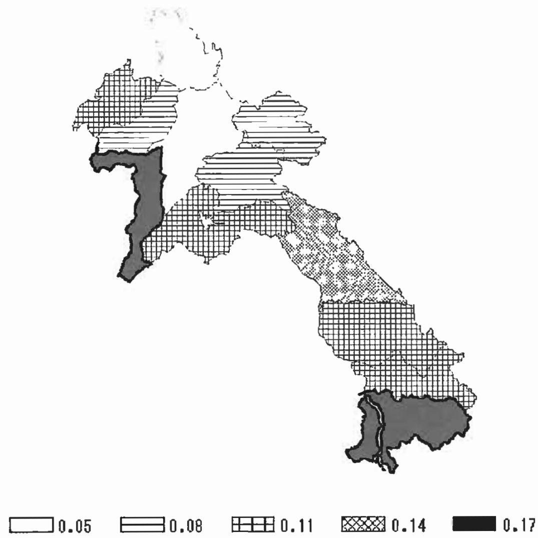

Fig. 7-3. Coefficient of variation of production

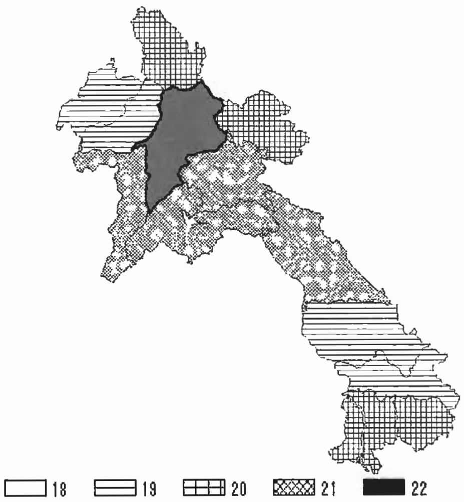

Fig. 7-4. Rate of increase of the coefficient

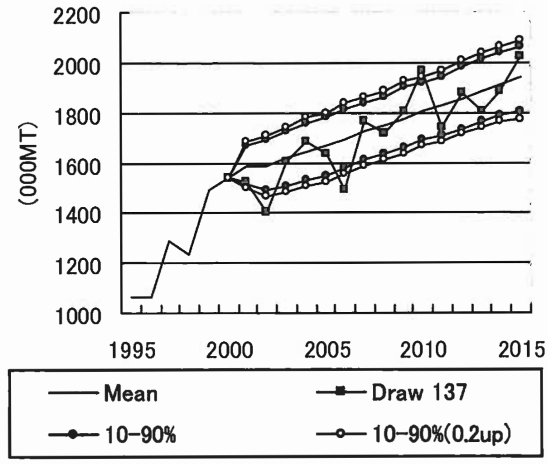

Fig. 7-5. Fluctuation of wet season rice production

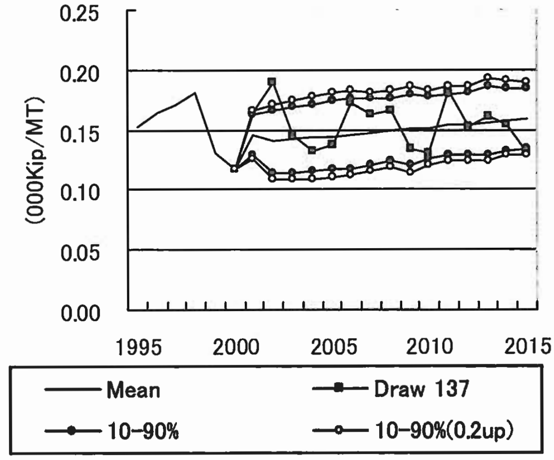

Fig. 7-6. Fluctuation of realized price

Figure 7-5 and Figure 7-6 show the fluctuation of wet season rice production and realized price. If the random error of ET expands by 20%, the average width between the 10th and 90th percentile of simulated outcomes for wet season rice production will increase from 238,000 MT to 285,000 MT, and the range for the real farm price will increase from 54.5 kip to 65.3 kip. The distribution of price is slightly negatively skewed; the width between 90% and mean is 27.8 kip and that between 10% and mean is 26.7 kip for the baseline.

7-3-1-2. Price risk evaluation

Table 7-3 and Table 7-4 show the difference between market and certainty equivalent prices (kip), i.e., the mark-up price. The greater the difference between the two prices, the greater the price risk to producers. The price gap for upland rice is the highest and it indicates that upland rice cultivation is riskier than wet and dry season rice cultivation. On the other hand, if the fluctuation of ET values is expanded, wet season rice cultivation is riskier than others. The third column of Table 7-3 and Table 7-4 shows the price gap for increase in the random ET error. The results indicate that wet season rice cultivation is quite risky under the volatile water supply scenario at the aggregate level. The price gaps for wet season rice are quite different among the provinces. The results show that wet season rice cultivation in Champasack and Attapeu is riskier than in other provinces. Figure 7-7 shows a provincial map of the difference between market and certainty equivalent price, i.e. price risk level. Figure 7-8 shows a map of the rate of increase in the difference between market and certainty equivalent prices due to the fluctuation of ET expanding 20% more than that in the baseline. The map indicates that the central region is sensitive to the risk associated with changes in ET, however, the risk level is lower than that in the southern region.

Table 7-3. Market-certainty eq. price for type of rice

Type of rice Cultivation	Baseline	ET error 20% up	Rate of Increase
Wet season	48.5	150.8	210.9
Dry season	14.3	20.5	43.3
Upland	66.4	94.9	42.9

Table 7-4. Market-certainty eq. price of wet season rice

Province	Baseline	ET error 20% up	Rate of increase
Phongsaly	1.0	1.3	30.0
Luangnamtha	2.8	4.0	42.9
Oudomxay	1.5	2.2	46.7
Bokea	2.7	3.8	40.7
Luangprabang	6.7	9.6	43.3
Huaphanh	1.1	1.7	54.5
Xayabury	9.8	14.7	50.0
Vientiane Mun.	3.6	5.4	50.0
Xiengkhuang	7.6	11.2	47.4
Vientiane	12.5	18.3	46.4
Borikhamxay	2.8	4.2	50.0
Khammuane	4.5	7.1	57.8
Savannakhet	14.6	20.7	41.8
Saravane	6.8	9.6	41.2
Sekong	4.5	6.3	40.0
Champasack	56.3	80.7	43.3
Attapeu	33.9	48.5	43.1

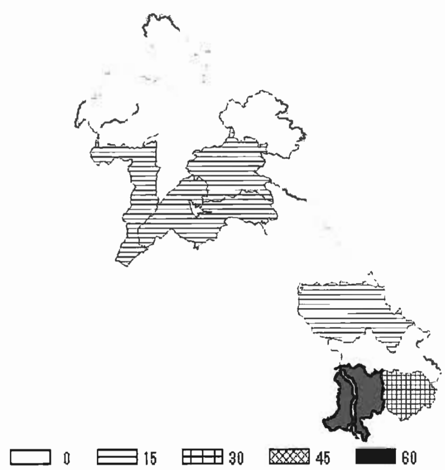

Fig. 7-7. Mark-up price for province

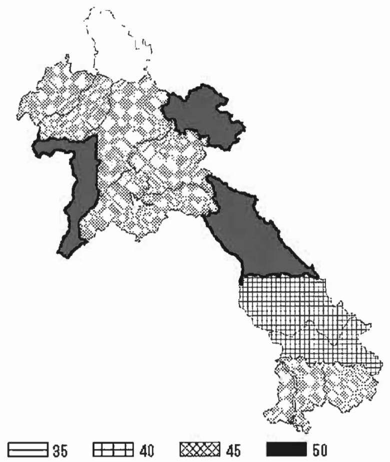

Fig. 7-8. Increase rate of mark-up price

7-3-2. Results of Cambodian model

7-3-2-1. Results of stochastic supply and demand model

The 500 sets of results of the simulation for correlated random ET values are distributed consistent with the historical fluctuations in the variable. Figure 7-9 shows the fluctuation of production in wet season and Figure 7-10 shows that in dry season. 90th and 10th percentiles indicating production band are shown in both figures. Furthermore, randomly selected 137th results of the simulation are shown in these figures. The difference between 90th and 10th percentiles for wet season rice production is about 400 thousand metric tons, which is about 10% of the average production. On the other hand, that for dry season rice production is about 180 thousand metric tons, which is about 17% of the average production; then, the variation of production in dry season is relatively greater than that in wet season.

Investigating increasing the water supply variability, a simulation where the random variation of the ET equation error is increased 20% is conducted. This simulation means that the random variation of the water supply will be 20% greater than the average variation from 1980 to 2000. The difference between 90th and 10th percentiles for wet season rice expands into 500 thousand metric tons and that for dry season rice expands into 220 thousand metric tons. The percentages increase of these changes, relative to the productions in the base year are 2.5% and 3.8% respectively, indicating rice production during the dry season is more affected by water supply changes than during the wet season. It seems that the dry season cultivation is the more stable of the two seasons due to the water control of irrigation facilities; however, planted area in the dry season depends on river discharges and reservoir capacity. Furthermore, if transplanting in the wet season is delayed by a dry spell, transplanting in dry season will also be delayed from the optimal planting season. Thus, the variation of production in the dry season is probably larger than that in the wet season.

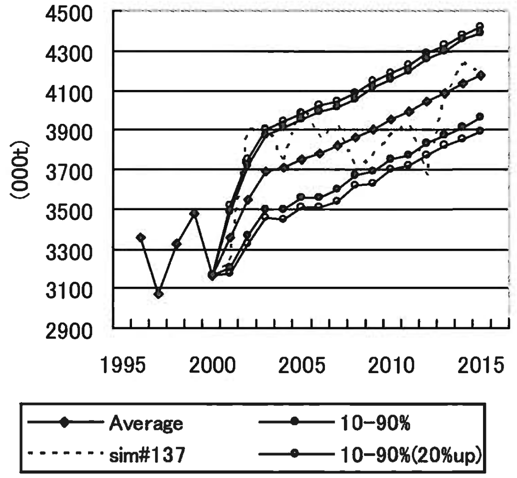

Fig. 7-9. Fluctuation of production of wet season rice for whole country

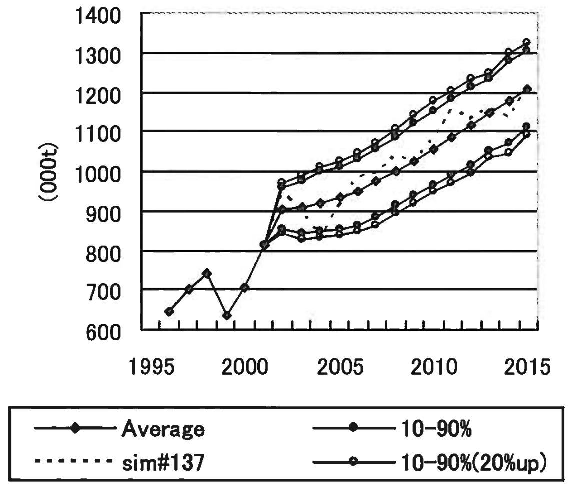

Fig. 7-10. Fluctuation of production of dry season rice for whole country

Next, impacts of water supply changes on the planted area during the wet season are investigated. Figure 7-11 shows a map in which indicates differences in coefficients of variations between the case of 20% increase in water supply fluctuations and baselines. Planted area in regions where elevations are high, such as Rottana Kiri, Mondol Kiri, and Koh Kong, and the land vulnerable to flooding, such as Phnom Penh and Prey Veng, are sensitive to increased fluctuations in water supplies. The average yields of these provinces are low, i.e., 1.5t/ha from 1995 to 2003.

Finally, the variation of the farm price is investigated. Figure 7-12 shows the fluctuation of the farm price similar to figures which show fluctuations of productions. The distribution of price is slightly negatively skewed; the width between 90th percentile and the mean is 75,400 Riel and that of between 10th percentile and the mean is 73,200 Riel for the baseline. The asymmetry of the distribution is based on the logarithmic ET variables of yield and planted area functions, and it corresponds to diminishing planted area in the case of water supply scarcity.

If the random error of ET expands 20%, the average width between the 10th and 90th percentile of simulated outcomes for farm price will increase from 149,000 Riel to 178,000 Riel. Therefore, an increase in the variation of water supplies leads to a higher price of rice.

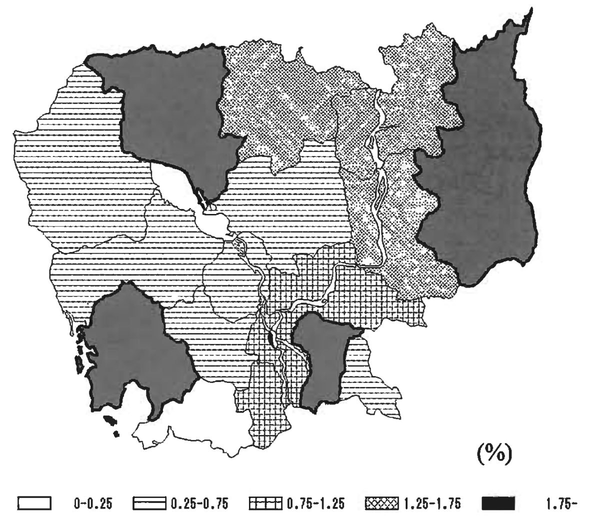

Fig. 7-11. Magnitude of fluctuations of planted area in wet season

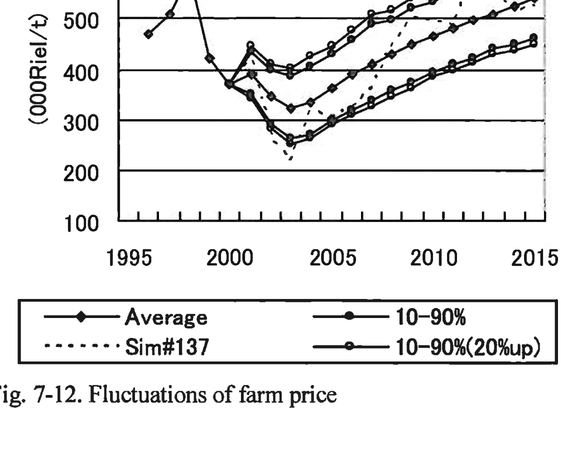

Fig. 7-12. Fluctuations of farm price

7-3-2-2. Price risk evaluation

The second column of Table 7-5 shows the difference between market and action certainty equivalent prices. The greater the difference between the two prices, the greater the price risk to producers. The price gap for wet season rice is higher than that for dry season rice and it indicates that wet season rice cultivation has higher price risk than dry season rice cultivation.

The third column of Table 7-5 shows the price gap, i.e., mark-up, for increase 20% in the random ET error. The results indicate that wet season rice cultivation is riskier than dry season rice cultivation under the volatile water supply scenario at the aggregate level due to an increase in the variation in gross returns. Such variation in production and returns has additional implication for developing country farmers through lack of storage and access to adequate credit.

Figure 7-13 shows a provincial map of the rate of increase in the mark-up price, which reflects the price risk level, due to expanding the fluctuation of ET 20% more than that in the baseline. The map indicates that higher yield and production provinces, such as Kandal or Takeo face higher price risk for water supply changes.

Table 7-5 Mark-up price for type of rice

Type of rice cultivation	Market-Action certainty eq. price		
	Baseline (Riel/t)	ET error up 20% (Riel/t)	Rate of Increase (%)
Wet season	2314	2741	18.46
Dry season	1709	1987	16.30

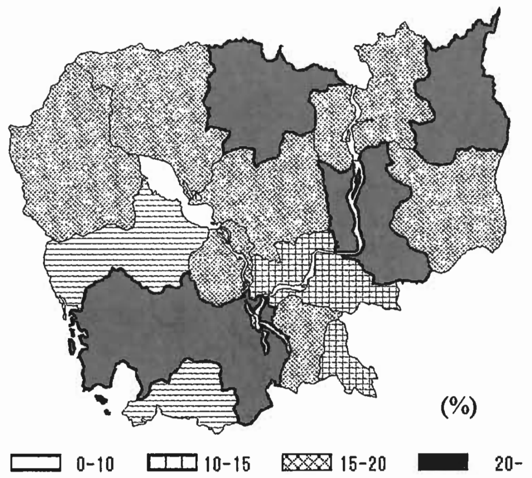

Fig. 7-13. Increase rate of mark-up price

7-4. Conclusions

Results of stochastic analyses of the Laotian rice model show that the production of upland rice is highly influenced by changes in the water supply, and thus adequate water management is required for upland cultivation to reduce the risk faced by producers. However, when considering price risk, the wet season rice cultivation is most vulnerable to water supply changes. Rice farmers producing wet season rice in the southern region, such as Champasack and Attapeu provinces, will likely incur serious damage under a scenario where the variation in the water supply expands.

Results of an analyses of Cambodian rice markets, utilizing a stochastic model, with increased variation in the ET variable, show that the production of dry season rice is more influenced by climatic change than that of wet season rice, and thus adequate water management is required for dry season rice to reduce production risk faced by producers. However, when considering price risk alone, the wet season rice cultivation is more vulnerable to water supply changes. Rice farmers producing wet season rice in high yielding regions with sizeable production, such as Kandal or Takeo province, will incur financial damages under a scenario where the variation in the water supply expands.

The distributions of the farm price of both countries are negatively skewed and the probabilities of higher prices are greater than those of lower prices. These indicates that if the fluctuation of water supply expands, consumers, such as rural poor are most vulnerable as they may face a higher price for rice which is a staple of their diet. The regions or provinces which suffer from highly variable production and higher price risk may need to consider water management and alternative cultivation methods to minimize the impacts on both producers and consumers from increased variation in the water supply.

Chapter 8
Conclusions

Supply and demand models for rice in Laos, Cambodia, Thailand, and Vietnam which can analyze production and water supply impacts for each province and region was developed for use in analyzing the impacts of changes in the regional water cycle. Furthermore, the supply and demand models in Laos and Cambodia are modified with stochastic models using simulated ET fluctuations to investigate how changes in variation of the environmental characteristic of ET impact producers. These supply and demand models can analyze changes in yield and planted area independently and consider supply responses and demand changes to the market price while equating supply and demand. While many previous researches have considered only yields, the inclusion of area and demand response to price changes makes the results more realistic than those based on yield function analyses alone. The baseline analysis, to be used in a subsequent water cycle scenario, indicates that production of wet and dry season rice steadily increases and prices rise modestly throughout the projection period. This deterministic projection is then used as the starting point for comparison, and increased variation in the water cycle is then introduced into the system.

Results of stochastic analyses, with increased variation in the ET variable, show that the production of dry season rice is more influenced by climatic change than is wet season rice, and thus adequate water management is required for dry season rice to reduce production risk faced by producers.

However, when considering price risk alone, the wet season rice cultivation is more vulnerable to water supply changes. Rice farmers producing wet season rice in high yielding regions with sizeable production will incur financial damages under a scenario where the variation in the water supply expands.

Productions of rice in the four countries are steadily increasing. The average yield of rice in Cambodia in 2005 was 2.48 t/ha and the harvested area was 2.44 million ha, achieving their stated targets. However, Murshid (1998) suggests that a scarcity of rice for self-sufficient food needs will immediately threaten regional food security because markets are undeveloped in these border regions. The distribution of the farm price is negatively skewed and the probability of a higher price is greater than that of a lower price. It indicates that if the fluctuation of water supply expands, consumers, such as rural poor are most vulnerable as they may face a higher price of rice which is a staple of their diet. The regions or provinces which suffer from highly variable production and higher price risk may need to consider water management and alternative cultivation methods, among other potential policies, to minimize the impacts on both producers and consumers from increased variation in the water supply.

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Appendix 1

Table A-1. Data for REMEW-LAO

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LYL01	1.323	1.606	1.795	1.575	1.910	2.329	2.436	2.590	2.305	2.848	3.025	3.001	2.570	3.005	2.624	3.090	3.056	3.300	3.197	3.191	3.314	3.400	3.828	4.000	
LYL02	1.420	1.400	1.600	1.507	1.800	2.431	2.500	2.500	2.251	2.600	2.800	2.800	2.920	3.000	2.340	3.000	2.309	2.500	3.158	3.207	3.264	3.208	3.199	3.310	
LYL03	1.500	1.300	1.700	1.559	1.900	2.800	2.800	2.792	2.800	3.000	3.500	2.980	2.200	3.000	3.310	3.000	3.499	3.500	3.214	3.498	3.299	3.236	3.704	3.702	
LYL04	1.246	1.512	1.705	1.792	2.030	2.400	2.500	2.748	3.240	3.300	3.300	3.501	3.500	2.900	3.000	3.000	3.700	3.500	3.512	3.501	3.230	3.292	3.204	3.700	
LYL05	1.350	1.638	1.847	1.941	2.199	2.600	2.507	2.830	2.200	2.600	3.500	3.100	3.200	2.575	3.200	3.500	3.500	3.500	4.000	3.601	3.349	3.190	3.500	3.400	
LYL06	1.501	1.504	1.700	1.537	2.120	2.600	2.530	2.900	2.600	2.800	2.729	2.950	2.499	2.705	3.001	3.000	2.715	3.000	3.333	3.501	3.312	3.296	3.441	3.700	
LYL07	1.619	1.055	1.700	1.547	1.900	2.800	2.805	2.800	2.869	2.900	3.158	3.017	2.755	3.005	3.300	3.500	3.598	3.500	3.504	3.601	3.301	3.200	3.198	3.999	
LYL08	1.298	1.575	1.776	1.867	2.115	2.500	2.260	2.995	2.309	2.749	2.998	2.469	2.320	2.778	2.264	3.550	3.446	3.440	3.502	3.500	3.325	3.240	3.207	3.500	
LYL09	1.401	1.648	1.821	1.632	2.023	2.577	2.593	2.628	2.470	2.891	2.801	2.768	2.446	2.846	2.533	3.153	2.769	2.800	3.299	2.977	3.026	3.200	3.560	3.400	
LYL10	1.609	1.893	2.091	1.874	2.323	2.960	2.978	3.018	2.837	3.321	3.217	3.179	2.809	3.268	2.909	3.621	3.180	3.200	3.579	3.604	3.254	3.247	4.085	4.100	
LYL11	1.038	1.220	1.348	1.208	1.498	1.908	1.920	1.946	1.829	2.141	2.074	2.049	1.811	2.107	1.875	2.334	2.050	2.500	2.623	2.954	3.004	3.200	3.148	3.369	
LYL12	1.500	1.600	1.800	1.598	1.700	2.080	2.653	2.700	2.588	1.504	2.500	2.600	1.947	2.725	2.101	3.000	2.680	2.700	2.857	2.171	3.022	3.247	2.755	3.060	
LYL13	1.201	1.700	1.800	1.556	1.900	2.500	2.618	2.700	2.610	1.005	2.833	2.780	2.527	2.965	2.540	3.164	3.118	3.000	3.152	3.233	3.250	3.298	3.425	3.460	
LYL14	1.105	1.556	1.611	1.633	1.685	2.501	2.580	2.770	2.800	2.215	2.806	3.103	3.233	3.085	2.999	3.207	3.027	2.930	2.957	1.918	2.982	3.244	3.010	3.300	
LYL15	1.106	1.559	1.613	1.633	1.686	2.503	2.799	2.800	2.530	1.588	1.933	1.800	1.938	2.500	2.817	3.499	2.498	2.500	2.857	2.867	3.099	3.159	3.300	3.300	
LYL16	1.281	1.804	1.868	1.893	1.953	2.900	3.004	3.202	2.800	1.750	2.163	2.300	2.576	3.005	2.707	3.000	2.448	2.501	2.653	2.379	3.005	3.249	2.974	3.102	
LYL17	1.801	1.800	2.100	1.818	2.000	2.500	2.500	2.683	2.500	1.800	2.605	2.847	2.482	2.995	2.750	3.000	2.426	2.500	2.816	2.001	2.805	3.164	3.103	3.200	
LYL18	1.384	1.627	1.798	1.612	1.998	2.545	2.561	2.595	2.440	2.855	2.766	2.733	2.416	2.810	2.502	3.114	2.734	2.700	3.026	3.151	2.908	3.197	3.219	2.975	
LAL01	30.958	37.737	37.737	38.174	36.508	36.157	36.252	37.246	33.490	36.293	38.962	39.417	38.981	42.673	40.209	40.000	27.001	43.479	42.700	46.237	47.683	50.640	47.835	48.156	
LAL02	5.953	4.439	4.434	4.446	4.295	4.438	4.473	4.550	4.290	4.600	4.896	4.900	4.851	4.745	4.850	4.691	5.313	5.237	5.700	5.720	5.747	5.380	5.790	4.939	
LAL03	10.940	11.600	9.300	9.324	8.900	4.184	4.056	4.600	4.045	4.154	4.469	4.460	2.027	2.543	5.012	5.147	5.802	7.210	7.000	7.066	7.485	7.850	10.290	10.736	
LAL04	6.534	7.233	7.263	7.319	6.896	6.690	6.664	10.765	8.646	9.146	9.400	11.995	12.500	5.037	6.826	7.008	7.515	8.251	8.670	7.012	8.731	9.180	9.770	9.809	
LAL05	2.689	2.977	2.989	3.012	2.838	2.753	2.931	3.170	3.416	3.597	3.517	4.458	4.291	4.875	6.081	6.448	7.083	6.878	8.500	9.150	9.775	10.190	10.370	11.531	
LAL06	7.430	7.228	7.682	7.702	7.769	8.079	8.118	8.316	6.708	8.154	8.363	8.370	7.967	7.731	8.642	8.772	8.449	9.133	9.300	9.530	9.677	9.770	10.255	10.670	
LAL07	16.623	11.000	8.891	8.914	7.513	7.152	7.136	7.217	6.787	7.070	6.997	7.167	6.831	7.206	6.543	7.553	8.107	8.565	10.060	9.515	11.285	11.380	11.540	11.474	
LAL08	15.887	17.587	17.660	17.796	16.766	16.266	13.765	11.351	9.170	9.496	11.470	10.630	9.083	15.780	11.947	17.117	17.994	19.430	17.790	20.250	20.334	21.530	21.670	21.615	
LAL09	14.275	16.874	16.873	17.025	16.298	15.315	15.185	15.785	12.517	13.166	14.771	15.987	13.526	15.921	14.316	13.732	11.872	12.694	12.730	11.851	13.103	14.510	14.400	14.497	
LAL10	28.690	33.914	33.911	34.217	32.756	30.779	30.518	31.724	25.157	26.461	29.686	32.131	27.184	31.997	28.773	27.598	23.860	33.449	29.760	35.262	35.317	37.660	41.380	43.101	
LAL11	9.890	11.691	11.690	11.795	11.292	10.610	10.520	10.936	8.672	9.122	10.233	11.076	9.371	11.030	9.919	9.514	8.225	16.096	15.630	22.284	23.983	25.010	16.945	15.672	
LAL12	47.160	34.495	44.000	44.114	39.600	37.650	37.792	38.367	30.436	20.510	37.553	43.510	23.798	39.625	34.260	25.888	28.235	20.426	33.600	35.268	42.990	34.000	34.960	42.050	
LAL13	106.228	94.800	94.800	94.989	77.643	68.795	83.304	80.883	83.399	80.123	82.458	75.635	61.542	83.418	67.092	86.666	87.506	65.802	93.110	81.959	103.396	101.610	105.290	117.417	
LAL14	34.969	35.522	35.505	35.592	33.257	28.689	30.504	31.782	29.000	31.660	32.919	33.318	30.271	34.282	19.894	33.436	34.946	34.186	37.200	36.598	38.142	46.270	54.830	56.300	
LAL15	0.596	0.605	0.605	0.607	0.567	0.489	0.686	0.620	0.789	0.961	1.216	1.476	1.040	1.715	1.260	1.372	1.569	1.340	2.450	3.310	2.788	2.960	3.285	3.870	
LAL16	84.591	85.928	85.888	86.097	80.449	69.399	77.639	75.406	71.031	54.761	71.940	74.455	58.661	70.852	71.888	72.930	71.484	59.836	72.750	77.849	79.490	71.130	73.440	80.115	
LAL17	7.870	9.288	10.000	10.026	9.200	9.200	9.980	8.532	8.562	8.890	9.097	9.589	7.638	9.266	9.491	9.711	9.479	7.846	10.300	7.046	12.300	12.390	11.940	13.905	
LAL18	3.394	4.013	4.012	4.048	3.875	3.642	3.611	3.753	2.976	3.131	3.512	3.802	3.216	3.786	3.404	3.265	2.823	3.275	3.800	4.300	4.950	4.010	2.780	3.614	
LQL01	40.952	60.617	67.748	60.134	69.745	84.217	88.296	96.467	77.181	103.379	117.847	118.274	100.181	128.232	105.528	123.600	82.525	143.481	136.500	147.530	158.007	172.200	183.100	192.600	
LQL02	8.453	6.215	7.094	6.699	7.730	10.790	11.182	11.375	9.655	11.960	13.710	13.720	14.166	14.235	11.351	14.073	12.268	13.090	18.000	18.345	18.761	17.260	18.520	16.350	
LQL03	16.410	15.080	15.810	14.532	16.910	11.714	11.357	12.845	11.326	12.462	15.640	13.290	4.460	7.629	16.590	15.441	20.300	25.236	22.500	24.720	24.692	25.400	38.110	39.740	
LQL04	8.139	10.935	12.384	13.115	14.000	16.056	16.659	29.580	28.014	30.183	31.020	41.993	43.748	14.607	20.478	21.025	27.806	28.880	30.450	24.550	28.205	30.220	31.300	36.290	

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LQL05	3.629	4.875	5.521	5.847	6.241	7.158	7.347	8.970	7.515	9.352	12.309	13.821	13.731	12.555	19.459	22.568	24.790	24.070	34.000	32.950	32.740	32.510	36.300	39.200	
LQL06	11.149	10.872	13.059	11.837	16.470	21.005	20.538	24.116	17.441	22.832	22.825	24.692	19.912	20.910	25.935	26.316	22.942	27.400	31.000	33.360	32.050	32.200	35.290	39.480	
LQL07	26.911	11.600	15.115	13.790	14.275	20.025	20.020	20.207	19.470	20.503	22.100	21.622	18.820	21.655	21.591	26.436	29.169	29.978	35.250	34.260	37.252	36.420	36.900	45.890	
LQL08	20.615	27.694	31.365	33.217	35.458	40.665	31.110	33.998	21.177	26.106	34.388	26.242	21.077	43.835	27.052	60.765	62.000	66.840	62.300	70.875	67.604	69.760	69.500	75.650	
LQL09	20.005	27.809	30.721	27.784	32.968	39.469	39.376	41.479	30.920	38.068	41.369	44.253	33.087	45.305	36.265	43.295	32.872	35.543	42.000	35.280	39.650	46.430	51.260	49.290	
LQL10	46.175	64.189	70.912	64.131	76.098	91.103	90.890	95.742	71.370	87.868	95.488	102.146	76.372	104.574	83.707	99.936	75.876	107.037	106.500	127.100	114.906	122.300	169.050	176.700	
LQL11	10.261	14.264	15.758	14.251	16.910	20.245	20.197	21.276	15.860	19.526	21.219	22.699	16.971	23.238	18.601	22.207	16.861	40.240	41.000	65.830	72.050	80.030	53.350	52.800	
LQL12	70.740	55.192	79.200	70.492	67.320	78.312	100.254	103.591	78.769	30.840	93.882	113.126	46.338	107.978	71.970	77.664	75.670	55.150	96.000	76.550	129.930	110.400	96.310	128.670	
LQL13	127.545	161.160	170.640	147.819	147.521	171.987	218.057	218.384	217.707	80.550	233.638	210.265	155.544	247.335	170.436	274.239	272.837	197.406	293.500	264.990	336.037	335.100	360.630	406.260	
LQL14	38.636	55.282	57.215	58.129	56.037	71.764	78.711	88.027	81.200	70.120	92.363	103.390	97.852	105.760	59.670	107.242	105.777	100.165	110.000	70.210	113.750	150.100	165.020	185.770	
LQL15	0.659	0.943	0.976	0.991	0.956	1.224	1.920	1.736	1.996	1.526	2.350	2.657	2.016	4.288	3.550	4.800	3.920	3.350	7.000	9.490	8.641	9.350	10.840	12.770	
LQL16	108.352	155.033	160.455	163.019	157.153	201.257	233.234	241.472	198.887	95.840	155.623	171.247	151.130	212.910	194.602	218.790	175.005	149.676	193.000	185.200	238.853	231.100	218.400	248.500	
LQL17	14.170	16.718	21.000	18.224	18.400	23.000	24.950	22.892	21.406	16.001	23.695	27.299	18.960	27.750	26.100	29.133	23.000	19.615	29.000	14.100	34.502	39.200	37.050	44.490	
LQL18	4.697	6.530	7.214	6.524	7.742	9.268	9.246	9.740	7.261	8.939	9.714	10.391	7.769	10.638	8.516	10.167	7.719	8.843	11.500	13.550	14.395	12.820	8.950	10.750	
LQLO	4.697	6.530	7.214	6.524	7.742	9.268	9.246	9.740	7.261	8.939	9.714	10.391	7.769	10.638	8.516	10.167	7.719	8.843	11.500	13.550	14.395	12.820	8.950	10.750	
LQL	577.50	705.01	782.19	730.54	761.93	919.26	1023.34	1081.90	917.16	686.06	1039.18	1081.13	842.13	1153.43	921.40	1197.70	1071.34	1076.00	1299.50	1248.89	1502.03	1552.80	1619.88	1801.20	
LYI01	0.000	0.000	0.000	2.735	2.300	2.600	2.721	2.720	2.825	3.395	3.301	3.785	3.500	3.860	3.677	3.677	3.920	4.366	4.416	4.131	4.301	4.600	4.617	4.610	
LYI02	1.186	1.194	1.241	1.750	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.333	2.000	2.650	3.286	3.889	3.500	2.407	3.130	3.536	3.333	3.538	
LYI03	1.000	1.300	0.000	0.000	0.000	2.857	2.500	2.579	2.538	1.207	2.917	1.167	3.000	0.000	2.541	3.000	3.800	3.680	3.125	3.695	3.397	3.870	4.000	4.100	
LYI04	1.143	1.200	1.333	0.000	0.000	0.000	1.842	2.566	2.500	2.800	2.273	2.800	1.037	2.804	2.800	3.407	4.000	3.625	3.676	4.000	3.620	3.200	3.108	3.623	
LYI05	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	2.500	0.000	0.000	0.000	0.000	2.000	0.000	0.000	0.000	0.000	3.030	3.343	4.109	3.407	3.484	
LYI06	1.200	2.704	1.550	1.982	2.299	2.754	2.000	3.319	2.180	2.859	2.950	2.948	2.959	3.600	3.796	3.661	3.659	3.763	3.795	4.200	3.397	4.100	4.143	4.169	
LYI07	1.227	1.300	1.300	1.950	1.441	2.501	1.200	1.447	1.699	1.382	1.575	1.000	1.500	2.000	2.500	2.503	2.501	3.158	3.394	3.201	2.988	3.000	3.100	3.262	
LYI08	1.795	1.703	2.286	2.294	2.339	2.000	3.100	2.707	2.223	2.166	1.524	1.289	2.080	2.572	2.177	2.112	2.564	2.828	3.432	3.344	3.493	3.180	3.309	3.760	
LYI09	0.508	1.300	1.760	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.497	3.034	3.500	3.276	3.444	
LYI10	2.231	2.230	2.380	0.753	1.702	2.101	2.605	2.631	3.014	2.800	2.818	3.271	2.940	3.360	3.548	3.464	3.522	3.418	4.376	3.534	3.982	4.250	4.216	4.508	
LYI11	0.000	0.000	0.000	0.000	0.000	2.000	2.667	2.778	3.000	0.000	0.000	4.255	0.000	1.667	2.000	3.200	2.900	3.875	3.649	4.220	4.198	4.270	4.230	4.334	
LYI12	1.500	1.400	1.453	2.281	1.791	2.364	2.506	3.200	3.342	3.308	4.051	3.500	4.000	4.050	4.300	3.854	4.465	4.537	4.309	4.298	4.100	4.272	4.233	4.746	
LYI13	1.201	0.650	2.330	2.017	1.700	2.262	3.013	3.032	2.982	2.570	3.207	2.930	3.392	3.230	3.190	3.119	3.515	3.577	4.355	4.043	4.100	4.335	4.299	4.530	
LYI14	1.333	0.911	1.450	2.333	1.214	2.000	2.006	1.143	1.500	2.000	2.016	3.327	2.977	3.211	1.867	1.503	3.007	3.224	4.219	3.814	4.165	4.004	4.106	4.247	
LYI15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.529	2.222	0.000	0.000	1.500	3.350	3.526	3.653	3.814	4.000	4.060	4.104	
LYI16	1.425	1.000	1.550	2.551	2.200	2.645	2.806	2.150	3.000	2.833	2.789	3.580	0.000	3.561	3.421	3.516	3.651	3.732	4.148	4.035	4.100	4.123	4.199	4.240	
LYI17	2.000	2.000	2.000	2.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000	0.000	3.042	0.000	0.000	0.000	3.167	3.538	3.500	3.822	4.100	3.780	4.061	
LYI18																	2.800	2.222	2.941	3.504	3.711	4.000	3.902	4.000	
LAI01	0.000	0.000	0.000	2.016	2.936	5.000	6.000	6.300	5.144	6.302	5.502	6.367	6.481	7.331	6.466	6.466	6.466	9.100	11.300	12.597	16.730	19.520	22.007	23.100	
LAI02	0.590	0.180	0.220	0.028	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.018	0.020	0.042	0.090	0.020	0.113	0.115	0.056	0.033	0.065	
LAI03	0.050	0.050	0.000	0.000	0.000	0.007	0.020	0.019	0.013	0.029	0.012	0.018	0.107	0.000	0.098	0.100	0.025	0.025	0.032	0.256	0.860	0.740	0.330	0.300	
LAI04	0.070	0.010	0.015	0.000	0.000	0.000	0.019	0.145	0.210	0.456	0.150	0.600	0.054	0.051	0.040	0.054	0.173	0.160	0.068	0.342	0.890	0.830	0.415	0.690	
LAI05	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.099	0.210	0.220	0.135	0.310	
LAI06	0.550	0.250	0.300	0.168	0.471	0.639	0.519	0.642	0.857	1.123	1.006	0.848	0.904	1.044	0.770	0.392	0.742	1.140	0.880	1.568	2.280	1.800	2.100	2.010	

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LAI07	1.980	1.342	1.800	1.800	0.506	0.615	0.530	0.479	0.481	0.395	0.120	0.001	0.400	0.395	0.650	0.167	0.337	0.330	0.548	1.103	1.525	0.980	1.245	1.410	
LAI08	0.780	0.320	0.021	0.068	0.416	0.517	0.389	0.745	0.853	0.535	0.296	0.512	0.800	1.097	0.469	0.679	0.546	0.900	0.950	1.647	2.045	1.950	1.348	1.250	
LAI09	0.590	0.500	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.185	0.320	0.330	0.058	0.090	
LAI10	2.120	2.120	1.365	0.434	0.208	0.159	0.266	0.222	0.417	0.913	0.510	0.800	1.095	1.235	1.249	0.828	1.201	1.820	2.468	3.750	5.600	6.970	10.080	8.540	
LAI11	0.000	0.000	0.000	0.000	0.000	0.051	0.015	0.018	0.028	0.000	0.000	0.047	0.000	0.018	0.004	0.015	0.040	0.080	0.444	3.428	6.050	4.307	7.517	5.930	
LAI12	0.240	0.513	0.095	0.121	0.043	0.121	0.077	0.055	0.073	0.289	0.590	0.712	1.180	1.302	0.834	0.411	0.739	0.972	1.880	3.916	6.720	7.773	8.362	9.440	
LAI13	2.440	2.000	1.880	0.770	1.205	0.956	1.755	1.087	1.482	0.830	1.300	1.281	2.005	2.271	1.970	1.456	2.732	2.460	4.363	11.444	20.155	21.250	22.751	19.780	
LAI14	0.120	0.056	0.100	0.045	0.028	0.307	0.167	0.007	0.010	0.325	0.254	0.401	0.129	0.142	0.015	0.173	0.143	0.290	1.185	3.684	5.820	4.890	6.600	4.850	
LAI15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.170	0.009	0.000	0.000	0.004	0.020	0.190	0.259	0.430	0.424	0.468	0.480	
LAI16	0.800	0.353	0.200	0.185	0.185	0.200	0.242	0.400	0.126	0.180	0.474	0.440	0.000	0.585	0.437	0.248	0.398	0.560	2.218	8.410	16.700	19.230	18.100	5.200	
LAI17	0.010	0.014	0.006	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.024	0.000	0.000	0.000	0.006	0.065	0.200	0.445	0.450	0.410	0.495	
LAI18																	0.005	0.009	0.034	0.135	0.135	0.080	0.041	0.060	
LQI01	0.000	0.000	0.000	5.513	6.753	13.000	16.324	17.136	14.533	21.395	18.161	24.099	22.683	28.298	23.773	23.773	25.348	39.730	49.900	52.035	71.949	89.792	101.600	106.500	
LQI02	0.700	0.215	0.273	0.049	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.036	0.053	0.138	0.350	0.070	0.272	0.360	0.198	0.110	0.230	
LQI03	0.050	0.065	0.000	0.000	0.000	0.020	0.050	0.049	0.033	0.035	0.035	0.021	0.321	0.000	0.249	0.300	0.095	0.092	0.100	0.946	2.921	2.864	1.320	1.230	
LQI04	0.080	0.012	0.020	0.000	0.000	0.000	0.035	0.372	0.525	1.277	0.341	1.680	0.056	0.143	0.112	0.184	0.692	0.580	0.250	1.368	3.222	2.656	1.290	2.500	
LQI05	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.300	0.702	0.904	0.460	1.080	
LQI06	0.660	0.676	0.465	0.333	1.083	1.760	1.038	2.131	1.868	3.211	2.968	2.500	2.675	3.758	2.923	1.435	2.715	4.290	3.340	6.586	7.745	7.380	8.700	8.380	
LQI07	2.430	1.744	2.340	3.510	0.729	1.538	0.636	0.693	0.817	0.546	0.189	0.001	0.600	0.790	1.625	0.418	0.843	1.042	1.860	3.531	4.557	2.940	3.860	4.600	
LQI08	1.400	0.545	0.048	0.156	0.973	1.034	1.206	2.017	1.896	1.159	0.451	0.660	1.664	2.821	1.021	1.434	1.400	2.545	3.260	5.507	7.143	6.201	4.460	4.700	
LQI09	0.300	0.650	0.880	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.647	0.971	1.155	0.190	0.310	
LQI10	4.730	4.728	3.249	0.327	0.354	0.334	0.693	0.584	1.257	2.556	1.437	2.617	3.219	4.150	4.432	2.868	4.230	6.220	10.800	13.253	22.300	29.623	42.500	38.500	
LQI11	0.000	0.000	0.000	0.000	0.000	0.102	0.040	0.050	0.084	0.000	0.000	0.200	0.000	0.030	0.008	0.048	0.116	0.310	1.620	14.466	25.400	18.391	31.800	25.700	
LQI12	0.360	0.718	0.138	0.276	0.077	0.286	0.193	0.176	0.244	0.956	2.390	2.492	4.720	5.273	3.586	1.584	3.300	4.410	8.100	16.830	27.550	33.210	35.400	44.800	
LQI13	2.930	1.300	4.380	1.553	2.049	2.162	5.288	3.296	4.419	2.133	4.169	3.753	6.800	7.335	6.284	4.541	9.604	8.800	19.000	46.266	82.629	92.115	97.800	89.600	
LQI14	0.160	0.051	0.145	0.105	0.034	0.614	0.335	0.008	0.015	0.650	0.512	1.334	0.384	0.456	0.028	0.260	0.430	0.935	5.000	14.050	24.239	19.580	27.100	20.600	
LQI15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.600	0.020	0.000	0.000	0.006	0.067	0.670	0.946	1.640	1.696	1.900	1.970	
LQI16	1.140	0.353	0.310	0.472	0.407	0.529	0.679	0.860	0.378	0.510	1.322	1.575	0.000	2.083	1.495	0.872	1.453	2.090	9.200	33.934	68.470	79.280	76.000	22.050	
LQI17	0.020	0.028	0.012	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.000	0.073	0.000	0.000	0.000	0.019	0.230	0.700	1.701	1.845	1.550	2.010	
LQI18																	0.014	0.020	0.100	0.473	0.501	0.320	0.160	0.240	
LYIN	1.323	1.513	1.335	1.961	2.000	2.448	2.007	2.592	2.129	2.454	2.515	2.457	2.347	2.903	2.916	2.708	3.154	3.364	3.555	3.610	3.363	3.519	3.603	3.765	
LYIC	1.544	1.441	2.252	2.295	2.102	2.526	2.778	2.765	2.875	3.245	3.310	3.602	3.478	3.709	3.619	3.576	3.810	4.120	4.369	4.061	4.152	4.393	4.370	4.566	
LYIS	1.419	1.021	1.526	2.532	2.070	2.254	2.479	2.133	2.890	2.297	2.519	3.448	3.291	3.463	3.369	2.689	3.466	3.551	4.128	3.954	4.106	4.097	4.166	4.229	
LAIN	4.020	2.152	2.356	2.064	1.395	1.778	1.478	2.030	2.414	2.568	1.584	1.979	2.265	2.590	2.047	1.412	1.865	2.645	2.498	5.128	7.925	6.576	5.606	6.035	
LAIC	5.390	5.133	3.840	3.341	4.392	6.287	8.113	7.682	7.144	8.334	7.902	9.207	10.761	12.157	10.523	9.176	11.183	14.441	20.489	35.455	55.710	60.230	70.816	66.940	
LAIS	0.930	0.423	0.306	0.250	0.213	0.507	0.409	0.407	0.136	0.505	0.728	0.861	0.299	0.760	0.452	0.421	0.545	0.876	3.658	12.553	23.395	24.994	25.578	11.025	
LQIN	5.320	3.257	3.146	4.048	2.790	4.352	2.966	5.262	5.139	6.303	3.984	4.862	5.316	7.519	5.970	3.824	5.883	8.899	8.880	18.510	26.650	23.143	20.200	22.720	
LQIC	8.320	7.396	8.647	7.669	9.233	15.884	22.538	21.242	20.537	27.040	26.157	33.161	37.422	45.086	38.083	32.814	42.612	59.490	89.520	143.970	231.300	264.606	309.450	305.650	
LQIS	1.320	0.432	0.467	0.633	0.441	1.143	1.014	0.868	0.393	1.160	1.834	2.969	0.984	2.632	1.523	1.132	1.889	3.111	15.100	49.630	96.050	102.401	106.550	46.630	
LYICO	1.827	1.946	2.177	1.086	1.717	2.181	2.587	2.746	3.060	2.922	3.479	3.405	3.490	3.700	3.846	3.589	3.859	3.804	4.273	4.001	4.076	4.250	4.223	4.553	

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LAICO	2.950	3.133	1.960	0.555	0.251	0.331	0.358	0.295	0.518	1.202	1.100	1.559	2.275	2.555	2.087	1.254	1.985	2.881	4.826	11.414	18.825	19.460	26.058	24.060	
LQICO	5.390	6.096	4.267	0.603	0.431	0.722	0.926	0.810	1.585	3.512	3.827	5.309	7.939	9.453	8.026	4.500	7.660	10.960	20.620	45.669	76.722	82.699	110.050	109.550	
LYI00	1.447	1.438	1.886	2.184	2.077	2.494	2.652	2.705	2.689	3.025	3.131	3.403	3.281	3.562	3.500	3.431	3.707	3.981	4.260	3.992	4.068	4.250	4.276	4.464	
LAI00	10.340	7.708	6.502	5.655	6.000	8.572	10.000	10.119	9.694	11.407	10.214	12.047	13.325	15.507	13.022	11.009	13.593	17.962	26.645	53.136	87.030	91.800	102.000	84.000	
LQIO	0.000	0.000	0.000	5.513	6.753	13.000	16.324	17.136	14.533	21.395	18.161	24.099	22.683	28.298	23.773	23.773	25.362	39.750	50.000	52.508	72.450	90.112	101.760	106.740	
LQI	14.960	11.085	12.260	12.350	12.464	21.379	26.518	27.372	26.069	34.503	31.975	40.992	43.722	55.237	45.576	37.770	50.384	71.500	113.500	212.110	354.000	390.150	436.200	375.000	
LYU01	0.844	1.013	1.109	1.095	0.976	1.200	1.200	1.200	1.201	1.200	1.201	0.531	1.000	1.500	1.300	1.490	1.740	1.556	1.600	1.602	0.000	1.732	0.000	0.000	
LYU02	1.000	0.800	1.054	1.048	1.100	1.200	1.200	1.400	1.101	1.206	1.200	1.300	1.160	1.300	1.085	1.300	1.380	1.406	1.494	1.350	1.570	1.661	1.722	1.778	
LYU03	1.200	1.500	1.175	1.189	1.100	1.200	1.200	1.250	1.140	1.300	1.500	1.389	1.200	1.200	1.711	1.700	1.700	1.530	1.798	1.700	1.644	1.695	1.800	1.866	
LYU04	1.046	1.048	1.074	1.064	1.128	1.200	1.200	1.294	1.340	1.400	1.750	1.700	1.749	1.400	1.700	1.700	1.635	1.475	1.637	1.700	1.645	1.700	1.721	1.741	
LYU05	1.395	1.398	1.432	1.418	1.504	1.600	1.600	1.700	1.700	1.802	1.700	2.000	1.905	1.360	1.800	1.800	1.800	1.468	1.955	1.696	1.652	1.715	1.913	1.943	
LYU06	1.000	1.300	1.300	1.259	1.170	1.240	1.200	1.250	1.300	1.240	1.359	1.413	1.320	1.400	1.400	1.300	1.784	1.685	1.527	1.750	1.650	1.747	1.659	1.616	
LYU07	1.000	1.200	1.509	1.498	0.900	1.500	1.200	1.200	1.400	1.200	1.788	1.816	1.600	1.500	1.500	1.800	1.832	1.700	1.422	1.402	1.584	1.665	1.835	1.821	
LYU08	1.134	1.136	1.164	1.152	1.222	1.300	1.200	1.267	1.000	1.500	1.905	1.498	1.930	1.541	1.475	1.948	1.812	1.601	1.799	1.551	1.580	1.725	1.999	1.957	
LYU09	1.041	1.206	1.252	1.256	1.160	1.556	1.494	1.478	1.521	1.617	1.666	1.502	1.406	1.688	1.626	1.498	1.628	1.444	1.878	1.655	1.584	1.680	1.800	1.728	
LYU10	0.923	1.069	1.109	1.113	1.028	1.379	1.324	1.310	1.348	1.433	1.476	1.331	1.246	1.496	1.442	1.327	1.443	1.401	1.536	1.900	1.673	1.658	1.419	1.821	
LYU11	1.049	1.215	1.261	1.266	1.169	1.568	1.505	1.489	1.533	1.630	1.678	1.513	1.416	1.701	1.639	1.509	1.640	1.450	1.429	1.345	1.586	1.654	1.539	1.977	
LYU12	1.121	1.100	0.985	0.998	1.200	1.300	1.333	1.300	1.576	1.452	1.396	1.500	1.074	1.450	1.254	1.306	1.217	1.422	1.434	1.574	1.602	1.650	1.894	1.617	
LYU13	0.999	0.700	1.020	0.998	1.100	1.240	1.212	1.300	1.276	1.276	1.269	1.460	1.465	1.500	1.643	1.498	1.740	1.454	1.663	1.578	1.561	1.719	1.860	1.610	
LYU14	0.900	1.358	1.060	1.240	1.329	1.645	1.871	1.622	1.287	0.863	1.372	1.519	1.628	1.600	1.800	2.000	1.618	1.600	1.624	0.503	1.510	1.728	1.897	2.050	
LYU15	0.739	1.115	0.869	1.018	1.091	1.350	1.200	1.344	1.200	0.524	1.062	1.300	1.300	1.400	1.609	1.659	1.300	1.416	1.313	1.199	1.531	1.687	1.511	1.608	
LYU16	0.776	1.171	0.914	1.070	1.146	1.419	1.772	1.850	1.400	1.779	1.982	1.994	2.195	1.980	1.783	1.775	1.594	1.486	1.446	0.000	0.000	1.738	2.007	0.000	
LYU17	0.901	0.800	1.250	1.195	1.100	1.150	1.300	1.354	1.000	1.000	1.500	1.056	1.000	1.280	1.200	1.500	1.335	1.423	1.500	1.000	1.504	1.708	1.693	1.692	
LYU18	0.722	0.836	0.868	0.871	0.804	1.079	1.036	1.025	1.055	1.121	1.155	1.041	0.975	1.171	1.128	1.038	1.129	1.436	1.484	1.500	1.645	1.699	1.725	1.662	
LAU01	0.813	1.087	1.087	1.054	1.317	1.390	1.207	1.000	0.394	0.365	0.711	0.729	1.081	0.350	1.026	1.354	0.712	0.919	2.000	2.025	0.000	0.634	0.000	0.000	
LAU02	18.780	24.579	24.579	23.842	22.500	20.380	22.516	19.750	5.542	17.490	18.868	20.000	26.547	19.945	20.811	18.716	20.684	17.986	16.200	16.315	15.800	16.282	12.600	9.000	
LAU03	22.712	22.562	24.000	23.280	22.600	17.731	14.610	14.150	12.841	11.984	13.358	14.266	13.217	7.455	13.960	13.534	13.370	11.825	10.955	11.098	11.200	10.576	11.295	10.080	
LAU04	30.644	39.261	43.829	42.514	38.355	40.270	36.857	41.821	34.951	36.738	31.037	32.960	34.650	20.288	23.079	27.478	26.000	25.600	18.300	20.223	24.201	19.400	21.910	18.434	
LAU05	4.946	6.337	7.074	6.862	6.191	6.500	6.208	6.340	5.982	5.650	1.932	4.324	4.203	4.220	7.547	8.854	7.184	6.785	5.780	5.100	5.280	1.560	5.280	4.775	
LAU06	42.198	44.193	54.570	52.933	49.300	54.000	51.439	48.880	27.407	31.811	33.743	60.196	54.413	41.072	38.370	55.912	37.221	35.313	34.570	32.829	32.000	32.109	30.900	27.743	
LAU07	30.899	31.064	31.064	30.132	34.920	38.418	32.441	26.723	36.380	38.000	23.534	23.376	22.612	18.825	15.551	20.350	15.316	15.623	9.950	7.735	12.657	14.313	18.015	16.433	
LAU08	17.141	21.962	24.517	23.781	21.455	22.526	20.056	16.591	16.230	13.373	15.949	15.004	9.074	15.382	14.528	16.843	14.015	11.440	13.060	8.739	12.220	14.125	16.770	17.029	
LAU09	10.687	14.053	15.386	14.924	17.928	17.805	19.744	18.257	13.574	12.662	17.692	18.452	15.960	16.997	10.524	10.935	8.281	8.163	8.520	6.950	12.320	10.175	8.900	9.188	
LAU10	6.948	9.137	10.003	9.703	11.656	11.576	12.837	11.870	8.826	8.232	11.503	11.997	10.377	11.051	6.842	7.109	5.384	3.485	4.200	5.758	4.308	2.158	5.080	3.169	
LAU11	6.450	8.482	9.286	9.008	10.821	10.746	11.916	11.019	8.193	7.642	10.678	11.137	9.633	10.258	6.352	6.600	4.998	7.640	4.900	4.379	2.908	9.180	5.095	2.676	
LAU12	11.600	15.898	12.990	12.600	8.600	5.230	4.291	2.617	2.015	1.570	1.647	1.500	1.409	1.238	1.140	1.720	0.904	1.955	1.255	1.102	1.250	1.394	3.670	0.637	
LAU13	22.282	18.639	18.000	17.460	14.000	11.253	9.705	9.705	9.002	8.880	7.725	5.860	7.939	7.752	5.090	6.030	5.527	5.392	4.900	3.206	4.170	3.795	2.500	2.385	
LAU14	9.818	10.636	7.509	7.284	7.753	7.244	5.534	5.942	5.461	3.060	7.246	6.699	8.213	7.900	7.836	8.540	6.818	7.616	8.250	1.828	6.767	4.874	7.450	6.784	
LAU15	9.067	9.823	6.935	6.727	7.160	6.690	6.915	6.950	6.876	5.458	6.087	5.817	3.687	4.303	5.144	5.004	4.540	4.500	3.200	2.720	3.142	3.713	4.415	3.936	
LAU16	9.680	10.487	7.403	7.181	7.644	7.142	6.133	5.448	5.934	5.332	5.544	5.540	3.647	5.223	4.449	3.966	3.302	2.644	1.660	0.000	0.000	1.346	1.470	0.000	

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LAU17	6.370	5.666	3.200	3.105	5.200	2.841	2.962	4.958	4.311	2.091	2.980	3.364	3.410	3.520	3.374	3.398	2.687	3.010	2.800	2.188	3.200	4.465	1.565	1.702	
LAU18	2.697	3.547	3.883	3.767	4.525	4.494	4.983	4.608	3.426	3.196	4.465	4.657	4.028	4.290	2.656	2.760	2.090	2.750	3.100	2.000	1.948	2.001	1.090	0.662	
LQU01	0.686	1.101	1.205	1.154	1.286	1.668	1.448	1.200	0.473	0.438	0.854	0.387	1.081	0.525	1.334	2.017	1.239	1.430	3.200	3.244	0.000	1.098	0.000	0.000	
LQU02	18.780	19.663	25.905	24.982	24.750	24.456	27.019	27.650	6.100	21.085	22.642	26.000	30.795	25.929	22.585	24.331	28.540	25.288	24.200	22.020	24.802	27.050	21.700	16.000	
LQU03	27.254	33.843	28.190	27.675	24.860	21.277	17.532	17.685	14.638	15.579	20.036	19.818	15.860	8.946	23.885	23.008	22.729	18.092	19.700	18.867	18.410	17.931	20.330	18.810	
LQU04	32.066	41.159	47.072	45.216	43.267	48.324	44.228	54.096	46.834	51.433	54.314	56.032	60.600	28.403	39.234	46.713	42.500	37.758	29.950	34.380	39.805	32.980	37.700	32.100	
LQU05	6.901	8.858	10.131	9.731	9.312	10.400	9.933	10.778	10.169	10.179	3.284	8.646	8.006	5.739	13.585	15.937	12.931	9.962	11.300	8.650	8.720	2.676	10.100	9.280	
LQU06	42.198	57.450	70.941	66.665	57.681	66.960	61.727	61.100	35.629	39.446	45.864	85.054	71.845	57.500	53.732	72.686	66.408	59.510	52.800	57.451	52.813	56.100	51.250	44.830	
LQU07	30.899	37.276	46.885	45.123	31.428	57.627	38.930	32.067	50.932	45.600	42.079	42.442	36.179	28.238	23.327	36.630	28.054	26.560	14.150	10.845	20.050	23.830	33.050	29.930	
LQU08	19.433	24.944	28.527	27.402	26.221	29.286	24.067	21.028	16.230	20.064	30.378	22.479	17.510	23.709	21.430	32.803	25.400	18.310	23.500	13.550	19.306	24.359	33.520	33.320	
LQU09	11.126	16.951	19.260	18.751	20.797	27.705	29.489	26.981	20.651	20.479	29.468	27.711	22.434	28.695	17.117	16.376	13.480	11.790	16.000	11.500	19.510	17.095	16.020	15.880	
LQU10	6.411	9.767	11.098	10.804	11.983	15.963	16.991	15.546	11.899	11.799	16.979	15.967	12.926	16.534	9.863	9.436	7.767	4.881	6.450	10.940	7.207	3.577	7.210	5.770	
LQU11	6.766	10.309	11.713	11.404	12.648	16.849	17.934	16.409	12.559	12.454	17.921	16.853	13.643	17.451	10.410	9.959	8.198	11.078	7.000	5.890	4.612	15.180	7.840	5.290	
LQU12	13.000	17.488	12.800	12.577	10.320	6.799	5.721	3.402	3.176	2.280	2.300	2.250	1.513	1.795	1.430	2.247	1.100	2.780	1.800	1.735	2.003	2.300	6.950	1.030	
LQU13	22.262	13.047	18.360	17.428	15.400	13.954	11.763	12.617	11.486	11.333	9.806	8.556	11.629	11.628	8.361	9.030	9.619	7.842	8.150	5.060	6.510	6.525	4.650	3.840	
LQU14	8.839	14.449	7.956	9.034	10.305	11.915	10.355	9.637	7.029	2.640	9.945	10.173	13.370	12.640	14.105	17.080	11.033	12.185	13.400	0.920	10.215	8.420	14.130	13.910	
LQU15	6.698	10.949	6.029	6.845	7.809	9.029	8.298	9.340	8.251	2.858	6.462	7.562	4.793	6.024	8.279	8.300	5.900	6.370	4.200	3.260	4.810	6.264	6.670	6.330	
LQU16	7.515	12.285	6.765	7.681	8.762	10.131	10.867	10.078	8.308	9.483	10.989	11.047	8.006	10.342	7.933	7.040	5.265	3.930	2.400	0.000	0.000	2.340	2.950	0.000	
LQU17	5.740	4.532	4.000	3.711	5.720	3.267	3.851	6.712	4.310	2.091	4.470	3.551	3.410	4.506	4.049	5.097	3.586	4.284	4.200	2.188	4.813	7.625	2.650	2.880	
LQU18	1.947	2.966	3.371	3.281	3.640	4.848	5.161	4.722	3.614	3.584	5.157	4.849	3.926	5.022	2.995	2.866	2.359	3.950	4.600	3.000	3.204	3.400	1.880	1.100	
LYU00	1.018	1.133	1.180	1.180	1.117	1.329	1.277	1.329	1.313	1.324	1.551	1.502	1.442	1.468	1.507	1.559	1.654	1.541	1.608	1.591	1.609	1.701	1.763	1.785	
LAU00	263.732	297.413	305.315	296.157	291.925	286.236	270.354	256.629	207.345	213.534	214.699	245.878	234.100	200.069	188.279	219.103	179.033	172.646	153.600	134.195	153.371	152.100	158.005	134.633	
LQUO	2.63	4.07	4.58	4.44	4.93	6.52	6.61	5.92	4.09	4.02	6.01	5.24	5.01	5.55	4.33	4.88	3.60	5.38	7.80	6.24	3.20	4.50	1.88	1.10	
LQU	268.52	337.04	360.21	349.46	326.19	380.46	345.31	341.05	272.29	282.83	332.95	369.38	337.53	293.63	283.65	341.56	296.11	266.00	247.00	213.50	246.79	258.75	278.60	240.30	
LQ	860.98	1053.13	1154.66	1092.35	1100.59	1321.10	1395.18	1450.32	1215.51	1003.38	1404.10	1491.50	1223.38	1502.30	1250.63	1577.02	1417.83	1413.50	1660.00	1674.50	2102.82	2201.70	2334.68	2416.50	
LIMP	127.84	1.11	55.58	20.01	29.46	42.24	7.56	4.48	2.33	4.18	6.25	4.71	29.02	7.80	6.35	18.29	17.72	29.72	22.15	45.12	5.23	15.22	24.42		
LSTC	-44.47	-7.78	-111.17	-22.23	-32.24	-155.63	-118.95	-121.17	33.35	88.93	-53.36	-110.06	27.79	-40.02	100.05	-72.26	55.58	44.47	-61.14	-83.38	-244.57	-300.15	-355.73		
LQS	657.65	695.77	714.57	726.37	731.31	767.78	819.19	850.67	846.43	762.37	889.42	889.49	872.80	969.81	940.57	997.91	1018.99	1016.99	1068.23	1078.63	1163.24	1183.61	1225.92		
LQC	208.12	216.75	218.52	216.83	213.21	217.50	226.30	228.67	221.58	194.48	220.70	215.37	205.85	222.94	210.89	218.36	217.27	211.87	217.12	214.01	225.43	224.17	227.02		
LFPR	0.0020	0.0029	0.0061	0.0083	0.0147	0.0128	0.0246	0.0368	0.0501	0.0491	0.0820	0.1046	0.1159	0.1242	0.1129	0.1159	0.1520	0.1850	0.2460	0.5010	0.8250	0.9300	0.9900	1.0700	
LRPR	0.004	0.006	0.013	0.017	0.030	0.026	0.050	0.075	0.102	0.100	0.167	0.213	0.236	0.253	0.230	0.236	0.334	0.362	0.545	1.040	1.622	1.871	2.002	2.201	
LWPR	273.02	340.29	398.55	258.63	252.25	237.66	204.16	170.76	198.64	269.37	288.07	270.20	287.14	291.03	257.18	484.96	314.85	366.67	216.85	321.01	264.11	265.95	205.37	222.39	
LCPI	0.61	0.95	1.29	1.63	2.88	3.91	10.40	14.68	19.19	27.02	43.59	59.12	67.07	73.69	78.30	83.62	100.00	113.02	144.12	275.23	628.68	786.39	847.810	937.950	
LEXR	367.5	10.0	21.7	35.0	35.0	35.0	55.0	95.0	187.5	400.4	591.5	707.8	702.1	716.1	716.3	717.7	804.7	921.0	1260.0	3298.3	7102.0	7887.6	8954.6	10056.3	
LGDP	355.87	355.87	410.43	429.78	442.67	471.18	514.15	538.98	533.81	522.60	574.22	612.68	637.10	681.70	712.80	780.60	835.60	893.20	955.00	993.10	1065.40	1127.00	1191.00	1259.00	
LPOP	3.16	3.21	3.27	3.35	3.43	3.53	3.62	3.72	3.82	3.92	4.03	4.13	4.24	4.35	4.46	4.57	4.69	4.80	4.92	5.04	5.16	5.28	5.40	5.53	
LET01JAN	23.7	10.3	18.1	31.4	29.8	26.1	24.9	18.1	26.7	26.2	25.2	19.8	24.4	28.4	18.9	11.9	28.6	30.2	34.8	16.0	31.6	35.4			
LET02JAN	50.7	27.0	39.9	59.4	58.8	62.8	41.1	52.5	57.0	56.2	43.5	27.4	56.4	51.1	53.4	26.2	64.9	53.7	55.9	44.7	51.9	68.4			
LET03JAN	38.6	29.1	33.5	59.4	60.5	68.6	43.0	50.2	58.6	54.0	43.1	28.9	60.1	54.5	55.2	25.5	70.5	44.8	54.4	52.9	64.3	70.5			
LET04JAN	37.9	22.6	30.3	57.8	56.5	66.1	38.7	44.5	58.0	46.5	38.2	27.4	52.0	47.4	49.3	22.7	69.1	50.9	54.4	41.4	53.5	65.2			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET05JAN	34.8	29.8	35.0	59.4	62.1	68.0	44.9	51.8	58.4	55.1	40.3	26.5	60.9	57.9	54.4	25.4	70.8	46.0	55.6	55.8	67.7	71.0			
LET06JAN	39.4	15.7	27.1	48.4	50.7	53.2	38.9	33.1	46.3	40.0	34.4	23.5	37.5	42.4	41.4	17.7	62.1	48.3	52.1	28.9	45.4	55.9			
LET07JAN	49.3	10.9	29.4	42.2	54.7	54.4	41.7	27.3	46.0	30.7	38.4	25.1	35.1	53.9	39.5	15.8	65.6	45.0	40.3	32.9	48.8	68.1			
LET08JAN	25.1	14.6	22.1	47.8	36.4	41.3	33.3	32.2	44.2	33.7	29.1	22.7	36.1	32.2	28.1	14.9	41.2	40.6	45.8	28.0	39.6	44.7			
LET09JAN	31.0	10.8	20.2	37.8	40.7	38.7	34.9	20.8	38.9	30.0	28.6	21.4	28.9	32.9	27.6	13.9	48.9	40.6	41.1	21.9	38.0	50.3			
LET10JAN	24.3	11.0	17.7	34.6	34.9	26.3	30.4	19.2	32.0	30.3	26.8	19.0	26.5	27.3	23.0	12.4	34.4	35.2	41.0	17.4	36.1	40.0			
LET11JAN	28.1	12.0	14.8	38.1	58.3	53.1	29.5	25.2	40.1	27.2	27.7	29.8	25.0	31.0	46.4	17.4	53.0	44.3	29.1	29.4	47.0	57.3			
LET12JAN	25.3	11.9	17.7	39.9	74.9	62.4	29.0	38.1	55.2	33.4	57.4	43.7	33.8	61.0	62.0	27.2	69.3	34.3	22.0	37.5	37.6	66.2			
LET13JAN	51.6	35.4	46.0	45.2	82.8	69.2	46.1	54.4	67.5	52.4	72.8	66.1	50.4	63.0	74.0	49.4	49.6	48.2	47.6	38.9	70.1	68.8			
LET14JAN	46.4	33.2	70.1	43.0	94.0	89.2	44.2	58.0	53.5	57.2	83.8	82.4	60.0	50.3	88.4	50.8	44.8	56.7	51.2	35.9	86.3	85.6			
LET15JAN	68.3	60.0	83.2	71.0	87.2	85.1	67.3	70.4	72.1	60.8	85.3	89.8	65.7	71.4	82.8	83.8	85.5	80.8	57.6	88.3	83.0	86.7			
LET16JAN	33.2	19.1	44.5	39.3	72.7	62.3	32.2	40.8	42.3	35.6	52.1	39.4	38.3	30.1	56.4	36.8	28.2	41.4	33.0	29.5	49.5	53.3			
LET17JAN	64.6	72.9	78.2	65.5	93.9	87.8	66.0	63.7	75.1	52.3	75.3	71.7	68.5	56.3	89.9	80.6	65.7	72.0	64.8	67.8	75.5	83.5			
LET00JAN	39.5	25.1	36.9	48.2	61.7	59.7	40.4	41.2	51.3	42.4	47.2	39.1	44.7	46.5	52.4	31.3	56.0	47.8	45.9	39.2	54.5	63.0			
LETOCJAN	27.2	11.4	17.6	37.6	52.2	45.1	31.0	25.8	41.6	30.2	35.1	28.5	28.6	38.1	39.8	17.7	51.4	38.6	33.3	26.6	39.7	53.5			
LETNJAN	39.4	21.4	31.0	53.5	54.2	59.2	40.2	41.7	52.6	45.2	38.1	25.9	48.3	48.5	45.9	21.2	63.5	47.0	51.2	40.7	53.0	63.4			
LETCJAN	30.7	15.2	22.4	37.8	53.6	46.0	32.5	29.3	43.4	33.3	39.8	33.3	31.5	40.6	42.0	22.0	47.3	38.8	35.9	26.9	43.4	53.0			
LETSJAN	53.1	46.3	69.0	54.7	87.0	81.1	52.4	58.2	60.8	51.5	74.1	70.8	58.1	52.0	79.4	63.0	56.1	62.7	51.7	55.4	73.6	77.3			
LET01FEB	31.5	11.3	14.4	28.6	23.9	17.1	33.4	21.8	23.2	22.6	15.2	23.6	14.0	38.8	17.9	20.3	15.9	15.8	35.2	27.1	19.2	20.9			
LET02FEB	44.3	29.7	37.4	61.5	67.1	57.5	40.4	34.5	43.4	49.7	33.9	46.4	33.4	67.7	72.0	38.6	64.3	32.5	41.2	38.0	35.4	70.0			
LET03FEB	30.6	24.0	31.5	57.5	55.5	57.9	37.3	32.7	41.2	42.4	26.3	27.6	34.8	60.5	51.1	22.5	65.6	26.1	39.3	33.6	38.6	53.5			
LET04FEB	36.6	21.9	28.3	53.7	47.2	53.0	38.4	28.7	39.9	40.7	23.8	32.0	28.2	57.4	44.3	22.7	57.4	30.4	40.8	32.3	34.1	45.0			
LET05FEB	24.2	21.1	32.1	54.1	53.8	58.8	31.2	33.6	44.2	36.2	27.2	27.6	36.6	53.3	46.6	19.7	64.8	25.5	38.7	36.8	41.5	47.3			
LET06FEB	41.1	20.1	25.6	42.7	40.6	36.5	41.0	26.5	34.6	37.1	22.7	36.6	21.2	58.5	40.8	23.7	47.5	27.4	44.2	34.5	27.7	42.6			
LET07FEB	59.9	20.3	26.5	42.9	45.9	36.7	47.2	23.8	33.4	37.7	27.7	47.5	21.6	58.1	45.1	23.4	53.1	29.5	43.2	41.6	30.9	43.5			
LET08FEB	26.7	14.3	19.4	40.8	29.5	29.9	32.6	25.1	29.9	28.4	19.2	31.5	20.2	41.9	27.4	18.0	26.2	25.7	36.0	29.8	26.0	25.9			
LET09FEB	41.6	14.9	17.0	35.9	34.0	25.1	41.2	23.5	32.1	27.9	19.1	28.3	16.4	48.7	29.8	24.5	28.8	22.0	40.5	33.8	23.2	27.4			
LET10FEB	34.6	12.2	14.1	31.3	26.3	16.8	38.5	22.3	27.7	24.4	16.2	22.0	15.3	43.1	23.7	20.0	18.5	18.1	41.2	31.4	21.0	23.1			
LET11FEB	33.9	13.6	10.7	29.0	48.6	26.2	51.0	25.0	26.8	29.4	15.6	34.3	13.1	54.4	31.1	29.3	26.5	23.6	28.4	30.9	31.1	25.3			
LET12FEB	38.6	12.2	16.7	32.8	72.4	33.5	59.0	31.6	28.2	36.5	28.8	38.5	17.1	62.3	40.7	25.9	32.5	21.4	27.8	27.1	23.0	26.6			
LET13FEB	45.1	22.5	38.2	33.3	74.8	42.9	60.2	38.3	30.3	32.7	53.7	43.3	20.6	54.8	52.3	43.3	25.4	27.3	40.4	33.4	56.2	37.4			
LET14FEB	35.7	23.8	45.0	32.3	91.2	65.9	62.5	40.2	28.3	37.3	58.7	53.3	26.5	47.3	68.4	49.1	21.3	35.5	41.3	35.8	71.6	46.8			
LET15FEB	42.9	34.3	63.5	48.4	100.1	87.9	78.3	55.4	40.6	43.6	78.3	66.3	34.9	65.5	83.0	69.1	54.0	48.0	39.8	61.8	99.6	67.4			
LET16FEB	19.0	13.7	31.1	27.3	49.9	37.6	37.8	26.2	19.2	21.6	28.5	23.5	17.3	26.4	33.9	27.8	17.1	23.6	20.7	26.5	35.4	28.8			
LET17FEB	31.6	32.7	63.6	40.8	98.4	68.3	66.7	45.8	38.9	36.3	65.4	49.5	30.9	51.8	71.5	58.7	42.1	38.7	39.7	48.4	88.2	58.2			
LET00FEB	36.3	20.2	30.3	40.8	56.4	44.2	46.9	31.5	33.1	34.4	33.0	37.2	23.7	52.4	45.9	31.6	38.9	27.7	37.6	35.5	41.3	40.6			
LETOCFEB	37.2	13.2	14.6	32.3	45.3	25.4	47.4	25.6	28.7	29.6	19.9	30.8	15.5	52.1	31.3	24.9	26.6	21.3	34.5	30.8	24.6	25.6			
LETNFEB	37.6	21.6	28.7	50.5	48.5	47.2	38.3	29.3	38.1	38.9	25.8	35.6	28.0	56.8	46.8	24.1	54.1	28.2	40.5	35.2	33.5	46.8			
LETCFEB	37.6	14.5	18.5	31.8	46.7	26.9	47.2	27.1	28.1	28.9	24.8	31.7	16.1	50.4	32.6	27.2	24.6	21.4	35.6	30.6	29.0	26.8			
LETSFEB	32.3	26.1	50.8	37.2	84.9	64.9	61.3	41.9	31.8	34.7	57.7	48.2	27.4	47.8	64.2	51.2	33.6	36.5	35.4	43.1	73.7	50.3			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET01MAR	19.4	30.6	42.1	44.2	35.9	24.6	32.0	16.0	39.6	22.9	27.0	70.4	16.9	24.1	16.5	29.0	20.1	22.9	44.9	53.1	45.2	37.1			
LET02MAR	31.9	42.3	48.3	43.0	63.5	37.2	37.3	29.0	43.3	36.8	48.8	73.7	32.0	68.8	41.1	30.7	52.3	37.5	68.5	43.6	27.1	50.6			
LET03MAR	18.9	35.6	40.6	37.4	53.7	30.9	26.7	25.4	44.8	24.6	37.8	78.1	29.0	49.6	30.7	38.7	40.8	28.2	49.3	30.9	28.6	42.2			
LET04MAR	23.0	38.3	41.2	38.2	49.2	31.9	31.3	24.0	43.4	24.0	36.6	76.6	28.5	39.3	28.3	31.6	34.5	30.6	57.6	40.9	30.9	40.9			
LET05MAR	15.2	31.6	29.7	34.3	44.2	30.8	22.0	24.8	48.2	20.2	34.7	61.3	28.2	46.5	26.4	41.1	39.7	26.0	41.6	31.5	28.1	38.9			
LET06MAR	35.1	36.6	49.5	47.1	48.1	31.9	40.3	24.1	47.2	29.5	35.6	78.5	25.4	40.1	29.2	29.1	31.9	31.4	58.1	55.5	35.7	41.8			
LET07MAR	55.8	44.6	46.6	49.4	57.2	41.3	63.8	23.9	45.7	41.0	49.0	82.8	30.8	53.9	39.6	48.6	47.5	31.0	63.1	58.7	35.9	50.6			
LET08MAR	20.6	28.4	42.8	38.1	36.4	25.2	28.5	20.9	43.6	19.2	28.1	64.1	23.1	27.2	17.5	33.1	19.2	28.7	49.4	48.5	38.0	40.3			
LET09MAR	36.0	38.9	45.9	48.2	44.9	30.2	49.0	18.9	43.1	30.6	35.4	76.2	21.4	34.8	27.1	34.7	27.5	27.0	54.8	58.3	47.8	43.1			
LET10MAR	24.0	36.1	37.6	43.0	32.1	24.7	37.3	17.3	40.6	26.1	30.6	75.7	17.5	29.5	21.7	31.3	20.8	25.1	49.1	59.4	49.0	43.3			
LET11MAR	42.5	24.1	55.7	47.5	55.2	35.7	57.9	16.1	48.8	27.6	40.4	80.3	23.2	27.6	26.7	52.0	32.0	27.3	63.1	66.5	56.1	44.5			
LET12MAR	28.7	21.0	29.3	37.8	63.4	43.5	50.6	21.4	41.8	23.2	38.4	76.1	25.4	39.6	25.5	68.1	29.7	27.8	61.9	51.6	41.5	40.7			
LET13MAR	24.6	31.0	23.2	31.5	63.6	42.6	56.8	24.8	32.1	26.2	44.0	59.2	27.4	41.7	30.8	57.5	31.6	31.9	58.2	58.1	39.0	30.3			
LET14MAR	21.1	27.3	20.6	32.3	56.6	45.2	56.6	22.8	28.7	29.1	49.4	50.7	30.2	29.6	34.2	48.5	27.9	31.9	60.8	49.9	34.2	35.1			
LET15MAR	28.3	29.3	42.0	35.8	59.8	65.1	66.4	28.4	37.8	37.9	59.0	67.3	35.0	47.7	40.6	62.1	47.8	42.3	74.4	66.8	60.5	44.4			
LET16MAR	13.8	24.3	19.7	24.3	27.1	27.6	30.9	13.4	22.9	19.6	28.9	31.7	17.9	17.8	19.8	30.3	19.0	21.0	33.6	38.1	22.0	21.0			
LET17MAR	20.9	32.4	33.3	35.2	52.3	49.5	45.9	22.8	36.4	34.0	40.0	54.0	32.5	31.2	37.7	43.3	30.9	35.1	59.1	52.4	43.5	34.6			
LET00MAR	27.0	32.5	38.1	39.3	49.6	36.3	43.1	22.0	40.5	27.8	39.0	68.0	26.1	38.2	29.0	41.7	32.5	29.7	55.7	50.8	39.0	40.0			
LETOCMAR	32.8	30.0	42.1	44.1	48.9	33.5	48.7	18.4	43.6	26.9	36.2	77.1	21.9	32.9	25.3	46.5	27.5	26.8	57.2	59.0	48.6	42.9			
LETNMAR	28.6	36.8	42.7	41.1	50.3	32.7	35.7	24.6	45.2	27.9	38.7	73.6	28.1	46.5	30.4	36.1	38.0	30.5	55.4	44.2	32.0	43.6			
LETCMAR	29.2	30.3	39.0	42.0	49.2	33.6	47.3	19.1	41.0	26.1	36.0	73.0	22.0	32.9	24.7	45.4	27.0	27.0	55.3	57.8	46.4	39.8			
LETSMAR	21.0	28.3	28.9	31.9	49.0	46.9	50.0	21.9	31.5	30.2	44.3	50.9	28.9	31.6	33.1	46.1	31.4	32.6	57.0	51.8	40.1	33.8			
LET01APR	32.6	44.8	68.9	39.0	63.6	74.1	73.4	54.8	41.4	47.6	51.6	65.4	19.7	20.1	40.5	51.5	24.6	45.9	77.8	52.3	55.3	90.8			
LET02APR	42.7	28.1	68.2	58.1	59.3	57.4	62.3	94.8	71.3	31.1	56.5	72.7	52.6	56.1	59.5	64.1	29.6	50.9	84.6	77.7	44.0	69.1			
LET03APR	34.3	31.3	58.0	40.6	41.7	56.5	60.9	81.4	77.5	29.4	49.7	51.4	49.1	38.7	41.2	51.8	26.0	51.6	107.7	59.9	37.6	62.1			
LET04APR	43.6	42.4	72.9	48.4	54.9	71.9	74.6	77.5	80.9	37.6	49.1	66.1	50.4	33.0	47.3	63.2	22.6	64.0	105.6	69.2	48.4	74.7			
LET05APR	36.5	22.6	45.9	34.8	41.3	47.2	67.4	96.7	80.1	40.0	45.5	47.3	50.5	44.6	30.0	51.1	27.8	50.2	113.4	36.1	37.6	67.2			
LET06APR	44.6	59.0	82.2	47.1	69.5	70.9	90.4	81.1	64.4	35.4	61.1	84.2	35.3	36.2	47.6	55.1	23.8	68.2	92.0	77.9	58.9	89.9			
LET07APR	58.0	79.3	82.7	62.4	82.4	78.7	93.0	85.1	48.9	37.2	68.2	97.5	35.7	39.5	53.2	47.5	40.9	52.5	93.5	70.5	66.6	85.9			
LET08APR	43.5	46.2	74.0	40.1	59.3	79.5	83.2	67.0	70.9	46.1	57.5	72.7	41.2	29.7	47.3	64.1	19.7	75.3	91.4	54.6	62.5	95.7			
LET09APR	45.2	61.5	86.2	50.3	72.8	80.4	92.9	64.4	49.0	37.7	61.6	84.1	26.8	25.3	48.5	51.6	32.3	56.5	89.6	59.7	64.1	88.8			
LET10APR	36.4	48.0	88.5	49.2	76.4	84.8	91.5	64.2	51.2	45.9	53.7	71.0	24.6	24.4	44.9	56.7	26.0	52.7	75.4	53.5	61.2	92.9			
LET11APR	45.4	68.5	74.6	46.4	83.7	85.4	93.6	48.5	35.8	58.1	63.5	58.2	16.3	16.1	39.5	49.8	41.0	53.6	108.1	58.0	80.2	98.2			
LET12APR	44.8	59.6	78.9	35.0	99.7	67.7	94.9	53.3	53.1	79.8	60.9	69.8	18.9	23.1	50.9	42.4	53.2	46.6	100.0	53.4	78.2	100.1			
LET13APR	35.4	53.9	58.2	34.3	72.5	69.5	71.9	49.3	56.5	81.6	62.8	58.8	19.6	32.7	59.3	35.5	38.4	36.2	87.7	34.7	50.5	77.0			
LET14APR	32.9	47.0	48.4	21.0	66.3	66.8	53.5	55.2	41.4	78.0	60.9	54.1	23.2	31.5	62.5	27.3	37.1	34.5	63.6	33.9	47.5	64.5			
LET15APR	37.5	53.8	60.7	28.9	69.6	55.1	55.8	47.8	57.2	62.2	73.1	49.0	29.9	29.3	68.1	42.3	42.7	43.0	86.9	46.0	53.9	63.3			
LET16APR	34.4	46.6	42.7	26.7	45.8	45.8	46.0	36.7	36.5	71.7	48.1	39.9	27.4	22.1	55.7	21.9	32.8	35.6	60.6	34.4	39.7	60.9			
LET17APR	40.9	53.4	56.8	24.8	57.3	52.6	54.0	37.5	50.9	78.3	50.4	43.3	27.0	24.6	65.1	27.3	35.1	35.3	67.0	40.0	42.6	61.5			
LET00APR	40.5	49.8	67.5	40.4	65.7	67.3	74.1	64.4	56.9	52.8	57.3	63.9	32.2	31.0	50.7	47.2	32.6	50.2	88.5	53.6	54.6	79.0			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LETOCAPR	43.0	59.4	82.1	45.2	83.2	79.6	93.2	57.6	47.3	55.4	59.9	70.8	21.7	22.2	46.0	50.1	38.1	52.4	93.3	56.2	70.9	95.0			
LETNAPR	43.3	44.1	69.1	47.4	58.3	66.0	76.0	83.4	70.6	36.7	55.4	70.3	45.0	39.7	46.6	56.7	27.2	59.0	98.3	63.7	50.8	77.8			
LETCAPR	40.0	56.1	75.9	42.4	78.1	77.0	86.4	55.8	47.8	58.5	59.0	67.9	21.0	23.6	47.3	47.9	35.9	48.6	89.8	51.9	64.9	91.3			
LETSAPR	36.4	50.2	52.2	25.4	59.8	55.1	52.3	44.3	46.5	72.6	58.1	46.6	26.9	26.9	62.9	29.7	36.9	37.1	69.5	38.6	45.9	62.6			
LET01MAY	93.1	110.5	87.2	89.5	70.4	85.6	96.6	94.7	104.3	89.3	95.1	91.2	57.2	77.8	102.8	94.5	83.1	94.8	102.0	97.0	69.6	92.5			
LET02MAY	99.8	78.7	97.4	92.2	71.2	83.5	113.9	111.8	94.3	97.8	111.5	97.9	90.8	82.2	90.9	97.3	62.8	108.7	119.2	85.0	74.6	91.8			
LET03MAY	84.6	70.7	96.4	97.3	78.0	68.1	105.8	113.3	89.3	102.8	98.7	74.1	97.1	66.8	107.9	90.1	61.4	107.7	100.9	80.0	80.3	92.4			
LET04MAY	90.6	80.7	96.3	105.2	75.3	84.0	103.7	111.7	102.3	101.3	103.2	79.2	92.6	75.6	107.9	94.5	61.7	107.4	109.3	78.8	81.4	97.6			
LET05MAY	75.6	93.9	100.5	102.4	75.8	82.3	103.9	113.1	79.3	101.5	106.4	77.1	97.0	63.6	105.4	90.8	74.6	105.3	87.8	95.4	79.6	87.2			
LET06MAY	98.9	107.1	94.6	105.2	73.4	103.3	104.6	109.4	111.0	104.0	108.9	94.0	89.5	75.5	105.7	98.4	77.6	103.3	117.1	92.3	77.5	99.3			
LET07MAY	102.5	119.1	105.2	93.8	100.1	108.8	117.9	112.3	124.5	105.6	97.7	104.2	67.8	86.4	113.7	98.7	97.9	109.3	132.2	112.4	82.7	111.0			
LET08MAY	89.3	102.8	91.5	101.6	68.3	87.7	101.7	98.4	112.2	96.1	97.4	82.8	72.3	69.5	93.6	84.7	73.1	101.6	106.0	79.1	74.2	93.2			
LET09MAY	93.3	109.7	89.9	92.4	79.3	95.6	103.3	99.3	106.0	99.3	104.0	95.1	65.5	78.3	101.8	93.8	78.7	94.6	110.9	101.7	71.4	95.8			
LET10MAY	94.8	109.7	87.1	98.8	71.8	88.6	98.3	97.1	102.6	92.5	106.8	92.7	64.6	93.2	105.6	98.6	72.0	98.5	108.5	100.6	70.3	93.9			
LET11MAY	94.6	106.7	98.7	76.1	71.3	95.8	113.2	101.8	102.9	104.0	104.6	101.9	55.1	64.1	103.6	98.2	83.1	84.5	112.3	90.4	72.7	102.7			
LET12MAY	104.2	113.4	101.2	77.7	79.4	97.8	120.2	101.9	119.3	115.8	109.1	83.4	41.4	78.8	113.7	84.7	77.4	77.4	119.5	91.9	72.5	105.5			
LET13MAY	93.9	95.4	99.1	62.7	78.1	83.3	113.7	83.9	101.1	119.5	89.7	85.8	58.6	79.7	109.5	71.3	89.6	75.0	108.4	89.0	83.3	108.8			
LET14MAY	98.0	100.6	98.6	68.2	77.4	89.8	111.3	71.4	106.5	120.5	98.7	99.2	81.0	65.2	106.9	68.2	95.3	65.7	109.0	81.5	89.2	105.3			
LET15MAY	70.7	82.8	94.2	67.4	87.7	83.1	94.0	76.9	104.2	112.7	83.1	86.4	81.4	75.3	101.6	85.3	110.1	66.9	84.2	90.0	86.3	103.2			
LET16MAY	91.6	85.3	95.7	65.6	77.2	92.3	108.8	81.9	112.7	116.7	100.4	85.9	82.8	78.9	114.5	86.4	97.5	83.3	104.3	95.6	90.6	112.8			
LET17MAY	84.1	63.2	93.2	68.3	78.4	81.4	98.2	82.0	116.7	108.7	96.2	93.7	73.6	91.6	99.3	76.0	102.9	74.5	99.6	82.6	90.6	104.7			
LET00MAY	91.7	95.9	95.7	86.1	77.2	88.9	106.4	97.7	105.2	105.2	100.7	89.7	74.6	76.6	105.0	88.9	82.3	91.7	107.7	90.8	79.2	99.9			
LETOCMAY	96.7	109.9	94.2	86.3	75.5	94.5	108.8	100.0	107.7	102.9	106.1	93.3	56.7	78.6	106.2	93.8	77.8	88.8	112.8	96.2	71.7	99.5			
LETNMAY	91.6	93.3	97.4	99.7	77.4	88.2	107.4	110.0	101.8	101.3	103.4	87.0	86.7	74.2	103.6	93.5	72.7	106.2	110.4	89.0	78.6	96.1			
LETCMAY	95.7	107.6	93.9	82.9	75.1	91.1	107.6	96.5	106.0	103.4	101.6	91.7	57.1	78.7	106.2	90.2	80.7	87.5	110.3	95.1	73.3	99.9			
LETSMAY	86.1	83.0	95.4	67.4	80.2	86.7	103.1	78.1	110.0	114.7	94.6	91.3	79.7	77.8	105.6	79.0	101.5	72.6	99.3	87.4	89.2	106.5			
LET01JUN	70.6	76.4	76.5	87.0	90.4	83.3	80.3	86.0	85.5	85.9	86.8	76.5	81.6	80.6	97.8	70.5	87.5	89.5	98.9	95.8	78.3	77.7			
LET02JUN	81.1	88.0	92.5	93.8	101.6	92.6	89.1	95.5	77.9	96.8	92.2	85.4	77.7	83.0	107.2	83.1	87.7	91.6	77.1	93.1	98.6	81.5			
LET03JUN	72.7	81.8	87.6	86.2	94.1	87.4	86.8	93.7	84.3	93.4	90.1	84.6	75.0	81.0	98.3	81.4	85.8	89.4	61.8	92.6	92.4	78.5			
LET04JUN	74.9	80.7	86.4	89.8	98.4	87.5	87.2	93.0	86.6	96.2	89.1	81.2	74.0	80.8	101.5	79.6	88.3	90.1	86.2	95.2	90.7	78.5			
LET05JUN	75.5	81.7	87.1	91.8	93.6	81.8	84.9	91.4	88.3	94.3	91.4	86.0	73.0	72.4	97.3	81.3	86.3	89.1	63.3	93.1	89.5	77.1			
LET06JUN	77.6	80.3	87.7	91.8	103.8	90.7	87.2	93.5	88.4	96.9	92.8	84.2	80.7	89.6	103.6	78.1	90.0	93.4	100.4	96.7	92.7	82.0			
LET07JUN	88.7	90.2	106.3	100.7	110.9	103.5	95.2	105.6	101.1	108.0	104.5	99.2	87.2	101.5	109.4	88.1	101.0	103.7	110.9	101.1	106.5	98.3			
LET08JUN	72.0	75.5	80.4	92.5	94.6	83.9	82.1	86.7	87.1	90.2	86.1	74.2	68.4	75.2	99.3	74.3	88.7	90.0	98.4	97.9	83.0	76.1			
LET09JUN	72.8	74.4	83.3	86.5	96.0	86.5	81.9	88.5	85.0	90.9	87.5	80.4	81.8	86.4	93.4	70.6	85.3	91.5	97.5	93.3	83.7	81.5			
LET10JUN	71.0	76.0	77.6	88.1	89.1	84.2	81.9	86.8	86.0	88.4	86.8	77.9	79.6	83.3	97.4	70.7	87.2	90.2	99.0	95.5	80.4	78.7			
LET11JUN	74.7	75.1	90.1	87.1	102.6	89.1	78.0	92.4	87.9	92.9	92.4	82.7	88.7	84.4	91.4	71.1	86.1	96.4	97.4	93.3	83.9	88.4			
LET12JUN	78.2	80.8	91.3	91.1	108.5	94.6	82.7	101.9	96.2	100.5	101.9	85.0	94.0	84.5	98.5	73.7	90.8	99.4	99.4	96.9	88.3	93.0			
LET13JUN	79.4	86.2	87.0	89.2	100.6	95.3	86.2	104.8	103.4	100.6	107.4	84.9	93.5	86.4	103.5	75.7	96.9	96.2	103.1	100.5	95.9	97.6			
LET14JUN	78.0	85.5	84.7	88.4	101.9	92.4	82.2	101.2	100.6	96.4	101.5	84.3	88.8	86.4	104.5	77.6	100.0	97.6	103.8	102.4	100.8	96.7			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET15JUN	76.7	82.0	81.0	86.9	90.3	90.7	79.6	108.4	97.4	95.7	98.9	83.6	90.7	85.7	102.3	76.3	99.7	96.9	98.7	100.1	98.2	95.4			
LET16JUN	78.9	83.0	82.8	91.3	103.6	90.7	80.0	103.4	98.3	93.4	99.9	84.6	90.6	89.1	108.7	79.5	107.4	101.7	105.0	103.7	99.0	94.1			
LET17JUN	77.8	82.9	81.2	90.0	100.3	90.8	79.0	108.2	98.5	95.2	97.7	84.8	90.4	87.8	107.9	79.3	104.1	103.1	102.6	105.0	98.8	94.9			
LET00JUN	76.5	81.2	86.1	90.1	98.8	89.7	83.8	96.5	91.3	95.0	94.5	83.5	83.3	84.6	101.3	77.1	92.5	94.7	94.3	97.4	91.8	86.5			
LETOCJUN	74.2	76.6	85.6	88.2	99.1	88.6	81.1	92.4	88.8	93.2	92.2	81.5	86.0	84.7	95.2	71.5	87.4	94.4	98.3	94.8	84.1	85.4			
LETNJUN	77.5	82.6	89.7	92.4	99.6	89.6	87.5	94.2	87.7	96.5	92.3	85.0	76.6	83.4	102.4	80.8	89.7	92.5	85.4	95.7	93.3	81.7			
LETCJUN	74.5	78.2	84.3	88.2	97.9	88.8	81.8	93.4	90.7	93.2	93.8	81.2	86.5	84.3	97.0	72.1	89.0	93.9	99.2	95.9	85.1	86.2			
LETSJUN	77.9	83.4	82.4	89.2	99.0	91.2	80.2	105.3	98.7	95.2	99.5	84.3	90.1	87.3	105.9	78.2	102.8	99.8	102.5	102.8	99.2	95.3			
LET01JLY	95.8	80.1	77.1	84.9	96.3	85.6	87.7	82.4	82.2	88.1	86.6	73.3	83.2	89.2	92.8	83.0	78.3	83.3	80.1	86.4	79.4	84.6			
LET02JLY	90.9	85.5	88.1	91.9	95.7	86.6	86.8	78.3	80.1	88.5	94.5	79.1	83.9	84.2	90.5	88.9	86.2	79.1	82.3	77.5	79.2	89.5			
LET03JLY	83.1	78.1	75.4	78.3	89.9	75.8	76.7	74.2	72.2	83.3	86.6	72.9	76.8	77.2	79.8	78.5	79.5	71.8	75.5	72.2	71.7	79.8			
LET04JLY	84.7	78.8	76.4	81.9	94.1	79.1	81.1	75.6	73.8	86.3	89.6	74.9	77.8	80.8	84.1	79.7	79.8	74.4	77.3	73.7	73.8	81.2			
LET05JLY	85.3	78.4	74.9	79.2	91.7	77.2	78.3	76.6	73.9	84.0	85.8	73.5	77.6	76.7	80.4	77.9	79.9	72.9	75.9	73.2	72.5	78.4			
LET06JLY	93.5	81.1	81.2	89.8	98.9	86.7	86.8	80.5	81.2	91.4	94.7	78.3	84.0	85.5	91.2	82.5	83.3	79.7	82.1	82.1	81.5	87.0			
LET07JLY	115.7	93.6	97.2	107.2	118.6	110.2	104.5	96.3	99.5	109.6	115.0	96.3	98.6	97.4	105.7	93.4	98.0	94.4	99.9	101.3	100.6	106.9			
LET08JLY	90.5	76.4	72.8	78.5	93.3	79.8	81.8	77.7	77.0	82.8	82.7	69.8	77.0	83.4	86.2	76.4	73.2	76.6	76.2	76.1	72.7	77.9			
LET09JLY	95.2	78.5	78.3	89.5	96.8	85.6	86.3	81.2	79.9	90.5	90.5	75.9	82.1	83.4	90.3	79.1	78.4	79.6	79.8	84.3	79.7	84.3			
LET10JLY	93.6	78.4	75.4	86.6	94.6	82.5	86.1	80.8	79.9	87.0	86.4	72.3	81.8	86.4	91.4	81.3	76.5	80.1	77.7	83.4	78.2	81.5			
LET11JLY	103.5	81.3	81.8	96.0	100.2	93.0	90.5	86.8	85.3	97.0	92.8	81.5	86.6	83.0	94.8	77.7	81.3	86.2	85.0	91.0	82.8	92.3			
LET12JLY	108.6	83.3	80.9	101.8	107.4	100.3	101.5	92.2	90.5	103.7	91.7	85.6	86.8	82.2	98.1	77.7	84.6	89.6	89.4	94.6	84.8	97.5			
LET13JLY	112.8	91.0	84.3	107.4	111.5	102.7	112.8	98.9	97.0	109.4	94.9	91.0	89.3	87.6	101.9	83.6	90.9	94.7	93.8	100.2	90.7	98.1			
LET14JLY	109.7	93.5	83.1	103.2	110.2	98.5	104.3	97.8	90.5	106.4	94.9	92.8	90.4	90.2	104.2	84.3	93.9	94.5	95.1	98.5	94.9	95.0			
LET15JLY	103.2	91.8	81.9	101.1	105.3	96.3	100.5	96.8	87.5	100.8	89.4	97.3	83.3	87.4	103.3	79.5	87.6	93.7	92.8	96.8	92.8	93.3			
LET16JLY	103.3	89.7	81.3	98.1	107.9	96.9	96.3	95.6	86.5	101.0	91.2	96.1	84.7	93.3	102.0	82.0	95.2	93.5	95.9	97.5	90.2	92.9			
LET17JLY	103.8	91.2	82.3	102.7	106.4	96.8	99.1	95.8	88.1	101.8	90.0	99.6	83.6	91.0	103.2	77.9	90.5	93.9	93.5	97.7	91.0	93.6			
LET00JLY	98.4	84.2	80.7	92.8	101.1	90.2	91.8	86.3	83.8	94.8	91.6	83.0	84.0	85.8	94.1	81.4	84.5	84.6	85.4	87.4	83.3	89.0			
LETOCJLY	100.2	80.4	79.1	93.5	99.8	90.4	91.1	85.3	83.9	94.6	90.4	78.8	84.3	83.8	93.7	79.0	80.2	83.9	83.0	88.3	81.4	88.9			
LETNJLY	92.0	81.7	80.9	86.7	97.5	85.1	85.1	79.9	79.7	89.4	92.7	77.8	82.2	83.6	88.3	82.5	82.8	78.4	81.3	79.4	78.9	85.8			
LETCJLY	101.6	82.1	79.6	94.4	101.1	91.6	94.2	87.1	85.8	96.0	90.5	79.9	85.0	85.3	94.9	80.4	81.7	85.6	84.3	90.0	82.6	89.7			
LETSJLY	105.0	91.6	82.2	101.3	107.5	97.1	100.1	96.5	88.2	102.5	91.4	96.5	85.5	90.5	103.2	80.9	91.8	93.9	94.3	97.6	92.2	93.7			
LET01AUG	75.1	75.5	76.1	74.6	82.7	74.4	73.2	89.9	85.9	65.0	81.8	90.8	73.7	90.9	77.8	74.7	75.5	79.5	78.5	99.6	73.2	85.7			
LET02AUG	75.7	76.1	84.8	81.3	91.1	87.5	79.4	91.7	83.9	68.8	95.8	107.3	87.9	104.3	76.7	81.0	79.6	82.6	80.0	97.1	68.0	99.8			
LET03AUG	68.9	72.6	79.4	73.5	83.7	79.2	75.5	88.5	79.2	65.9	88.4	98.5	79.3	97.1	71.3	73.4	71.3	77.6	73.7	92.3	62.9	90.5			
LET04AUG	68.9	72.7	79.7	75.7	84.1	79.0	76.1	91.1	81.7	66.9	90.1	98.6	78.4	98.6	73.2	73.4	73.0	78.2	75.7	93.5	66.4	92.7			
LET05AUG	68.6	74.3	80.1	73.8	83.7	80.9	76.7	87.8	80.4	66.7	88.4	98.9	79.3	97.6	72.6	73.7	70.7	78.9	72.7	93.1	62.6	89.0			
LET06AUG	72.6	76.0	81.8	79.4	86.1	80.1	76.1	92.0	85.3	69.6	91.8	100.2	81.3	99.8	77.7	78.0	76.3	79.1	80.5	97.5	72.0	96.9			
LET07AUG	85.8	88.8	99.0	91.0	96.2	91.0	83.2	104.5	99.2	80.1	99.8	113.5	92.6	113.9	90.2	91.5	86.6	90.1	95.6	118.8	85.6	110.5			
LET08AUG	68.6	73.0	75.5	70.1	79.5	73.1	71.1	87.8	81.3	64.8	81.9	90.3	71.3	90.4	73.0	70.0	70.3	77.3	74.1	90.2	66.8	85.0			
LET09AUG	70.9	74.0	79.5	75.0	82.4	73.7	70.4	86.2	84.3	65.6	83.6	92.6	75.2	92.4	75.7	73.4	72.0	75.5	78.3	99.6	70.8	90.3			
LET10AUG	70.7	73.6	75.7	72.5	82.2	73.9	71.2	88.0	84.1	64.3	82.3	91.6	73.2	90.7	76.0	72.4	73.0	78.1	75.5	97.7	69.6	86.2			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET11AUG	73.9	80.3	85.6	79.5	84.6	75.0	72.5	89.0	92.1	70.6	83.1	92.3	75.9	93.9	80.6	74.3	73.5	76.3	82.1	106.9	79.5	90.5			
LET12AUG	80.5	87.0	90.5	85.6	85.8	72.9	78.9	96.2	103.7	78.1	85.9	91.5	79.6	96.1	84.7	78.1	75.1	80.7	88.9	112.6	84.8	97.1			
LET13AUG	88.2	93.9	95.5	88.9	91.0	76.9	88.8	101.2	112.0	89.5	90.2	92.8	85.2	95.1	92.5	88.0	84.4	89.8	100.7	112.3	93.2	105.1			
LET14AUG	88.4	96.3	97.5	88.5	93.1	76.1	91.8	95.4	105.9	95.1	88.1	93.2	85.6	90.7	94.8	92.2	90.0	95.3	102.4	110.2	97.3	103.8			
LET15AUG	90.4	99.8	96.2	93.4	92.3	78.1	94.1	94.1	104.4	99.1	84.9	95.5	84.7	91.2	98.5	91.6	86.2	97.1	99.5	110.5	100.5	102.9			
LET16AUG	85.6	96.6	93.7	89.4	90.1	73.7	88.4	86.6	102.6	94.4	86.0	92.9	83.4	85.2	94.7	94.3	94.1	96.7	97.6	105.2	95.5	99.8			
LET17AUG	91.7	101.8	97.7	97.4	92.2	77.0	92.8	92.5	106.5	101.1	86.7	97.9	85.7	90.0	97.2	93.7	91.0	100.6	101.8	109.4	100.1	104.8			
LET00AUG	77.9	83.1	86.4	81.7	87.1	77.8	80.0	91.9	92.5	76.8	87.6	96.4	80.7	95.2	82.8	80.8	79.0	84.3	85.7	102.7	79.3	95.9			
LETOCAUG	74.0	78.7	82.8	78.2	83.8	73.9	73.3	89.9	91.1	69.7	83.7	92.0	76.0	93.3	79.3	74.6	73.4	77.7	81.2	104.2	76.2	91.0			
LETNAUG	72.7	76.2	82.9	77.8	86.3	81.5	76.9	91.9	84.4	69.0	90.9	101.0	81.4	100.2	76.4	77.3	75.4	80.5	78.9	97.5	69.2	94.9			
LETCAUG	76.6	80.7	83.8	79.4	84.8	74.5	75.8	91.8	93.7	72.2	84.5	91.9	77.1	93.2	81.2	76.8	75.6	80.0	84.0	104.8	78.5	92.5			
LETSAUG	89.0	98.6	96.3	92.2	91.9	76.2	91.8	92.2	104.9	97.4	86.4	94.9	84.9	89.3	96.3	93.0	90.3	97.4	100.3	108.8	98.4	102.8			
LET01SEP	79.0	78.0	87.5	72.1	82.9	91.0	80.8	93.8	85.4	87.3	83.2	80.3	87.2	87.6	90.2	80.6	96.6	79.2	89.9	89.8	85.3	81.4			
LET02SEP	77.1	88.7	96.2	82.4	86.6	87.7	80.5	88.0	83.4	83.0	90.9	90.2	84.5	93.9	85.9	82.9	85.1	96.3	87.3	102.4	88.7	85.1			
LET03SEP	74.9	83.5	94.1	79.3	82.1	85.0	81.3	83.8	83.0	82.9	80.1	86.3	80.9	90.1	83.2	82.8	83.6	86.8	87.7	93.6	79.6	79.1			
LET04SEP	77.4	85.2	95.8	79.7	84.2	88.3	84.7	88.7	85.9	85.3	83.8	86.6	85.1	92.2	87.2	83.4	86.7	86.3	90.2	96.5	85.5	82.6			
LET05SEP	77.1	81.9	92.6	78.2	84.1	84.2	80.9	81.5	82.8	84.3	78.3	85.8	81.3	89.7	82.9	82.6	84.2	85.8	89.0	92.7	76.7	76.9			
LET06SEP	81.3	87.9	98.9	81.9	88.1	89.1	85.5	93.0	90.0	89.0	88.3	91.1	91.0	94.4	91.5	85.1	91.8	86.8	92.6	101.5	91.0	87.9			
LET07SEP	90.2	101.0	109.6	85.3	102.9	95.6	90.1	104.9	99.2	98.5	101.8	102.2	105.7	102.6	97.4	91.4	97.4	96.6	102.6	113.7	103.8	102.3			
LET08SEP	76.3	77.5	86.4	71.0	78.2	84.7	80.9	88.4	80.4	82.7	77.6	79.3	81.2	84.1	85.4	79.1	86.7	78.1	85.4	89.1	80.7	75.1			
LET09SEP	80.0	80.2	95.1	75.4	87.8	87.8	80.6	93.0	86.7	88.1	87.4	86.3	90.5	88.9	88.4	79.2	91.0	81.7	90.7	95.3	87.2	84.9			
LET10SEP	77.5	78.4	88.7	72.8	81.7	88.0	80.5	92.2	84.8	86.0	82.5	81.5	87.0	87.4	88.3	78.5	93.1	79.0	90.1	90.5	83.7	80.9			
LET11SEP	86.6	79.2	102.5	77.8	99.0	93.9	81.1	100.0	92.4	95.5	95.7	91.0	97.3	92.3	92.9	81.5	95.6	82.6	94.2	97.4	90.2	91.3			
LET12SEP	92.0	78.4	103.1	84.7	107.2	99.7	86.6	108.0	96.3	98.5	101.3	93.5	103.9	94.7	98.9	84.3	96.7	83.3	96.1	94.5	95.0	95.6			
LET13SEP	94.9	74.4	101.4	87.4	106.1	97.4	85.9	108.8	96.0	97.0	100.3	91.5	99.1	91.5	97.1	86.3	92.0	79.8	95.7	90.2	99.5	96.0			
LET14SEP	93.4	69.3	105.6	82.2	105.1	92.6	83.1	102.7	90.0	93.7	94.2	87.6	91.3	86.6	91.7	85.4	82.9	79.4	95.0	89.9	102.0	94.5			
LET15SEP	87.8	65.4	101.1	79.5	100.9	89.1	77.2	97.7	85.4	86.6	90.2	84.3	88.6	84.1	83.1	81.2	74.8	72.6	86.9	85.7	96.9	90.7			
LET16SEP	94.8	75.5	105.2	80.6	104.3	90.9	83.6	101.5	88.7	93.3	94.8	87.8	90.3	91.2	94.4	90.0	86.8	80.9	86.3	89.0	102.3	92.9			
LET17SEP	92.7	72.6	104.0	81.1	101.9	91.1	80.7	100.3	87.8	91.0	93.5	87.1	90.5	89.4	88.1	88.1	78.1	76.4	86.1	89.0	100.2	92.3			
LET00SEP	84.3	79.8	98.1	79.5	93.1	90.4	82.6	95.7	88.1	89.6	89.6	87.8	90.3	90.6	89.8	83.7	88.4	83.0	90.9	94.2	91.1	87.6			
LETOCSEP	84.0	79.1	97.4	77.7	93.9	92.4	82.2	98.3	90.1	92.0	91.7	88.1	94.7	90.8	92.1	80.9	94.1	81.7	92.8	94.4	89.0	88.2			
LETNSEP	79.2	86.5	96.2	79.7	86.6	87.8	83.4	89.8	86.4	86.5	85.8	88.8	87.1	92.4	87.6	83.9	87.9	88.1	90.7	98.5	86.6	84.1			
LETCSEP	85.0	78.1	96.4	78.4	94.1	93.0	82.6	99.3	90.3	92.1	91.7	87.4	94.2	90.4	92.6	81.7	94.2	80.9	92.8	93.0	90.2	88.4			
LETSSEP	92.2	70.7	104.0	80.9	103.1	90.9	81.2	100.6	88.0	91.2	93.2	86.7	90.2	87.8	89.3	86.2	80.7	77.3	88.6	88.4	100.4	92.6			
LET01OCT	93.8	87.8	82.3	92.4	83.4	87.8	92.6	87.7	102.6	75.0	86.8	89.0	91.0	84.4	96.3	101.9	96.9	95.1	97.2	94.5	83.8	87.7			
LET02OCT	79.2	74.2	73.3	86.3	83.0	76.7	88.6	77.3	94.2	79.0	70.9	81.3	76.4	71.4	72.2	86.4	87.5	84.9	89.4	92.7	80.5	82.5			
LET03OCT	78.8	72.7	74.9	84.4	81.4	76.8	84.8	77.9	95.5	80.1	74.9	83.7	79.0	71.6	75.0	84.7	90.0	87.5	86.7	90.7	76.3	82.7			
LET04OCT	82.2	75.3	75.7	87.9	82.0	78.4	87.2	80.6	96.4	78.8	78.5	86.4	81.9	75.7	81.6	87.5	92.5	89.6	90.2	92.6	79.1	84.8			
LET05OCT	79.0	71.5	74.6	84.0	81.0	76.9	83.8	76.2	94.2	80.3	74.1	81.2	79.6	70.4	76.4	83.0	88.9	87.7	85.1	89.1	72.7	80.1			
LET06OCT	90.8	80.9	80.0	91.3	84.2	82.5	94.0	82.7	100.1	79.7	84.8	89.2	88.0	82.8	88.9	94.0	95.2	92.6	94.4	96.8	83.9	87.7			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET07OCT	100.2	89.1	82.9	95.1	84.7	88.7	102.5	86.4	101.9	81.1	95.0	90.1	99.8	93.2	95.4	102.7	102.5	98.3	102.2	107.2	92.1	91.8			
LET08OCT	85.4	75.1	75.4	87.7	78.5	77.8	84.3	80.6	94.0	73.9	77.9	82.1	81.1	75.1	88.8	92.6	90.5	89.3	89.7	88.1	76.7	80.7			
LET09OCT	95.3	86.6	81.8	91.8	83.0	86.3	95.3	84.1	103.0	77.5	87.5	88.4	91.0	85.9	93.6	97.9	97.2	91.9	96.1	99.9	83.9	86.9			
LET10OCT	95.3	84.7	80.5	91.6	82.4	85.6	91.6	85.6	100.7	75.6	85.3	88.2	89.1	83.6	94.6	99.4	95.6	92.6	94.3	96.2	82.0	86.5			
LET11OCT	102.4	97.1	92.0	100.5	91.1	96.6	106.6	92.4	113.7	83.2	96.4	95.2	99.9	93.8	103.5	105.4	106.3	99.0	107.4	108.0	91.4	92.4			
LET12OCT	114.4	100.6	95.9	108.4	97.6	104.5	113.2	101.6	121.9	88.0	103.9	100.1	109.3	98.4	109.9	112.2	106.8	105.9	115.6	113.6	97.6	94.0			
LET13OCT	116.2	96.7	94.9	110.7	99.3	103.7	112.6	105.7	118.8	84.0	102.2	97.6	108.6	96.7	105.5	109.5	104.7	102.3	117.7	112.5	102.4	92.1			
LET14OCT	115.8	92.3	96.2	114.3	94.1	98.6	108.7	98.3	114.2	78.9	101.8	94.4	103.9	95.4	104.3	107.7	101.0	101.5	117.1	110.6	103.9	90.9			
LET15OCT	105.7	80.8	89.1	106.2	82.9	91.4	97.6	87.2	103.5	70.4	88.4	85.9	94.5	85.1	90.3	94.6	89.8	90.7	104.9	101.1	92.3	78.8			
LET16OCT	116.2	93.2	97.0	116.9	94.2	101.4	109.6	99.5	118.0	78.4	106.2	98.2	104.5	99.1	112.2	112.7	106.3	106.6	120.7	112.0	105.7	91.8			
LET17OCT	108.4	86.9	93.2	110.7	86.2	95.4	101.2	91.0	109.7	73.7	95.2	90.2	98.7	91.9	97.1	101.7	95.9	96.7	112.0	105.2	96.5	83.2			
LET00OCT	97.6	85.0	84.7	97.7	86.4	88.8	97.3	87.9	104.8	78.7	88.8	89.5	92.7	85.6	93.3	98.5	96.9	94.8	101.2	100.6	88.3	86.7			
LETOCOCT	101.9	92.3	87.6	98.1	88.5	93.3	101.7	90.9	109.8	81.1	93.3	93.0	97.3	90.4	100.4	103.7	101.5	97.4	103.4	104.4	88.7	90.0			
LETNOCT	85.1	77.0	76.7	88.1	82.1	79.7	89.3	80.2	96.6	79.0	79.4	84.9	83.7	77.2	82.6	90.1	92.4	90.0	91.1	93.9	80.2	84.3			
LETCOCT	102.9	92.3	87.9	99.2	89.5	94.1	102.0	92.9	110.1	80.6	93.7	93.1	98.2	90.5	100.6	104.4	101.3	97.8	104.7	104.1	90.2	89.9			
LETSOCT	111.5	88.3	93.9	112.0	89.4	96.7	104.3	94.0	111.4	75.4	97.9	92.2	100.4	92.9	101.0	104.2	98.3	98.9	113.7	107.2	99.6	86.2			
LET01NOV	45.5	65.9	68.4	75.6	68.7	73.8	67.3	71.3	70.5	67.8	72.4	73.4	72.0	66.0	48.0	77.2	74.1	67.0	67.8	56.6	71.4	69.0			
LET02NOV	59.5	71.2	57.7	65.4	61.8	73.1	64.1	62.2	65.6	60.2	69.4	70.3	62.2	65.5	67.3	71.4	60.3	66.0	72.8	66.5	67.2	71.8			
LET03NOV	62.8	66.1	61.7	68.0	60.4	70.3	63.6	65.8	68.4	61.8	66.4	69.6	65.1	62.6	68.6	71.5	63.6	71.0	73.0	70.8	67.8	71.3			
LET04NOV	60.5	66.6	63.1	71.1	62.7	71.9	65.1	67.6	68.1	64.9	69.6	71.7	68.5	66.2	67.0	74.6	65.8	70.8	71.6	74.1	69.3	72.1			
LET05NOV	62.1	68.3	60.4	66.0	60.3	70.3	62.6	65.1	68.1	61.3	64.1	69.6	65.0	61.2	65.0	69.8	63.8	70.0	72.3	68.5	65.7	71.1			
LET06NOV	58.5	69.3	65.6	73.4	70.1	75.9	68.8	71.3	70.3	68.9	74.1	75.8	73.0	72.0	60.5	79.6	69.6	69.7	74.4	69.5	71.6	73.9			
LET07NOV	45.6	73.7	65.2	73.0	80.7	77.3	68.9	73.6	69.0	77.6	79.2	78.8	76.1	61.6	46.3	83.1	74.9	73.6	74.5	70.6	73.7	76.9			
LET08NOV	54.2	67.2	64.8	73.7	66.5	73.4	66.7	69.4	68.3	66.5	70.7	74.4	70.9	66.1	56.7	78.5	68.6	68.9	72.6	71.8	70.0	71.3			
LET09NOV	46.3	68.8	68.9	77.3	74.3	77.6	67.8	74.1	72.3	72.8	76.7	78.6	68.8	65.8	51.7	80.7	75.5	70.5	72.8	64.8	72.8	73.7			
LET10NOV	47.6	65.6	67.4	77.8	69.6	75.7	67.2	72.2	71.3	69.1	72.9	75.5	70.9	70.0	48.3	79.9	73.5	68.0	70.6	59.6	70.6	71.4			
LET11NOV	41.8	71.5	81.2	90.0	83.3	88.8	78.7	85.7	81.9	87.7	90.0	90.3	66.1	59.0	54.7	86.2	87.2	81.9	79.8	81.3	80.4	81.5			
LET12NOV	46.2	79.1	90.0	99.9	97.6	94.7	88.9	95.4	89.6	93.7	100.4	99.7	77.9	70.1	83.5	86.9	90.9	83.4	85.2	95.3	75.9	88.6			
LET13NOV	70.7	90.7	92.6	102.7	103.4	100.4	94.6	98.3	94.3	94.4	106.2	101.2	90.9	83.4	95.0	98.6	91.9	90.6	94.0	96.6	86.0	95.3			
LET14NOV	87.8	91.0	95.9	107.8	105.6	106.4	96.7	101.0	97.8	96.7	112.8	104.1	105.5	95.6	104.2	108.6	93.8	95.0	104.6	106.1	90.3	100.4			
LET15NOV	94.1	77.6	85.8	98.0	95.3	95.3	84.4	89.6	83.7	87.3	103.5	92.1	100.5	89.5	93.3	98.3	78.9	84.6	100.7	96.1	76.8	90.7			
LET16NOV	88.5	93.2	99.0	111.1	108.0	109.7	103.2	107.4	100.1	102.6	114.7	108.9	111.1	98.8	111.3	107.0	99.4	100.7	110.4	112.7	98.3	102.5			
LET17NOV	101.9	83.3	89.8	107.0	99.1	102.9	90.2	95.3	89.0	92.7	108.9	98.5	107.8	96.2	103.0	107.8	86.2	90.7	104.9	103.5	83.9	96.5			
LET00NOV	63.2	74.7	75.1	84.6	80.4	84.6	76.4	80.3	78.1	78.0	85.4	84.3	79.5	73.5	72.0	85.9	77.5	77.8	82.5	80.3	76.0	81.1			
LETOCNOV	45.5	71.3	76.9	86.3	81.2	84.2	75.7	81.9	78.8	80.8	85.0	86.0	70.9	66.2	59.6	83.4	81.8	76.0	77.1	75.3	74.9	78.8			
LETNNOV	57.6	68.9	62.6	70.1	66.1	73.2	65.7	67.9	68.3	65.9	70.5	72.9	68.7	65.0	61.6	75.5	66.7	70.0	73.0	70.3	69.3	72.6			
LETCNOV	49.7	73.6	78.1	87.2	82.8	85.2	77.4	82.8	80.0	80.9	86.4	86.5	74.4	69.1	63.5	84.9	82.2	76.9	78.4	75.7	76.2	79.9			
LETSNOV	93.1	86.3	92.6	106.0	102.0	103.6	93.6	98.3	92.7	94.8	110.0	100.9	106.2	95.0	103.0	105.4	89.6	92.8	105.2	104.6	87.3	97.5			
LET01DEC	18.9	36.5	51.6	45.2	45.0	48.7	39.1	53.8	49.3	44.0	40.2	48.0	40.0	37.1	21.3	52.9	59.0	53.1	32.3	30.2	50.8	39.6			
LET02DEC	36.7	49.7	51.7	57.7	57.8	56.9	60.4	60.1	57.1	54.0	42.5	61.8	56.3	61.5	36.6	57.1	57.3	53.4	49.1	52.5	51.1	44.7			

Table A-1. Data for REMEW-LAO (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LET03DEC	40.2	45.4	51.2	57.1	60.4	58.6	60.9	60.8	57.7	52.9	44.2	60.4	58.1	58.9	38.8	59.0	58.0	58.2	48.1	61.1	52.6	46.0			
LET04DEC	31.3	42.7	54.1	58.7	61.4	57.3	61.4	62.4	57.8	50.6	44.7	60.8	56.2	58.7	34.8	62.9	61.8	59.4	43.4	54.2	53.8	45.8			
LET05DEC	40.9	47.8	51.1	56.6	59.5	57.9	59.3	59.5	57.7	54.1	40.2	59.0	57.8	57.1	36.1	58.5	56.7	56.5	49.3	63.4	51.7	49.1			
LET06DEC	24.7	43.1	59.4	61.0	62.6	59.1	58.7	64.8	60.4	48.2	42.7	61.1	53.5	56.3	27.4	68.9	66.6	60.8	40.0	41.8	57.7	43.9			
LET07DEC	17.1	44.4	64.8	66.8	64.8	59.0	50.9	64.8	63.5	48.4	46.5	66.7	59.9	56.6	25.3	67.9	70.7	56.6	36.7	41.2	64.3	44.8			
LET08DEC	23.2	39.4	55.4	49.2	53.8	56.4	55.8	60.6	53.9	49.2	42.0	55.0	42.9	44.0	23.9	61.0	63.7	58.7	40.3	43.7	52.1	43.8			
LET09DEC	18.3	37.9	62.2	59.6	56.9	60.7	43.8	65.6	56.1	45.0	42.7	58.1	47.0	46.0	23.7	66.8	67.2	60.0	34.4	32.9	61.0	42.2			
LET10DEC	18.9	35.5	56.0	51.5	47.6	56.9	40.7	61.9	54.9	45.3	39.0	53.4	41.1	42.0	20.6	59.6	63.9	59.3	32.5	34.7	56.2	40.3			
LET11DEC	16.8	28.6	72.5	71.8	51.2	60.1	46.8	73.1	56.2	58.5	53.7	60.3	52.3	51.2	24.9	74.1	77.0	52.0	32.2	39.6	67.1	42.8			
LET12DEC	18.6	32.6	72.7	78.9	71.3	51.6	69.5	80.3	61.0	55.8	76.9	73.8	54.8	70.5	49.0	87.4	62.6	43.0	44.4	54.3	73.7	47.7			
LET13DEC	47.5	66.2	64.6	85.0	71.8	66.5	82.7	87.5	69.4	69.5	90.2	76.1	57.7	68.7	55.9	75.3	68.5	63.7	57.8	70.1	74.9	68.0			
LET14DEC	52.6	87.5	61.1	98.6	75.9	75.0	89.5	83.3	76.6	78.5	90.3	83.9	58.5	80.2	66.1	97.0	83.0	62.9	53.7	87.3	85.9	73.2			
LET15DEC	75.4	87.1	73.5	96.5	87.9	86.1	89.5	93.8	75.1	80.8	103.5	87.2	68.2	88.3	76.6	98.2	88.5	75.2	96.4	90.9	82.9	84.7			
LET16DEC	39.8	81.0	66.9	85.1	87.3	68.3	84.2	88.1	69.1	68.6	74.5	77.6	49.6	79.7	59.6	63.8	75.0	60.4	56.2	71.0	83.8	66.6			
LET17DEC	88.0	94.4	78.0	103.5	95.0	91.8	93.8	102.4	80.5	86.8	107.9	94.0	82.0	93.9	82.4	98.3	84.5	81.2	87.8	89.5	88.2	96.0			
LET00DEC	35.8	52.9	61.6	69.6	65.3	63.0	63.9	71.9	62.1	58.2	60.1	66.9	55.1	61.8	41.4	71.1	68.5	59.7	49.1	56.4	65.2	54.1			
LETOCDEC	18.2	33.7	65.9	65.5	56.8	57.3	50.2	70.2	57.1	51.2	53.1	61.4	48.8	52.4	29.6	72.0	67.7	53.6	35.9	40.4	64.5	43.3			
LETNDEC	30.6	44.6	55.4	58.2	60.0	57.9	58.2	61.9	58.3	51.1	43.3	60.7	55.0	56.2	31.8	62.2	62.1	57.7	43.8	51.1	54.8	45.4			
LETCDEC	23.2	39.6	63.3	65.3	57.3	57.4	53.8	70.4	57.8	53.0	57.1	61.6	48.8	52.6	32.6	69.4	66.4	55.2	38.9	43.6	64.0	46.8			
LETSDEC	64.0	87.5	69.9	95.9	86.5	80.3	89.3	91.9	75.3	78.7	94.1	85.7	64.6	85.5	71.2	89.3	82.8	69.9	73.5	84.7	85.2	80.1			

Appendix 2
Table A-2. Data for REMEW-CAM

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY01		1.100	1.500	2.000	2.000	2.000	1.333	1.300	1.600	1.583	1.917	1.583	2.111	1.431	1.182	1.678	1.903	2.302	1.804	2.074	1.836	2.001	1.787	1.946	2.720
CY02		1.213	1.923	1.940	2.013	2.077	1.857	2.121	2.254	1.812	1.967	1.378	1.924	2.318	2.056	3.183	2.836	3.128	2.576	2.677	2.810	3.140	3.446	3.254	3.314
CY03		1.327	1.504	1.427	1.625	1.372	1.481	1.519	1.500	1.363	1.429	1.229	1.469	1.350	1.566	1.556	1.700	2.249	1.889	2.335	2.337	2.485	2.421	2.618	2.477
CY04		0.989	0.900	0.878	0.886	0.734	0.982	1.081	0.858	1.188	1.159	1.258	0.987	0.992	0.944	1.037	1.405	1.542	1.302	1.116	1.558	1.531	1.619	1.346	1.823
CY05		1.063	1.094	1.171	1.239	1.588	1.056	1.379	1.159	1.245	1.368	1.192	1.261	1.195	1.192	1.156	2.100	2.111	1.982	1.698	1.943	2.124	1.987	2.239	2.228
CY06		0.990	1.113	1.041	1.252	1.348	1.317	1.473	1.461	1.474	1.561	1.495	1.584	1.462	1.492	1.280	1.902	2.101	2.636	2.023	2.401	2.630	2.133	2.351	2.648
CY07		1.297	0.835	1.057	1.210	1.014	1.000	1.101	1.184	1.213	1.241	1.204	1.146	1.290	0.963	1.496	1.456	1.611	1.177	1.835	1.516	1.830	2.014	1.847	1.385
CY08		1.177	1.000	0.994	1.006	1.258	1.055	1.187	1.148	1.302	1.364	1.364	1.134	1.273	1.214	1.438	1.441	1.246	1.307	1.323	1.363	1.995	1.751	1.292	1.442
CY09		1.362	1.095	1.248	1.205	1.067	1.303	1.337	1.299	0.730	1.440	1.332	1.581	1.195	1.353	2.025	1.770	1.795	1.461	1.959	1.938	1.922	2.111	1.503	1.975
CY11		0.886	0.915	1.250	1.311	0.921	1.254	1.468	1.152	1.338	1.390	1.182	1.500	1.255	1.248	1.456	1.464	1.500	1.931	1.765	1.841	2.213	2.425	2.207	1.893
CY12		1.125	1.350	1.220	1.313	1.281	1.326	1.480	1.205	1.400	1.459	1.393	1.627	1.554	1.247	1.272	1.796	1.723	1.860	1.868	1.660	2.354	1.885	1.768	1.719
CY15		1.205	0.978	1.231	1.350	1.417	1.393	1.389	1.608	1.626	1.607	1.884	1.336	1.197	1.130	1.326	1.660	1.628	1.738	1.625	2.238	2.161	1.944	1.775	2.340
CY16		1.250	0.875	1.286	1.171	1.667	1.333	1.000	1.250	1.333	1.400	1.800	1.333	1.226	1.268	1.429	1.600	1.300	0.140	1.260	1.301	1.230	1.200	1.310	1.580
CY17		1.508	0.917	1.029	1.125	1.040	1.197	1.164	1.167	1.284	1.228	1.203	1.279	1.249	1.289	1.362	2.167	1.958	7.563	1.415	1.822	1.878	2.187	1.534	1.925
CY18		1.000	1.000	1.231	1.154	1.600	1.818	1.571	1.500	1.333	1.692	1.538	1.667	1.300	2.012	1.859	1.800	1.500	2.687	1.300	1.300	1.532	1.400	1.400	1.928
CY19		1.375	1.429	1.889	1.222	1.286	1.625	2.000	1.571	1.875	1.857	2.143	1.778	1.300	1.500	0.862	1.700	1.600	0.748	1.280	1.400	1.907	1.564	1.502	2.042
CY20		1.100	1.182	1.538	1.231	1.500	1.231	1.444	1.250	1.077	1.583	1.167	1.800	1.253	1.147	2.256	1.700	1.300	4.746	1.250	1.300	1.500	1.300	1.400	2.115
CY21		1.000	1.000	1.750	1.200	1.750	1.317	1.250	1.250	1.200	1.600	1.000	1.667	1.249	1.398	2.226	1.701	1.440	0.303	1.250	1.450	1.450	1.100	1.400	1.942
CY22		1.556	1.500	1.529	1.474	1.353	1.318	1.750	1.708	1.759	1.750	1.857	1.630	1.751	1.563	1.586	1.708	1.876	22.125	2.004	1.986	1.679	2.190	2.163	2.879
CYW01																	1.820	2.219	1.700	2.000	1.799	1.900	1.600	1.800	2.685
CYW02																	2.230	2.000	1.850	1.924	2.171	2.579	2.415	2.672	2.660
CYW03																	1.600	2.100	1.670	2.232	2.200	2.233	2.343	2.400	2.310
CYW04																	1.360	1.400	1.190	1.039	1.500	1.426	1.516	1.132	1.742
CYW05																	1.699	1.755	1.450	1.414	1.692	1.756	1.522	1.856	1.978
CYW06																	1.650	1.800	2.500	1.730	2.200	2.407	1.899	2.050	2.462
CYW07																	1.450	1.600	1.150	1.831	1.500	1.776	1.992	1.813	1.337
CYW08																	1.400	1.200	1.210	1.268	1.300	1.951	1.715	1.224	1.404
CYW09																	1.757	1.804	1.450	1.959	1.938	1.913	2.103	1.494	1.968
CYW11																	1.450	1.503	1.930	1.765	1.840	2.201	2.418	2.200	1.883
CYW12																	1.711	1.550	1.690	1.736	1.500	2.251	1.771	1.623	1.564
CYW15																	1.652	1.616	1.849	1.619	2.222	2.122	1.930	1.758	2.338
CYW16																	1.600	1.300	1.530	1.260	1.301	1.230	1.200	1.310	1.580
CYW17																	2.162	1.950	1.470	1.403	1.810	1.868	2.176	1.519	1.920
CYW18																	1.800	1.500	1.520	1.300	1.300	1.532	1.400	1.400	1.928
CYW19																	1.700	1.600	1.590	1.280	1.400	1.905	1.560	1.500	2.042
CYW20																	1.700	1.300	1.550	1.250	1.300	1.500	1.300	1.400	2.115
CYW21																	1.700	1.444	1.570	1.250	1.450	1.450	1.100	1.400	1.942
CYW22																	1.600	1.700	1.630	1.774	1.720	1.354	1.784	1.961	2.754
CYD01																	2.362	2.677	2.500	2.559	2.000	2.899	3.000	3.000	3.000
CYD02																	3.455	3.937	3.190	3.400	3.415	3.500	4.263	3.691	3.837

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CYD03																	2.411	2.556	2.969	2.927	3.100	3.245	2.700	3.213	3.070
CYD04																	2.603	3.000	2.713	2.519	2.600	3.000	2.686	2.750	2.910
CYD05																	3.547	3.258	3.429	2.869	3.000	3.117	3.460	3.291	3.179
CYD06																	2.751	2.805	3.003	2.850	3.000	3.244	2.800	3.161	3.179
CYD07																	1.876	1.900	2.157	2.100	2.400	2.800	2.420	2.597	2.554
CYD08																	2.161	1.974	3.000	2.340	2.500	2.900	2.500	2.496	2.135
CYD09																	2.889	2.498	2.572	1.913	2.040	2.921	2.898	2.875	3.221
CYD11																	2.468	1.856	2.340	2.400	2.600	2.700	2.650	2.441	2.440
CYD12																	2.586	2.992	3.258	3.000	3.000	3.000	2.700	2.739	2.600
CYD15																	2.554	2.000	3.100	2.619	2.800	2.901	3.100	2.521	2.501
CYD16																	2.118	2.302	2.500	2.767	2.900	2.500	3.130	2.690	3.200
CYD17																	2.543	2.000	2.480	2.222	2.545	2.829	3.100	2.411	2.435
CYD18																	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CYD19																	0.000	0.000	0.000	0.000	0.000	2.714	2.900	2.209	0.000
CYD20																	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CYD21																	2.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CYD22																	2.118	2.267	2.458	2.570	2.677	2.500	3.074	2.690	3.200
CQ01		3300	3000	4000	6000	6000	4000	13000	16000	19000	23000	19000	19000	12020	10225	12300	15810	16250	15946	15290	12110	12584	12070	15700	21571
CQ02		97000	125000	163000	151000	108000	143000	140000	142000	125000	179000	124000	177000	171430	166635	210200	249125	239220	213873	230800	246331	239780	314877	291923	304376
CQ03		195000	210600	214000	251800	118000	200000	234000	186000	214000	253000	215000	257000	242000	283645	220000	325000	411810	326873	438600	460935	465733	443444	496831	484551
CQ04		87000	90000	101000	117000	47000	107000	146000	91000	190000	175000	190000	154000	161420	156576	154400	214500	241400	212003	175700	266877	255307	241147	160976	314336
CQ05		201000	186000	267000	280000	154000	228000	320000	240000	310000	357000	310000	275000	264450	272007	205300	549625	491270	435060	425945	577380	461315	483135	519697	639452
CQ06		166000	118000	154000	204000	120000	187000	268000	225000	314000	331000	314000	293000	297400	309455	242100	437312	434280	585560	443680	554890	466360	397629	487977	616757
CQ07		130700	71000	112000	127000	73000	103000	109000	116000	165000	170000	165000	149000	152450	122000	134100	162960	178200	143104	204950	153070	176547	203910	204594	169012
CQ08		173000	141000	158000	162000	156000	154000	159000	132000	220000	221000	221000	169000	191500	205200	221000	251535	221740	235012	252310	260404	411606	378179	274315	316177
CQ09		303000	246400	342000	276000	144000	232000	270000	265000	181000	373000	345000	351000	254980	365900	317400	443677	448660	392611	577750	601306	561197	671626	528945	770796
CQ11		39000	43000	80000	97000	35000	74000	69000	53000	95000	107000	91000	99000	68700	74795	84700	105256	114790	144073	124640	132650	154055	167553	160237	135678
CQ12		45000	54000	61000	63000	41000	57000	74000	47000	84000	89000	85000	96000	110120	92411	86200	150791	145810	174398	165300	154300	208529	190001	183179	186336
CQ15		106000	88000	128000	139000	146000	149000	125000	156000	213000	180000	211000	163000	135000	126205	155500	232936	233630	271449	211253	330235	308621	252113	214290	321732
CQ16		10000	7000	9000	8200	10000	8000	6000	5000	8000	7000	9000	8000	6500	6000	4800	8115	9630	11230	8965	9460	10021	9250	10154	12527
CQ17		95000	44000	70000	81000	26000	79000	64000	56000	95000	97000	95000	87000	68050	84950	82400	171810	169330	119151	119500	155388	157180	184588	99462	181154
CQ18		13000	13000	16000	15000	16000	20000	22000	18000	20000	22000	20000	20000	11700	29175	22400	30600	21750	23947	18174	21986	25226	25147	27005	40906
CQ19		11000	10000	17000	11000	9000	13000	14000	11000	15000	13000	15000	16000	14270	16452	8100	22950	7680	14172	19363	18852	27837	24910	26918	33950
CQ20		11000	13000	20000	16000	21000	16000	13000	10000	14000	19000	14000	18000	6200	14690	15000	22095	22100	29355	20435	22905	26195	26954	29742	47052
CQ21		3000	3000	7000	6000	7000	7900	5000	5000	6000	8000	5000	5000	5120	4750	6700	9380	6500	9711	5316	8960	11616	12929	11939	19260
CQ22		28000	24000	26000	28000	23000	29000	42000	41000	51000	49000	52000	44000	47090	42279	40400	44350	43950	57391	51900	52861	46383	59554	78625	95334
CQW01																	12810	12850	13071	12800	9710	10740	9370	12757	18910
CQW02																	98925	66000	70343	81200	92646	77030	97487	102749	108565
CQW03																	268000	334950	240179	357300	367935	314230	335444	333479	352411
CQW04																	200000	211400	179558	155300	243477	222067	205847	117416	279406

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CQW05																	348425	308800	232690	285400	406380	278175	281244	315843	449227
CQW06																	292312	277200	405073	280300	380890	313139	261885	310204	424431
CQW07																	159960	174400	135991	201800	148750	162270	191328	192076	156842
CQW08																	231035	202200	205912	229200	235404	383926	353179	245800	291671
CQW09																	435107	445500	385435	574900	598246	553846	662180	522480	763564
CQW11																	102756	113500	143839	124400	132390	149384	162478	155367	132521
CQW12																	129791	118580	141330	137700	124600	172010	156521	146250	144250
CQW15																	228436	228630	271449	208753	322260	292995	244613	207313	317607
CQW16																	8115	9630	11230	8965	9460	10021	9250	10154	12527
CQW17																	169310	166730	116671	117300	152588	154874	181488	96976	179318
CQW18																	30600	21750	23947	18174	21986	25226	25147	27005	40906
CQW19																	22950	7680	14172	19363	18852	27742	24765	26823	33950
CQW20																	22095	22100	29355	20435	22905	26195	26954	29742	47052
CQW21																	9350	6500	9711	5316	8960	11616	12929	11939	19260
CQW22																	32850	30600	42641	35300	35461	26783	33844	51527	65539
CQD01																	3000	3400	2875	2490	2400	1844	2700	2943	2661
CQD02																	150200	173220	143530	149600	153685	162750	217390	189174	195811
CQD03																	57000	76860	86694	81300	93000	151503	108000	163352	132140
CQD04																	14500	30000	32445	20400	23400	33240	35300	43560	34930
CQD05																	201200	182470	202370	140545	171000	183140	201891	203854	190225
CQD06																	145000	157080	180487	163380	174000	153221	135744	177773	192326
CQD07																	3000	3800	7113	3150	4320	14277	12582	12518	12170
CQD08																	20500	19540	29100	23110	25000	27680	25000	28515	24506
CQD09																	8570	3160	7176	2850	3060	7351	9446	6465	7232
CQD11																	2500	1290	234	240	260	4671	5075	4870	3157
CQD12																	21000	27230	33069	27600	29700	36519	33480	36929	42086
CQD15																	4500	5000	0	2500	7975	15626	7500	6977	4125
CQD16																	0	0	0	0	0	0	0	0	0
CQD17																	2500	2600	2480	2200	2800	2306	3100	2486	1836
CQD18																	0	0	0	0	0	0	0	0	0
CQD19																	0	0	0	0	0	95	145	95	0
CQD20																	0	0	0	0	0	0	0	0	0
CQD21																	30	0	0	0	0	0	0	0	0
CQD22																	11500	13350	14750	16600	17400	19600	25710	27098	29795
CAP01		3000	2000	2000	3000	3000	3000	10000	10000	13000	13000	13000	13000	9740	8652	9900	9850	9010	9045	9053	8730	8451	8205	8164	7930
CAP02		80000	86000	86000	81000	76000	78000	67000	64000	82000	97000	93000	95000	81260	84310	83790	92694	90957	88891	88350	91523	95613	101351	92300	96210
CAP03		147000	152000	155000	160000	146000	135000	154000	125000	162000	179000	178000	179000	179760	181400	190390	191140	200660	176937	188877	200374	220867	204880	202059	207157
CAP04		88000	103000	118000	134000	90000	110000	137000	106000	160000	158000	153000	158000	165320	166540	159700	159797	171110	163681	163800	177878	191477	162087	125596	173291
CAP05		189000	206000	236000	233000	220000	217000	234000	208000	251000	267000	265000	254000	253960	228720	230290	286051	308470	237652	261785	300308	305843	275605	244858	295311
CAP06		168000	128000	153000	168000	136000	142000	183000	154000	215000	219000	211000	221000	216280	216240	227750	237577	240772	231648	228973	235102	231400	222371	222483	234025

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CAP07		101000	94000	116000	118000	97000	104000	100000	98000	138000	142000	138000	142000	132650	130765	127460	127847	133913	130999	123452	110887	126746	129715	126424	128637
CAP08		147000	150000	160000	168000	150000	146000	135000	119000	176000	166000	163000	152000	158900	170400	178860	185665	191720	188820	192175	192930	223730	223670	219555	220683
CAP09		223000	261000	286000	295000	170000	178000	205000	205000	257000	270000	268000	268000	265310	275520	270020	317439	301366	345105	361133	331464	369852	378374	389949	411745
CAP11		44000	57000	65000	75000	51000	63000	49000	46000	76000	78000	78000	78000	56360	72870	66160	81039	83639	76128	77247	76514	90327	81645	77712	75694
CAP12		40000	49000	52000	52000	40000	44000	51000	39000	65000	65000	63000	65000	80880	68520	83370	87269	92790	94360	89913	93861	98520	107450	106574	110219
CAP15		88000	93000	107000	110000	106000	109000	90000	97000	134000	120000	114000	125000	112810	111731	133990	143065	149806	157990	143774	150413	158119	141415	132492	137622
CAP16		8000	8000	8000	8000	7000	6000	6000	4000	6000	5000	5000	6000	5300	4730	3500	5193	7410	82931	7115	7514	8544	7809	7791	8003
CAP17		63000	51000	70000	73000	61000	66000	55000	48000	74000	83000	80000	82000	69260	66435	78740	85658	87363	15755	84635	87698	86266	86431	66371	95436
CAP18		13000	13000	14000	14000	11000	11000	14000	12000	15000	14000	14000	14000	9000	14500	17000	17000	17500	14262	15000	17425	17314	18891	20496	22105
CAP19		8000	8000	10000	10000	9000	8000	7000	7000	8000	8000	7000	10000	10980	10968	13280	13500	12160	19883	16000	17110	18497	18647	19373	20450
CAP20		10000	11000	13000	13000	15000	13000	9000	8000	13000	13000	13000	13000	4950	13076	13050	12997	18870	6185	17423	18822	19335	20967	21550	22335
CAP21		3000	3000	4000	5000	5000	6000	4000	4000	5000	6000	5000	6000	4100	3398	5000	5514	6114	33145	5000	7602	10161	13564	11812	13454
CAP22		18000	18000	19000	20000	25000	23000	23000	24000	29000	29000	29000	29000	27180	27785	31750	26696	29270	2594	30308	31437	37433	37840	41566	35546
CAPW01		2100	1500	1500	2500	2000	2000	9000	9000	12000	12000	12000	12000	8940	8052	8630	8580	7740	7845	7980	7530	7815	7305	7183	7043
CAPW02		55000	52000	54000	52500	46000	48000	37000	32000	45000	61000	57000	57000	47260	45230	45000	48547	46810	42891	44150	45143	48113	45341	40253	42927
CAPW03		137000	135000	139000	145000	130000	120500	142000	110000	143000	159000	157000	160000	160760	161900	170000	167500	177020	146937	160500	168374	174184	152806	149616	158297
CAPW04		87300	102000	118000	133500	89000	109000	136000	105000	159000	157000	152000	157000	164620	165740	156950	154227	165540	151681	154800	167878	180397	146187	107835	161025
CAPW05		174000	175000	207000	210500	197000	197000	209000	186000	225000	242000	238000	227000	226960	198720	195700	229331	251750	177507	204112	241308	246096	200109	180514	235042
CAPW06		144500	90000	127000	135000	105000	110000	153000	121000	179000	180000	172000	181000	176280	174240	185160	184865	188060	170648	170648	176102	182288	166998	153912	173045
CAPW07		100500	90000	115000	117000	96000	103000	97000	96000	136000	140000	135000	141000	130850	129365	124600	126144	132210	127501	121702	108887	121647	121271	121522	123648
CAPW08		139000	140000	152000	163000	145000	142000	130000	114000	171000	161000	157000	146000	154000	163000	169700	176155	182210	178820	182000	182630	213985	212725	208010	208755
CAPW09		222500	261000	286000	295000	169000	176500	204000	203000	255000	268000	266000	267000	264831	275420	267840	314473	298400	342315	359533	329854	367335	373375	383786	409500
CAPW11		44000	56500	64500	75000	51000	63000	48000	45000	75000	77000	77000	78000	56260	72850	65380	80000	82600	76028	77147	76404	88597	78728	75717	74400
CAPW12		32500	43000	44000	48000	36000	40000	46000	34000	60000	60000	58000	59000	74380	61920	76190	78979	84500	84110	79714	83561	85947	94093	92191	93855
CAPW15		87500	92000	106000	109000	105000	107000	90000	95000	132000	118000	112000	124000	120510	110731	133010	141059	147800	148544	142774	147913	153384	135528	128459	135934
CAPW16		8000	8000	8000	8000	7000	6000	6000	4000	6000	5000	5000	6000	5300	4730	3500	5193	7410	7340	7115	7514	8544	7809	7791	8003
CAPW17		63000	49000	68000	72000	60000	65000	53000	46000	73000	82000	79000	80000	67860	65435	77780	84675	86380	81931	83645	86598	85451	85431	65340	94682
CAPW18		13000	13000	14000	14000	11000	11000	14000	12000	15000	14000	14000	14000	9000	14500	17000	17000	17500	15755	15000	17425	17314	18891	20496	22105
CAPW19		8000	8000	10000	10000	9000	8000	7000	7000	8000	8000	7000	10000	10980	10968	13280	13500	12160	14262	16000	17110	18462	18597	18809	20450
CAPW20		10000	11000	13000	13000	15000	13000	9000	8000	13000	13000	13000	13000	4950	13076	13000	12997	18870	19883	17423	18822	19335	20967	21550	22335
CAPW21		3000	3000	4000	5000	5000	6000	4000	4000	5000	6000	5000	6000	4100	3398	5000	5500	6100	6185	5000	7602	10161	13564	11812	13454
CAPW22		14500	13000	15000	16000	21000	18000	19000	18000	23000	24000	24000	23000	22180	22285	26280	21266	23840	27145	23850	24937	29593	26279	26429	26235
CAPD01		300	500	500	500	1000	1000	1000	1000	1000	1000	1000	1000	800	600	1270	1270	1270	1200	1073	1200	636	900	981	887
CAPD02		25000	34000	32000	28500	30000	30000	30000	32000	37000	6000	36000	38000	34000	39080	38790	44147	45000	46000	44200	46380	47500	51000	51256	51939
CAPD03		10000	17000	16000	15000	16000	14500	12000	15000	19000	20000	21000	19000	19000	19500	20390	23640	30740	30000	28377	32000	46683	43074	50845	48860
CAPD04		700	1000	0	500	1000	1000	1000	1000	1000	1000	1000	1000	700	800	2750	5570	10000	12000	9000	10000	11080	13781	16690	12266
CAPD05		15000	31000	29000	22500	23000	20000	25000	22000	26000	25000	27000	27000	27000	30000	34590	56720	56740	60145	57673	59000	59747	60524	64344	60269
CAPD06		23500	38000	26000	33000	31000	32000	30000	33000	36000	39000	39000	40000	40000	42000	42590	52712	57000	61000	58325	59000	49112	50000	58938	60980
CAPD07		500	4000	1000	1000	1000	1000	3000	2000	2000	2000	3000	1000	1800	1400	2860	1703	2000	3498	1750	2000	5099	5200	4902	4765
CAPD08		8000	10000	8000	5000	5000	4000	5000	5000	5000	5000	6000	6000	4900	7400	9160	9510	9970	10000	10175	10300	9745	10945	11425	11928

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CAPD09		500	0	0	0	1000	1500	1000	2000	2000	2000	2000	1000	500	100	2180	2966	1290	2790	1600	1610	2517	3509	2270	2245
CAPD11		0	500	500	0	0	0	1000	1000	1000	1000	1000	0	100	20	780	1039	700	100	100	110	1730	1915	1995	1294
CAPD12		7500	6000	8000	4000	4000	4000	5000	5000	5000	5000	5000	6000	6500	6600	7180	8290	9500	10250	10199	10300	12573	13357	14383	16364
CAPD15		500	1000	1000	1000	1000	2000	0	2000	2000	2000	2000	1000	1300	1000	980	2006	2600	4700	1000	2500	4735	3250	2813	1688
CAPD16		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPD17		0	2000	2000	1000	1000	1000	2000	2000	1000	1000	1000	2000	1400	1000	960	983	1300	1000	990	1100	815	1000	1031	754
CAPD18		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPD19		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	50	43	0
CAPD20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0
CAPD21		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
CAPD22		3500	5000	4000	4000	4000	5000	6000	6000	6000	5000	5000	6000	5000	5500	5470	5430	5890	6000	6458	6500	7840	8364	10074	9311
CAH01		3000	2000	2000	3000	3000	3000	10000	10000	12000	12000	12000	9000	8400	8652	7330	8308	7060	8839	7373	6596	6289	6755	8068	7930
CAH02		80000	65000	84000	75000	52000	77000	66000	63000	69000	91000	90000	92000	73950	81060	66040	87837	76476	83023	86200	87674	76368	91363	89710	91845
CAH03		147000	140000	150000	155000	86000	135000	154000	124000	157000	177000	175000	175000	179250	181100	141390	191140	183140	173020	187877	197243	187404	183148	189794	195608
CAH04		88000	100000	115000	132000	64000	109000	135000	106000	160000	151000	151000	156000	162700	165900	148930	152627	156570	162849	157500	171318	166807	148934	119564	172397
CAH05		189000	170000	228000	226000	97000	216000	232000	207000	249000	261000	260000	218000	221300	228220	177560	261745	232720	219491	250791	297225	217161	243093	232118	286950
CAH06		167700	106000	148000	163000	89000	142000	182000	154000	213000	212000	210000	185000	203400	207405	189100	229871	206712	222129	219325	231131	177327	186379	207557	232883
CAH07		100800	85000	106000	105000	72000	103000	99000	98000	136000	137000	137000	130000	118200	126665	89630	111914	110599	121551	111700	100964	96467	101238	110765	122074
CAH08		147000	141000	159000	161000	124000	146000	134000	115000	169000	162000	162000	149000	150400	169000	153660	174500	177985	179875	190675	191080	206283	215928	212255	219252
CAH09		222500	225000	274000	229000	135000	178000	202000	204000	248000	259000	259000	222000	213300	270473	156750	250611	249966	268683	294890	310271	292055	318183	351949	390325
CAH11		44000	47000	64000	74000	38000	59000	47000	46000	71000	77000	77000	66000	54750	59940	58160	71879	76513	74628	70600	72050	69601	69105	72616	71672
CAH12		40000	40000	50000	48000	32000	43000	50000	39000	60000	61000	61000	59000	70850	74100	67750	83964	84620	93777	88499	92966	88588	100773	103609	108419
CAH15		88000	90000	104000	103000	103000	107000	90000	97000	131000	112000	112000	122000	112770	111681	117260	140316	143506	156210	129973	147557	142807	129710	120727	137506
CAH16		8000	8000	7000	7000	6000	6000	6000	4000	6000	5000	5000	6000	5300	4730	3360	5072	7410	80168	7115	7272	8148	7708	7751	7929
CAH17		63000	48000	68000	72000	25000	66000	55000	48000	74000	79000	79000	68000	54500	65885	60490	79284	86479	15755	84440	85303	83704	84413	64828	94129
CAH18		13000	13000	13000	13000	10000	11000	14000	12000	15000	13000	13000	12000	9000	14500	12050	17000	14500	8913	13980	16911	16461	17962	19289	21217
CAH19		8000	7000	9000	9000	7000	8000	7000	7000	8000	7000	7000	9000	10980	10968	9400	13500	4800	18939	15127	13466	14594	15925	17925	16626
CAH20		10000	11000	13000	13000	14000	13000	9000	8000	13000	12000	12000	10000	4950	12806	6650	12997	17000	6185	16348	17618	17463	20734	21244	22247
CAH21		3000	3000	4000	5000	4000	6000	4000	4000	5000	5000	5000	3000	4100	3398	3010	5514	4514	32060	4253	6180	8011	11754	8528	9918
CAH22		18000	16000	17000	19000	17000	22000	24000	24000	29000	28000	28000	27000	26900	27052	25480	25962	23430	2594	25900	26617	27621	27190	36348	33109
CAH		1440000	1317000	1615000	1612000	978000	1450000	1520000	1370000	1825000	1861000	1855000	1718000	1685000	1823535	1494000	1924041	1864000	1928689	1962566	2079442	1903159	1980295	1994645	2242036
CAHW01																	7038	5790	7689	6400	5396	5653	5855	7087	7043
CAHW02																	44361	33000	38023	42200	42674	29868	40363	38454	40814
CAHW03																	167500	159500	143820	160100	167243	140721	143148	138949	152559
CAHW04																	147057	151000	150889	149400	162318	155727	135792	103724	160394
CAHW05																	205025	176000	160476	201800	240225	158414	184743	170174	227112
CAHW06																	177159	154000	162029	162000	173131	130095	137899	151319	172393
CAHW07																	110315	109000	118253	110200	99164	91368	96038	105944	117309
CAHW08																	165015	168500	170175	180800	181080	196738	205928	200830	207774
CAHW09																	247645	247000	265893	293400	308771	289538	314924	349700	388080

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CAHW11																	70866	75500	74528	70500	71950	67871	67190	70621	70378
CAHW12																	75844	76500	83627	79300	83066	76415	88373	90126	92232
CAHW15																	138310	141500	146844	128973	145057	138072	126710	117914	135818
CAHW16																	5072	7410	7340	7115	7272	8148	7708	7751	7929
CAHW17																	78305	85500	79368	83600	84303	82909	83413	63842	93395
CAHW18																	17000	14500	15755	13980	16911	16461	17962	19289	21217
CAHW19																	13500	4800	8913	15127	13466	14559	15875	17882	16626
CAHW20																	12997	17000	18939	16348	17618	17463	20734	21244	22247
CAHW21																	5500	4500	6185	4253	6180	8011	11754	8528	9918
CAHW22																	20532	18000	26160	19900	20617	19781	18976	26274	23798
CAHD01																	1270	1270	1150	973	1200	636	900	981	887
CAHD02																	43476	44000	45000	44000	45000	46500	51000	51256	51031
CAHD03																	23640	30070	29200	27777	30000	46683	40000	50845	43049
CAHD04																	5570	10000	11960	8100	9000	11080	13142	15840	12003
CAHD05																	56720	56000	59015	48991	57000	58747	58350	61944	59838
CAHD06																	52712	56000	60100	57325	58000	47232	48480	56238	60490
CAHD07																	1599	2000	3298	1500	1800	5099	5200	4821	4765
CAHD08																	9485	9900	9700	9875	10000	9545	10000	11425	11478
CAHD09																	2966	1265	2790	1490	1500	2517	3259	2249	2245
CAHD11																	1013	695	100	100	100	1730	1915	1995	1294
CAHD12																	8120	9100	10150	9199	9900	12173	12400	13483	16187
CAHD15																	2006	2600	4620	1000	2500	4735	3000	2813	1688
CAHD16																	0	0	0	0	0	0	0	0	0
CAHD17																	979	1300	800	840	1000	795	1000	986	734
CAHD18																	0	0	0	0	0	0	0	0	0
CAHD19																	0	0	0	0	0	35	50	43	0
CAHD20																	0	0	0	0	0	0	0	0	0
CAHD21																	14	0	0	0	0	0	0	0	0
CAHD22																	5430	5800	5900	6000	6000	7840	8214	10074	9311
CABW01																	1542	1950	156	1580	2134	2162	1450	96	0
CABW02																	4186	13810	4868	1950	2469	18245	4978	1799	2113
CABW03																	0	17520	3117	400	1131	33463	9658	10667	5738
CABW04																	7170	14540	792	5400	5560	24670	10395	4111	631
CABW05																	24306	75750	17031	2312	1083	87682	15366	10340	7930
CABW06																	7706	34060	8619	8648	2971	52193	29099	2593	652
CABW07																	15829	23210	9248	11502	9723	30279	25233	15578	6339
CABW08																	11140	13710	8645	1200	1550	17247	6797	7180	981
CABW09																	66828	51400	76422	66133	21083	77797	58451	34086	21420
CABW11																	9134	7100	1500	6647	4454	20726	11538	5096	4022
CABW12																	3135	8000	483	414	495	9532	5720	2065	1623

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CABW15																	2749	6300	1700	13801	2856	15312	8818	10545	116
CABW16																	121	0	0	0	242	396	101	40	74
CABW17																	6370	880	2563	45	2295	2542	2018	1498	1287
CABW18																	0	3000	0	1020	514	853	929	1207	888
CABW19																	0	7360	5349	873	3644	3903	2722	927	3824
CABW20																	0	1870	944	1075	1204	1872	233	306	88
CABW21																	0	1600	0	747	1422	2150	1810	3284	3536
CABW22																	734	5840	985	3950	4320	9812	7303	155	2437
CABD01																	0	0	50	100	0	0	0	0	0
CABD02																	671	1000	1000	200	1380	1000	0	0	908
CABD03																	0	670	800	600	2000	0	3074	0	5811
CABD04																	0	0	40	900	1000	0	639	850	263
CABD05																	0	740	1130	8682	2000	1000	2174	2400	431
CABD06																	0	1000	900	1000	1000	1880	1520	2700	490
CABD07																	104	0	200	250	200	0	0	81	0
CABD08																	25	70	300	300	300	200	945	0	450
CABD09																	0	25	0	110	110	0	250	21	0
CABD11																	26	5	0	0	10	0	0	0	0
CABD12																	170	400	100	1000	400	400	957	900	177
CABD15																	0	0	80	0	0	0	250	0	0
CABD16																	0	0	0	0	0	0	0	0	0
CABD17																	4	0	200	150	100	20	0	45	20
CABD18																	0	0	0	0	0	0	0	0	0
CABD19																	0	0	0	0	0	0	0	0	0
CABD20																	0	0	0	0	0	0	0	0	0
CABD21																	0	0	0	0	0	0	0	0	0
CABD22																	0	90	100	458	500	0	150	0	0
CRABW01																	0.1797	0.2519	0.0199	0.1980	0.2834	0.2766	0.1985	0.0134	0.0000
CRABW02																	0.0862	0.2950	0.1135	0.0442	0.0547	0.3792	0.1098	0.0447	0.0492
CRABW03																	0.0000	0.0990	0.0212	0.0025	0.0067	0.1921	0.0632	0.0713	0.0362
CRABW04																	0.0465	0.0878	0.0052	0.0349	0.0331	0.1368	0.0711	0.0381	0.0039
CRABW05																	0.1060	0.3009	0.0959	0.0113	0.0045	0.3563	0.0768	0.0573	0.0337
CRABW06																	0.0417	0.1811	0.0505	0.0507	0.0169	0.2863	0.1742	0.0168	0.0038
CRABW07																	0.1255	0.1756	0.0725	0.0945	0.0893	0.2489	0.2081	0.1282	0.0513
CRABW08																	0.0632	0.0752	0.0483	0.0066	0.0085	0.0806	0.0320	0.0345	0.0047
CRABW09																	0.2125	0.1723	0.2233	0.1839	0.0639	0.2118	0.1565	0.0888	0.0523
CRABW11																	0.1142	0.0860	0.0197	0.0862	0.0583	0.2339	0.1466	0.0673	0.0541
CRABW12																	0.0397	0.0947	0.0057	0.0052	0.0059	0.1109	0.0608	0.0224	0.0173
CRABW15																	0.0195	0.0426	0.0114	0.0967	0.0193	0.0998	0.0651	0.0821	0.0009
CRABW16																	0.0233	0.0000	0.0000	0.0000	0.0322	0.0463	0.0129	0.0051	0.0092

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CRABW17																	0.0752	0.0102	0.0313	0.0005	0.0265	0.0297	0.0236	0.0229	0.0136
CRABW18																	0.0000	0.1714	0.0000	0.0680	0.0295	0.0493	0.0492	0.0589	0.0402
CRABW19																	0.0000	0.6053	0.3751	0.0546	0.2130	0.2114	0.1464	0.0493	0.1870
CRABW20																	0.0000	0.0991	0.0475	0.0617	0.0640	0.0968	0.0111	0.0142	0.0039
CRABW21																	0.0000	0.2623	0.0000	0.1494	0.1871	0.2116	0.1334	0.2780	0.2628
CRABW22																	0.0345	0.2450	0.0363	0.1656	0.1732	0.3316	0.2779	0.0059	0.0929
CRABD01																	0.0000	0.0000	0.0417	0.0932	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD02																	0.0152	0.0222	0.0217	0.0045	0.0298	0.0211	0.0000	0.0000	0.0175
CRABD03																	0.0000	0.0218	0.0267	0.0211	0.0625	0.0000	0.0714	0.0000	0.1189
CRABD04																	0.0000	0.0000	0.0033	0.1000	0.1000	0.0000	0.0464	0.0509	0.0214
CRABD05																	0.0000	0.0130	0.0188	0.1505	0.0339	0.0167	0.0359	0.0373	0.0072
CRABD06																	0.0000	0.0175	0.0148	0.0171	0.0169	0.0383	0.0304	0.0458	0.0080
CRABD07																	0.0611	0.0000	0.0572	0.1429	0.1000	0.0000	0.0000	0.0165	0.0000
CRABD08																	0.0026	0.0070	0.0300	0.0295	0.0291	0.0205	0.0863	0.0000	0.0377
CRABD09																	0.0000	0.0194	0.0000	0.0688	0.0683	0.0000	0.0712	0.0093	0.0000
CRABD11																	0.0250	0.0071	0.0000	0.0000	0.0909	0.0000	0.0000	0.0000	0.0000
CRABD12																	0.0205	0.0421	0.0098	0.0980	0.0388	0.0318	0.0716	0.0626	0.0108
CRABD15																	0.0000	0.0000	0.0170	0.0000	0.0000	0.0000	0.0769	0.0000	0.0000
CRABD16																	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD17																	0.0041	0.0000	0.2000	0.1515	0.0909	0.0245	0.0000	0.0436	0.0265
CRABD18																	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD19																	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD20																	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD21																	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRABD22																	0.0000	0.0153	0.0167	0.0709	0.0769	0.0000	0.0179	0.0000	0.0000
CQ		1717000	1490000	1949000	2039000	1260000	1810900	2093000	1815000	2339000	2673000	2500000	2400000	2220400	2383350	2223000	3447827	3458000	3414919	3509871	4040900	4026092	4099016	3822509	4710957
CQW																	2802827	2759000	2672597	2873906	3332900	3212269	3275953	2915900	3837957
CQD																	645000	699000	742323	635965	708000	813823	823063	906609	873000
CQME		1145239	993830	1299983	1360013	840420	1207870	1396031	1210605	1560113	1782891	1667500	1600800	1481007	1589694	1482741	2299701	2306486	2277751	2341084	2695280	2685403	2734044	2549614	3142208
CIMPPE		216406	205625	227188	111719	156250	85938	125000	125000	164062	60000	41613	32258	130645	135484	82258	130645	41881	44516	63226	58710	97816	83222	193083	
CIMPME		144343	137152	151534	74516	104219	57320	83375	83375	109430	40020	27756	21516	87140	90368	54866	87140	27934	29692	42172	39159	65243	55509	128786	
CEXPPE		0	41281	0	0	1562	6148	0	0	0	0	0	0	0	0	0	0	9073	5806	968	3548	1016	2344	6009	
CEXPME		0	27535	0	0	1042	4101	0	0	0	0	0	0	0	0	0	0	6051	3873	645	2367	678	1563	4008	
CSTCPE		-332106	6656	-336962	-157369	571188	-57489	-107175	363500	-257812	-221825	91452	434194	500860	470926	769704	-107035	-248708	-206534	-110758	-475661	-243873	-649859	-430833	
CSTCME		-221515	4440	-224754	-104965	380982	-38345	-71486	242454	-171961	-147957	60998	289607	334073	314107	513392	-71393	-165888	-137758	-73876	-317266	-162663	-433456	-287366	
CSTCPEb		332106	-6656	336962	157369	-571188	57489	107175	-363500	257812	221825	-91452	-434194	-500860	-470926	-769704	107035	248708	206534	110758	475661	243873	649859	430833	
CSTCMEb		221515	-4440	224754	104965	-380982	38345	71486	-242454	171961	147957	-60998	-289607	-334073	-314107	-513392	71393	165888	137758	73876	317266	162663	433456	287366	
CQSME		1068067	1107887	1226763	1329564	1324579	1222744	1407920	1536434	1497582	1674954	1756254	1911923	1902220	1994169	2050999	2315448	2162481	2165812	2308735	2414806	2587305	2354534	2387026	
CQSPC		162	164	174	180	171	151	166	175	165	178	180	189	182	185	184	202	183	178	185	188	197	175	173	
CFPR		56200	62500	64000	65000	67000	68500	69500	70000	71000	72500	73000	101401	110000	350000	380000	520000	470000	510000	590000	420000	370000	412000	470000	

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CRPR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1036.5	1057.5	980.5	1067.25	1356.75	1329	1200	1040.5	1090	
CCPI											3.46	8.92	22.17	46.38	93.17	98.96	100.00	110.07	113.56	130.37	135.60	134.52	133.72	138.01	143.37
CRFPR											2093919	817930	457356	237156	375669	383994	520000	427001	449102	452558	309735	275052	308106	340555	327834
CWPR		340.29	398.55	258.63	252.25	237.66	204.16	170.76	198.64	269.37	288.07	270.20	287.14	291.03	257.18	484.96	314.85	366.67	216.85	321.01	264.11	265.95	205.37	222.39	
CGDP_USD		0	0	0	0	0	0	0	824.17	1321.6	1075.4	1114.7	1633.3	1980.2	2478.7	2744.6	3384.2	3438.9	3369.4	3100.3	3448.5	3595.5	3713.7	4004.8	
CGDP_RIEL		0	0	0	0	0	0	0	102	196	241	599	1,336	2,508	6,545	6,812	8,111	8,886	9,778	11,364	12,587	12,932	13,365	0	
CEXC											216	600	520	2000	2305	2575	2526	2713	3452	3770	3770	3905	3895	3930	
CPOP		6.610	6.770	7.040	7.380	7.760	8.120	8.460	8.780	9.090	9.410	9.740	10.090	10.440	10.790	11.140	11.480	11.820	12.160	12.490	12.820	13.150	13.480	13.810	
CET01JAN		47.7	51.4	55.6	57.2	72.7	64.5	49.1	55.7	55.6	63.2	48.4	58.4	45.7	75.5	44.6	60.3	60.5	55.7	70.6	65.7	80.4			
CET02JAN		64.2	65.2	70.9	69.4	76.2	73.3	62.5	66.2	64.9	75.4	61.8	68.1	58.9	81.6	56.5	74.6	68.2	69.2	80.2	74.7	87.2			
CET03JAN		53.3	51.5	58.0	54.1	61.8	53.0	54.0	52.4	56.3	51.2	54.9	52.9	45.6	61.6	48.7	51.7	60.7	59.0	58.4	67.7	67.9			
CET04JAN		77.7	71.0	85.2	84.7	82.2	89.8	69.7	76.3	79.8	92.8	79.0	78.6	68.8	93.1	71.4	82.2	89.2	75.3	83.7	76.1	91.8			
CET05JAN		77.8	76.6	80.9	81.2	80.7	84.5	68.9	75.1	76.2	86.5	72.4	74.4	71.7	90.6	67.0	84.9	78.6	78.5	88.2	80.4	96.7			
CET06JAN		94.7	83.3	95.7	84.3	94.3	97.1	88.1	79.7	78.1	99.1	88.8	92.6	82.6	106.4	77.8	100.2	81.0	83.3	100.1	88.6	105.3			
CET07JAN		24.1	31.4	34.6	31.9	37.5	31.0	35.4	33.1	36.0	29.6	31.6	32.0	27.2	38.9	29.6	28.9	33.8	37.0	32.5	38.0	44.7			
CET08JAN		17.1	32.8	38.2	29.0	39.0	33.3	36.0	31.8	36.6	32.8	29.6	35.2	27.4	29.9	30.8	20.6	35.0	36.6	23.3	35.2	41.9			
CET09JAN		17.0	30.5	37.2	35.9	45.1	29.8	33.5	33.9	38.0	28.1	27.5	31.7	30.1	45.2	27.8	26.0	32.9	39.3	29.5	37.7	46.4			
CET11JAN		27.5	35.1	39.6	43.3	53.1	42.5	40.0	39.3	45.7	41.3	39.4	36.8	38.7	52.4	32.9	40.8	41.6	47.4	50.6	44.9	64.4			
CET12JAN		38.0	45.9	53.0	56.4	55.9	50.9	49.5	49.7	52.4	52.6	45.0	47.4	38.8	58.2	40.2	50.4	51.3	56.4	59.9	53.9	72.4			
CET15JAN		68.6	51.8	77.2	80.3	86.6	13.0	80.7	57.4	61.7	97.8	79.4	67.2	66.3	105.1	53.7	81.2	93.5	66.3	100.2	91.3	110.0			
CET16JAN		35.6	32.3	39.6	50.0	79.2	68.3	37.2	37.9	44.8	79.8	50.1	46.4	44.5	90.3	29.3	69.2	69.6	44.9	88.5	64.7	81.9			
CET17JAN		52.0	55.0	59.4	59.6	79.4	71.8	51.8	59.0	57.6	71.7	51.0	64.3	51.2	82.7	47.1	67.7	61.7	57.3	76.8	67.5	87.9			
CET18JAN		19.0	28.6	32.0	25.8	31.9	27.3	30.7	32.0	31.0	28.7	27.1	29.9	22.4	27.0	26.5	22.5	30.0	30.9	24.3	30.2	35.7			
CET19JAN		32.6	40.6	37.2	62.1	61.7	32.3	35.4	47.9	33.1	39.0	32.3	34.5	27.9	55.4	37.3	35.7	38.3	37.8	28.4	48.5	42.5			
CET20JAN		66.7	73.8	54.3	84.5	77.2	51.7	50.8	71.9	47.0	64.8	57.8	57.9	49.6	87.0	68.6	68.4	64.5	62.7	45.9	83.9	62.9			
CET21JAN		51.3	57.0	51.0	55.9	73.9	52.6	59.6	55.2	53.9	53.8	50.4	55.1	39.9	79.5	54.1	50.7	53.6	56.3	45.2	77.4	67.2			
CET22JAN		36.8	46.1	41.4	40.7	55.7	39.3	47.4	46.4	43.5	41.2	41.0	41.3	33.7	54.1	38.7	39.9	47.0	47.7	38.1	55.6	57.1			
CETPJAN		69.2	66.5	74.4	71.8	78.0	77.0	65.4	67.6	68.5	78.0	67.6	70.8	62.2	84.8	61.0	75.7	73.0	70.2	80.2	75.5	88.2			
CETTJAN		24.7	35.1	40.5	39.3	46.1	37.5	38.9	37.6	41.7	36.9	34.6	36.6	32.4	44.9	32.3	33.3	38.9	43.3	39.2	41.9	54.0			
CETCJAN		52.1	42.1	58.4	65.2	82.9	40.7	59.0	47.7	53.3	88.8	64.8	56.8	55.4	97.7	41.5	75.2	81.6	55.6	94.4	78.0	96.0			
CETMJAN		43.1	50.2	45.9	54.8	63.3	45.8	46.0	52.1	44.4	49.9	43.3	47.2	37.5	64.3	45.4	47.5	49.2	48.8	43.1	60.5	58.9			
CET01FEB		21.1	36.9	27.3	25.7	36.1	24.8	26.6	26.8	26.5	31.2	23.2	26.2	21.8	39.8	19.5	26.9	44.0	41.0	32.0	43.0	40.8			
CET02FEB		32.1	42.9	38.0	35.1	43.4	38.2	34.2	35.3	34.4	37.8	32.1	34.3	26.7	45.9	32.3	37.3	45.5	44.2	40.8	49.9	47.8			
CET03FEB		27.4	34.1	30.6	26.8	35.7	27.3	31.1	28.2	30.7	24.6	28.8	26.4	21.6	30.2	24.4	26.2	32.7	34.6	26.7	39.6	37.3			
CET04FEB		45.4	48.2	46.5	48.3	54.9	48.3	44.6	45.4	48.6	45.6	41.2	46.3	31.9	55.4	42.1	42.9	51.8	47.6	39.9	53.0	56.3			
CET05FEB		42.4	48.5	47.7	46.2	50.3	49.3	41.2	43.4	43.8	43.1	37.7	42.9	32.2	55.2	41.3	44.5	47.0	46.1	45.4	56.9	55.3			
CET06FEB		51.7	60.8	55.2	46.8	61.4	59.8	47.8	48.6	44.1	59.0	51.6	45.9	39.9	67.9	52.1	55.7	60.7	48.0	64.0	61.4	64.6			
CET07FEB		11.5	27.0	20.9	16.1	21.6	25.0	19.2	17.3	18.8	14.5	16.2	15.2	14.3	17.1	14.7	15.8	24.5	20.2	16.5	22.9	21.1			
CET08FEB		10.4	31.3	27.4	15.2	23.7	22.4	20.3	15.3	18.1	15.8	14.3	16.6	14.3	15.6	17.0	11.1	24.0	20.6	18.8	21.1	23.4			
CET09FEB		12.6	41.2	30.4	20.0	23.6	28.2	16.0	16.7	16.3	12.3	16.2	14.0	19.1	15.7	17.3	13.0	34.8	31.0	36.7	21.7	36.6			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CET11FEB		17.8	45.9	24.1	20.2	29.4	31.1	22.0	21.2	25.3	22.4	23.2	18.4	19.0	32.4	20.2	28.0	48.5	39.4	29.8	32.7	43.4			
CET12FEB		16.9	32.6	22.6	24.4	31.1	29.5	23.2	23.9	26.0	23.2	22.9	21.8	17.9	25.7	22.8	28.2	38.9	34.3	28.5	37.3	32.6			
CET15FEB		32.9	53.8	36.8	35.1	56.4	50.8	31.7	34.0	38.0	45.5	38.8	33.5	26.9	53.6	39.8	41.4	59.7	53.1	54.9	54.7	59.7			
CET16FEB		26.7	60.6	25.2	21.2	41.3	50.1	22.5	28.3	32.7	50.9	23.5	25.8	29.5	68.6	34.5	42.1	63.4	71.0	55.4	38.5	70.4			
CET17FEB		24.8	41.5	30.6	28.1	39.5	29.3	28.9	29.4	28.0	37.9	25.3	28.7	24.2	46.9	22.6	30.5	48.6	42.1	38.0	46.1	46.1			
CET18FEB		8.9	21.5	20.5	13.9	18.6	23.9	17.3	16.1	15.9	14.1	13.1	14.4	12.1	14.4	13.8	11.3	17.9	15.3	14.5	17.4	20.6			
CET19FEB		16.8	32.9	26.5	37.0	32.3	29.5	22.2	23.0	21.8	25.9	18.2	17.0	24.5	25.9	22.5	18.6	21.2	19.9	24.3	34.1	23.5			
CET20FEB		32.1	52.9	38.1	59.3	50.0	48.0	27.7	29.8	33.7	53.5	29.2	26.3	43.7	45.1	37.4	28.5	32.4	27.0	46.0	61.4	34.6			
CET21FEB		25.7	32.1	29.8	29.9	34.1	37.4	27.4	25.0	25.8	25.9	24.1	25.7	26.0	38.3	27.4	27.1	30.0	29.3	22.2	37.7	31.9			
CET22FEB		18.0	27.0	25.3	21.4	28.5	26.9	24.3	22.0	21.8	20.3	20.6	20.4	19.1	23.5	20.2	20.4	23.2	24.6	19.8	28.8	26.0			
CETPFEB		36.7	45.2	40.9	38.2	47.0	41.3	37.6	38.0	38.0	40.2	35.8	37.0	29.0	49.1	35.3	38.9	47.0	43.6	41.5	50.6	50.4			
CETTFEB		13.8	35.6	25.1	19.2	25.9	27.2	20.1	18.9	20.9	17.6	18.6	17.2	16.9	21.3	18.4	19.2	34.1	29.1	26.1	27.1	31.4			
CETCFEB		29.8	57.2	31.0	28.2	48.9	50.5	27.1	31.2	35.4	48.2	31.2	29.7	28.2	61.1	37.2	41.8	61.6	62.1	55.2	46.6	65.1			
CETMFEB		21.1	34.7	28.5	31.6	33.8	32.5	24.6	24.2	24.5	29.6	21.8	22.1	24.9	32.4	24.0	22.7	28.9	26.4	27.5	37.6	30.5			
CET01MAR		22.7	61.6	26.6	23.9	36.0	35.7	15.6	29.3	29.6	42.8	56.2	17.5	20.4	51.2	43.1	43.8	27.9	76.2	20.5	58.3	27.0			
CET02MAR		32.6	48.2	29.2	27.1	37.6	45.4	19.5	29.1	33.4	35.6	51.9	22.6	17.1	62.3	47.3	43.9	26.9	71.2	26.4	56.5	31.8			
CET03MAR		27.9	29.6	23.2	21.7	29.2	21.1	18.4	24.5	27.6	26.3	44.3	23.2	16.2	40.4	39.2	25.7	19.6	39.0	22.3	30.8	25.0			
CET04MAR		30.9	39.8	31.6	30.5	37.6	40.0	27.3	29.3	29.7	31.3	41.7	27.8	19.7	50.8	42.7	36.6	32.7	45.2	26.3	39.0	35.0			
CET05MAR		35.1	36.8	31.0	30.4	34.2	44.3	23.0	31.2	36.0	34.2	49.9	22.2	14.2	58.6	49.2	45.3	29.1	63.1	29.5	53.6	35.7			
CET06MAR		51.5	64.7	40.9	34.5	57.6	66.3	30.0	38.0	42.4	46.6	56.3	31.8	22.9	84.8	58.1	48.9	34.7	84.2	45.9	69.2	53.5			
CET07MAR		27.8	24.2	20.4	15.6	21.0	32.9	11.8	19.4	23.6	27.7	47.6	19.5	9.0	34.0	39.9	23.5	23.1	46.6	25.4	22.9	17.8			
CET08MAR		36.8	17.7	27.2	11.8	20.1	29.3	9.4	14.2	21.4	32.7	35.0	13.8	8.3	23.0	27.1	18.6	20.1	41.6	37.6	15.3	17.8			
CET09MAR		46.4	29.2	42.8	13.4	23.2	59.5	9.8	22.8	28.0	24.8	62.6	28.4	11.0	43.4	58.0	33.3	25.1	54.5	40.3	26.4	25.5			
CET11MAR		44.1	55.9	28.7	21.8	26.1	55.9	11.3	29.6	36.8	38.4	80.5	32.7	12.7	65.8	73.8	57.0	33.4	79.7	30.9	46.5	27.6			
CET12MAR		36.3	46.8	20.3	24.0	27.7	50.2	12.4	21.9	31.2	32.9	59.3	27.3	13.0	66.0	51.4	46.8	26.4	66.0	20.4	42.7	21.1			
CET15MAR		36.0	52.8	34.9	39.2	48.5	77.0	22.9	31.4	40.3	64.4	87.0	20.0	20.3	62.6	77.2	71.7	33.4	88.0	37.5	49.3	48.8			
CET16MAR		52.3	94.1	40.9	36.5	41.7	79.1	15.3	34.8	44.9	80.3	85.1	32.8	21.1	91.0	94.9	89.5	46.4	129.2	33.7	87.6	50.5			
CET17MAR		24.8	67.5	29.8	25.0	41.9	40.3	17.4	34.0	30.9	47.4	55.0	18.1	23.1	53.1	43.8	48.1	31.0	85.7	24.2	67.5	31.9			
CET18MAR		29.9	15.3	20.0	11.5	16.7	24.3	9.2	15.7	19.6	23.2	29.0	13.5	7.0	15.7	25.9	15.2	16.8	29.3	30.6	14.3	14.6			
CET19MAR		23.4	21.1	30.3	20.8	24.3	29.5	16.9	24.5	24.5	25.9	32.8	18.7	15.0	21.2	26.1	20.5	21.8	35.2	37.3	21.9	20.5			
CET20MAR		28.9	24.2	39.9	30.4	36.1	46.7	26.5	22.0	33.1	39.8	39.5	30.3	25.2	30.8	28.9	40.6	36.7	52.1	41.7	31.7	29.7			
CET21MAR		24.5	25.5	23.6	21.6	24.2	32.8	19.8	25.9	26.1	23.7	30.4	19.4	18.6	27.4	33.3	31.0	22.4	40.2	20.9	24.5	21.5			
CET22MAR		22.4	20.7	21.1	18.0	21.1	27.6	13.6	22.1	22.7	22.9	32.0	16.9	13.8	24.0	27.3	23.5	16.6	37.1	23.5	23.2	18.5			
CETPMAR		33.5	46.8	30.4	28.0	38.7	42.1	22.3	30.2	33.1	36.1	50.1	24.2	18.4	58.0	46.6	40.7	28.5	63.2	28.5	51.2	34.7			
CETTMAR		38.3	34.8	27.9	17.3	23.6	45.6	10.9	21.6	28.2	31.3	57.0	24.3	10.8	46.4	50.0	35.8	25.6	57.7	30.9	30.8	22.0			
CETCMAR		44.2	73.5	37.9	37.9	45.1	78.1	19.1	33.1	42.6	72.4	86.1	26.4	20.7	76.8	86.1	80.6	39.9	108.6	35.6	68.5	49.7			
CETMMAR		25.7	29.1	27.5	21.2	27.4	33.5	17.2	24.0	26.2	30.5	36.5	19.5	17.1	28.7	30.9	29.8	24.2	46.6	29.7	30.5	22.8			
CET01APR		52.5	48.5	72.0	24.5	68.2	72.3	52.6	37.3	66.3	67.5	89.3	46.1	32.8	81.7	67.6	42.3	40.1	75.1	22.5	45.3	88.7			
CET02APR		38.6	50.2	56.5	24.1	58.8	54.4	42.9	32.9	54.5	56.2	66.3	46.5	28.8	62.3	53.8	38.2	37.5	56.3	27.1	45.0	75.6			
CET03APR		31.2	43.1	40.3	27.8	46.1	43.2	29.0	26.1	52.8	35.6	54.1	33.4	31.9	42.9	30.1	32.6	35.0	60.7	39.1	32.6	55.2			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CET04APR		25.3	27.8	46.9	23.7	56.7	44.1	33.0	27.2	46.9	34.6	43.5	34.1	29.7	35.7	36.8	31.2	23.8	47.6	23.6	40.5	59.9			
CET05APR		36.7	45.7	51.7	21.3	47.9	47.7	29.4	21.3	46.4	38.8	30.5	40.2	19.9	50.2	39.2	34.1	28.0	48.3	27.6	46.6	65.2			
CET06APR		30.0	54.7	50.9	24.1	68.1	68.6	33.1	39.3	61.4	47.3	78.7	48.0	32.0	59.8	58.5	42.6	33.2	51.0	34.4	56.0	69.4			
CET07APR		43.7	39.8	36.7	24.7	47.3	60.4	25.0	43.6	87.6	46.2	65.6	33.3	32.4	53.5	39.1	34.7	52.0	64.5	59.9	50.8	74.0			
CET08APR		57.4	39.9	29.6	23.5	46.0	62.5	23.3	36.0	88.2	39.4	56.3	34.3	49.5	61.3	35.6	23.2	33.2	69.8	69.0	63.5	63.5			
CET09APR		69.8	35.7	36.3	26.9	56.0	85.8	40.4	40.4	69.1	47.7	84.6	40.1	41.0	77.6	46.3	31.4	55.1	79.0	61.5	68.1	67.2			
CET11APR		57.2	52.3	54.3	25.0	71.0	78.4	53.0	43.9	84.8	51.7	102.9	45.4	34.3	92.7	57.4	42.0	60.3	75.9	49.4	58.1	91.2			
CET12APR		33.5	51.1	56.0	26.0	62.6	47.6	58.5	45.4	61.4	60.7	85.3	46.9	33.1	68.3	48.8	41.9	54.9	53.0	38.5	46.4	89.5			
CET15APR		50.5	91.1	84.4	24.3	86.5	69.6	39.8	39.0	66.3	52.2	79.1	58.8	32.5	99.6	61.7	56.8	66.9	72.0	31.3	60.1	70.4			
CET16APR		60.9	89.3	88.1	23.3	103.5	98.7	42.1	38.9	68.0	81.2	131.7	62.3	34.5	120.3	90.5	57.5	62.0	99.7	24.0	66.1	94.2			
CET17APR		55.5	50.2	74.6	23.4	70.4	79.1	49.1	39.0	72.9	73.2	95.2	46.1	34.2	89.5	76.7	44.1	39.3	73.3	20.5	50.0	90.7			
CET18APR		43.8	39.6	30.9	27.2	39.8	56.1	23.5	40.4	85.7	56.5	37.7	31.5	32.4	58.9	30.7	28.3	48.6	53.4	50.5	44.8	66.0			
CET19APR		47.5	42.6	25.3	40.2	32.1	43.8	34.8	31.9	54.9	43.8	40.5	25.1	32.6	50.3	28.6	30.2	35.1	59.4	38.0	43.2	63.7			
CET20APR		44.4	47.4	23.6	37.0	40.0	45.9	41.5	32.8	52.3	49.2	42.7	24.8	36.2	46.0	23.9	36.0	33.0	70.5	38.2	42.7	55.2			
CET21APR		42.6	38.0	26.6	38.4	42.7	38.7	37.9	36.9	47.8	40.7	54.6	34.4	37.1	51.3	34.3	29.0	42.8	52.3	33.3	47.5	52.1			
CET22APR		43.7	34.7	29.1	32.2	36.8	45.4	34.2	29.8	53.0	40.8	60.2	33.6	29.0	42.9	33.6	26.4	47.0	53.1	47.3	49.6	64.0			
CETPAPR		35.7	45.0	53.1	24.3	57.6	55.1	36.7	30.7	54.7	46.7	60.4	41.4	29.2	55.4	47.7	36.8	32.9	56.5	29.1	44.3	69.0			
CETTAPR		52.3	43.8	42.6	25.2	56.6	66.9	40.0	41.9	78.2	49.1	78.9	40.0	38.1	70.7	45.4	34.6	51.1	68.4	55.7	57.4	77.1			
CETCAPR		55.7	90.2	86.3	23.8	95.0	84.2	41.0	39.0	67.2	66.7	105.4	60.6	33.5	110.0	76.1	57.2	64.5	85.9	27.7	63.1	82.3			
CETMAPR		46.3	42.1	35.0	33.1	43.6	51.5	36.8	35.1	61.1	50.7	55.2	32.6	33.6	56.5	38.0	32.3	41.0	60.3	38.0	46.3	65.3			
CET01MAY		93.1	87.3	87.6	98.1	96.0	106.3	100.1	74.9	107.5	99.7	107.5	103.4	77.7	86.1	74.3	115.0	109.0	96.4	107.0	97.6	105.5			
CET02MAY		84.6	81.6	87.4	88.9	91.5	98.5	94.2	78.1	100.6	85.5	101.7	91.2	79.9	78.7	74.2	105.7	106.3	84.8	104.3	89.1	98.9			
CET03MAY		78.5	77.1	84.1	60.9	89.6	103.4	93.1	77.3	96.5	99.0	98.5	97.4	59.7	75.6	89.0	100.7	103.0	80.5	109.4	94.7	107.7			
CET04MAY		77.2	86.6	83.9	66.3	75.5	87.3	94.8	65.0	87.3	86.2	76.3	86.4	67.7	76.8	91.6	96.5	90.9	90.4	103.6	79.4	86.3			
CET05MAY		68.7	88.4	77.6	92.0	90.2	95.6	91.2	77.2	95.2	72.0	87.9	79.9	83.0	63.2	67.9	99.7	104.4	74.4	99.5	75.1	85.9			
CET06MAY		85.8	90.4	92.8	82.6	97.5	76.0	99.1	78.1	96.0	71.2	102.0	96.7	82.5	78.7	76.7	101.0	107.7	76.9	100.6	88.9	98.4			
CET07MAY		103.3	99.7	79.6	94.6	101.9	100.8	89.1	82.0	111.2	100.7	104.9	113.0	105.6	115.2	83.2	111.5	97.4	102.7	122.9	102.4	117.5			
CET08MAY		84.9	94.8	77.2	74.7	97.7	104.2	70.7	106.2	108.1	103.8	90.1	84.6	78.8	115.3	84.2	106.9	97.3	94.9	99.7	92.9	108.4			
CET09MAY		94.6	86.9	81.1	83.1	91.3	93.8	84.0	103.9	105.1	102.4	90.0	78.8	83.5	102.5	78.8	98.7	90.4	98.2	114.4	80.6	101.6			
CET11MAY		94.0	91.1	91.7	102.7	98.6	102.8	96.4	92.4	107.5	107.5	105.3	104.5	91.7	93.0	89.5	107.7	90.1	103.4	121.7	81.5	105.3			
CET12MAY		100.3	71.2	88.8	94.6	91.5	104.8	90.3	84.4	106.6	101.2	107.5	100.0	86.0	94.3	91.5	103.8	89.9	104.3	117.8	89.9	105.9			
CET15MAY		88.1	96.9	91.2	103.8	102.8	95.5	104.4	73.1	106.9	103.9	109.0	121.0	81.3	104.5	86.0	98.3	100.8	94.2	110.8	87.1	107.2			
CET16MAY		99.0	109.1	107.1	107.4	106.5	105.7	105.8	73.3	115.0	104.5	116.0	118.7	76.6	109.3	91.7	115.2	116.0	115.3	110.2	94.2	112.4			
CET17MAY		98.9	95.2	88.1	103.7	97.3	102.0	99.9	75.5	106.5	98.8	107.2	107.1	78.5	89.8	69.8	117.8	111.6	97.3	106.3	97.3	103.8			
CET18MAY		102.2	105.7	81.6	82.8	101.6	104.2	85.0	107.5	115.5	86.5	94.6	99.4	97.2	126.6	82.7	111.9	90.1	112.7	112.3	101.7	120.6			
CET19MAY		86.6	101.5	79.0	88.0	100.4	103.6	84.8	118.1	117.9	105.8	87.4	100.1	88.6	119.3	80.0	105.9	86.0	108.1	108.0	94.0	115.1			
CET20MAY		79.8	91.6	60.0	99.3	84.2	93.1	79.4	113.6	107.2	101.1	88.3	98.3	80.8	104.8	73.7	93.6	72.5	98.7	86.5	81.3	102.8			
CET21MAY		90.2	93.9	80.7	85.9	93.5	107.6	72.0	91.8	110.2	95.0	89.2	102.7	89.7	90.3	88.2	91.0	80.7	101.7	112.7	91.3	99.0			
CET22MAY		82.3	99.6	87.9	84.8	92.4	106.8	72.6	102.8	112.6	97.0	101.7	113.2	100.9	100.8	86.9	91.4	90.0	97.1	124.3	101.0	106.7			
CETPMAY		81.3	85.2	85.6	81.5	90.1	94.5	95.4	75.1	97.2	85.6	95.7	92.5	75.1	76.5	79.0	103.1	103.6	83.9	104.1	87.5	97.1			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CETTMAY		95.4	88.7	83.7	89.9	96.2	101.3	86.1	93.8	107.7	103.1	99.6	96.2	89.1	104.1	85.4	105.7	93.0	100.7	115.3	89.5	107.7			
CETCMAY		93.6	103.0	99.2	105.6	104.7	100.6	105.1	73.2	111.0	104.2	112.5	119.9	79.0	106.9	88.9	106.8	108.4	104.8	110.5	90.7	109.8			
CETMMAY		90.0	97.9	79.6	90.8	94.9	102.9	82.3	101.6	111.7	97.4	94.7	103.5	89.3	105.3	80.2	101.9	88.5	102.6	108.4	94.4	108.0			
CET01JUN		88.7	92.9	91.9	105.6	98.8	96.0	105.8	104.9	108.2	109.7	95.2	102.8	102.1	109.6	96.4	114.0	107.2	114.5	115.9	104.3	98.9			
CET02JUN		88.4	93.3	90.0	103.3	97.5	95.5	104.3	100.6	107.5	104.4	92.8	101.7	99.0	106.8	97.2	112.3	100.4	114.2	113.5	105.5	99.2			
CET03JUN		93.1	94.1	88.5	107.0	97.8	98.2	110.7	104.2	107.1	106.4	93.0	103.1	103.2	112.1	98.4	115.8	106.9	115.3	117.2	110.0	99.9			
CET04JUN		88.8	92.1	86.1	99.5	94.7	95.2	104.8	100.4	107.1	96.6	91.3	96.6	102.7	110.3	94.1	112.2	105.9	83.9	108.6	105.7	99.1			
CET05JUN		87.6	94.2	86.7	100.0	96.2	94.1	104.2	95.1	107.0	100.5	91.5	103.7	92.0	113.4	98.0	109.4	90.7	104.0	112.7	105.8	101.6			
CET06JUN		87.4	93.0	91.6	101.4	95.9	94.0	103.4	96.5	108.8	95.0	94.4	99.6	98.9	105.3	93.3	114.0	107.0	118.1	111.7	104.0	96.6			
CET07JUN		93.5	94.5	97.1	95.7	99.2	94.6	111.9	109.3	109.5	109.9	95.4	103.7	96.4	119.5	95.5	122.5	111.1	120.8	115.0	111.5	104.1			
CET08JUN		87.6	82.9	90.9	90.0	94.3	86.4	81.3	99.7	100.8	104.1	86.3	93.3	90.9	109.3	82.4	116.1	104.5	111.9	96.0	102.6	95.8			
CET09JUN		79.9	79.2	87.6	91.0	88.1	81.2	89.7	94.9	98.6	102.6	83.4	90.0	81.8	101.6	77.8	107.5	100.4	108.1	96.0	95.8	90.8			
CET11JUN		81.3	84.3	87.9	100.0	91.5	87.2	100.9	99.9	100.9	106.5	89.1	96.8	93.0	106.6	86.0	112.2	102.3	114.6	107.5	99.9	93.2			
CET12JUN		86.6	89.3	92.5	102.8	96.1	93.4	102.1	104.8	106.1	109.5	91.9	98.3	101.3	103.1	93.9	114.8	104.4	117.0	110.4	104.3	97.4			
CET15JUN		89.1	97.7	90.4	106.1	97.6	95.9	104.9	107.5	110.0	105.8	100.5	104.5	106.5	108.7	97.1	117.7	107.8	117.2	116.6	105.1	101.3			
CET16JUN		86.1	94.0	88.7	105.7	95.7	94.0	103.8	106.6	105.9	107.3	99.4	106.1	104.0	111.2	94.5	118.1	108.4	126.4	116.2	101.1	96.6			
CET17JUN		87.1	92.1	92.3	104.3	98.1	94.7	104.5	104.2	108.6	107.1	95.3	102.6	103.7	109.4	95.4	113.4	106.8	117.7	114.6	102.9	97.9			
CET18JUN		91.0	90.8	94.2	96.6	97.1	88.7	101.5	105.3	104.2	108.0	91.9	97.4	95.8	117.1	89.5	120.8	109.3	114.6	108.1	108.4	100.4			
CET19JUN		90.9	89.8	100.4	109.9	97.1	88.6	111.4	108.9	103.4	105.8	92.2	97.1	98.5	122.0	90.4	120.1	112.8	114.1	112.1	108.6	102.5			
CET20JUN		89.8	87.1	99.7	101.5	96.5	85.4	110.4	108.1	103.4	101.8	92.0	94.5	95.3	118.8	89.5	114.0	110.8	107.3	109.7	107.3	100.5			
CET21JUN		92.6	93.1	103.6	110.4	101.4	93.4	118.8	114.6	109.5	107.1	96.4	92.5	104.6	126.6	95.9	121.3	114.5	116.4	119.9	111.7	104.9			
CET22JUN		94.8	96.8	98.8	111.5	102.6	96.9	118.6	112.5	111.7	110.1	98.0	96.1	106.3	123.4	98.1	122.5	115.2	119.9	121.8	114.3	107.3			
CETPJUN		89.0	93.3	89.1	102.8	96.8	95.5	105.5	100.3	107.6	102.1	93.0	101.3	99.7	109.6	96.2	113.0	103.0	108.3	113.3	105.9	99.2			
CETTJUN		85.8	86.0	91.2	95.9	93.8	88.6	97.2	101.7	103.2	106.5	89.2	96.4	92.7	108.0	87.1	114.6	104.5	114.5	105.0	102.8	96.3			
CETCJUN		87.6	95.9	89.6	105.9	96.7	95.0	104.4	107.1	108.0	106.6	100.0	105.3	105.3	110.0	95.8	117.9	108.1	121.8	116.4	103.1	99.0			
CETMJUN		91.0	91.6	98.2	105.7	98.8	91.3	110.9	108.9	106.8	106.7	94.3	96.7	100.7	119.6	93.1	118.7	111.6	115.0	114.4	108.9	102.3			
CET01JLY		94.1	95.7	96.3	101.7	98.7	96.4	98.3	102.0	105.6	98.2	100.5	98.0	107.2	107.7	95.9	107.9	98.4	89.3	108.8	97.1	98.7			
CET02JLY		93.1	96.9	95.9	99.1	95.4	95.2	95.8	96.9	103.4	96.2	99.7	95.2	99.6	101.8	92.6	104.6	95.2	86.0	107.3	97.5	95.9			
CET03JLY		97.8	97.9	102.4	104.5	98.6	99.0	101.8	100.3	106.2	97.5	102.0	96.8	104.7	108.7	95.0	105.9	99.4	95.1	108.0	99.0	102.0			
CET04JLY		92.8	96.7	93.2	99.6	92.6	93.2	99.6	99.2	99.0	92.0	100.2	88.7	100.7	100.5	95.2	103.4	101.9	96.7	107.3	99.2	102.0			
CET05JLY		93.1	98.7	96.1	98.6	92.7	93.5	95.4	92.7	102.0	93.0	98.8	92.4	91.2	100.2	90.3	99.5	93.7	87.5	105.9	98.6	97.1			
CET06JLY		90.2	96.7	91.6	93.0	94.2	94.8	88.7	94.2	97.8	91.9	98.7	91.4	97.2	88.5	89.2	103.6	94.2	78.1	107.7	96.4	92.3			
CET07JLY		101.4	98.6	105.1	112.3	106.5	101.5	104.5	102.9	111.7	99.8	106.4	98.4	110.0	112.6	96.2	109.0	104.1	94.1	110.0	101.6	103.0			
CET08JLY		91.7	86.6	98.7	107.9	99.7	93.8	82.1	91.5	107.4	97.4	92.1	87.6	101.1	109.0	83.8	103.2	97.2	91.3	100.1	94.5	94.0			
CET09JLY		88.8	81.1	94.6	103.9	97.4	90.9	85.6	91.5	103.1	95.6	93.3	82.8	99.2	106.7	83.3	97.4	92.3	76.2	96.7	89.1	87.7			
CET11JLY		90.3	87.4	93.6	103.2	97.2	91.1	94.8	97.7	103.8	93.6	97.5	90.8	101.1	105.3	92.7	102.8	95.3	79.6	101.1	91.3	91.4			
CET12JLY		93.2	93.9	97.0	102.6	99.1	94.9	98.2	100.4	105.8	97.2	100.7	95.7	105.1	107.3	94.9	108.3	96.3	85.5	106.4	96.8	95.6			
CET15JLY		98.8	101.9	98.5	97.8	100.8	98.1	98.3	103.7	104.4	99.4	106.3	102.0	107.9	105.7	95.1	110.3	103.3	91.3	114.3	101.1	102.3			
CET16JLY		96.0	93.6	94.4	99.9	100.8	95.0	99.0	103.5	102.7	100.7	105.5	98.8	106.6	106.8	97.8	107.8	99.4	86.6	111.0	97.2	97.8			
CET17JLY		92.4	95.3	94.6	100.1	98.6	95.8	96.5	101.4	104.3	97.3	101.0	97.3	106.2	104.8	95.1	107.1	98.4	87.0	109.5	96.2	97.7			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CET18JLY		98.9	92.5	103.8	113.9	105.6	101.9	100.3	97.1	108.8	99.1	102.6	95.5	105.9	111.1	92.6	107.7	102.5	100.8	107.8	98.3	101.2			
CET19JLY		97.7	92.1	109.4	115.4	104.7	103.0	103.7	97.9	109.0	97.9	109.3	92.1	104.4	111.8	86.2	104.4	101.1	100.4	104.8	98.6	102.3			
CET20JLY		97.4	93.3	112.3	115.6	104.4	106.7	104.2	95.9	108.6	96.5	112.6	89.9	102.7	112.6	82.7	101.4	100.8	101.0	103.5	101.2	106.1			
CET21JLY		100.9	99.4	113.9	116.2	105.4	107.2	109.4	107.4	112.7	99.8	117.7	97.1	109.8	117.3	90.2	107.8	104.4	102.0	112.3	104.7	108.0			
CET22JLY		102.2	102.1	111.2	115.6	105.1	105.8	108.3	106.9	112.4	101.1	113.9	99.3	110.3	114.6	94.2	110.1	105.5	100.3	113.8	105.2	107.6			
CETPJLY		93.5	97.1	95.9	99.4	95.4	95.4	96.6	97.6	102.3	94.8	100.0	93.8	100.1	101.2	93.0	104.2	97.1	88.8	107.5	98.0	98.0			
CETTJLY		93.1	89.5	97.8	106.0	100.0	94.4	93.0	96.8	106.4	96.7	98.0	91.1	103.3	108.2	90.2	104.1	97.0	85.3	102.9	94.7	94.3			
CETCJLY		97.4	97.8	96.5	98.9	100.8	96.6	98.7	103.6	103.6	100.1	105.9	100.4	107.3	106.3	96.5	109.1	101.4	89.0	112.7	99.2	100.1			
CETMJLY		98.3	95.8	107.5	112.8	104.0	103.4	103.7	101.1	109.3	98.6	109.5	95.2	106.6	112.0	90.2	106.4	102.1	98.6	108.6	100.7	103.8			
CET01AUG		98.1	99.7	93.8	93.0	93.2	98.6	92.8	100.3	99.7	99.6	96.2	98.4	100.8	94.3	97.2	100.2	96.0	97.7	104.5	104.1	108.5			
CET02AUG		96.9	98.0	92.2	90.5	91.6	97.4	90.5	99.0	97.4	97.5	94.9	96.2	97.9	90.9	94.5	101.9	92.3	93.4	100.2	101.0	105.3			
CET03AUG		103.3	103.0	101.5	92.5	92.9	100.5	94.8	101.1	103.2	97.0	95.6	97.3	99.5	97.7	96.0	102.0	94.4	99.7	106.0	104.8	109.8			
CET04AUG		102.1	104.1	102.8	92.8	94.2	105.1	94.7	105.9	104.0	98.2	98.9	98.8	101.0	96.4	97.4	105.3	94.7	101.3	107.0	100.9	106.6			
CET05AUG		98.1	97.5	92.2	90.3	91.3	97.9	90.7	99.5	96.6	95.8	94.2	93.5	98.3	84.8	93.4	103.6	87.0	88.3	98.7	99.8	107.2			
CET06AUG		93.9	95.4	91.9	84.2	87.6	96.9	85.9	99.8	98.9	98.2	97.1	99.6	94.1	94.2	88.4	101.9	94.6	96.3	96.1	96.5	96.0			
CET07AUG		105.1	100.8	95.5	96.5	90.9	99.0	95.2	108.8	102.6	97.8	98.6	96.4	98.2	99.2	100.3	105.7	102.7	106.3	110.3	106.7	112.2			
CET08AUG		97.2	92.9	86.5	94.6	85.4	88.6	91.4	105.8	94.5	95.7	93.1	86.5	87.1	95.6	90.9	100.6	100.2	97.4	104.4	95.7	102.0			
CET09AUG		92.6	88.8	80.3	87.9	86.0	86.9	89.4	101.0	92.1	96.9	92.1	84.0	87.9	89.8	86.7	91.6	97.1	92.4	98.5	93.7	96.0			
CET11AUG		93.6	91.8	83.8	86.3	87.9	91.8	89.2	101.3	94.2	94.3	93.8	90.0	93.5	89.3	91.4	95.5	97.5	96.3	100.3	97.3	100.7			
CET12AUG		96.7	97.0	89.9	91.2	92.5	96.9	91.8	101.9	97.4	96.6	95.7	95.9	97.7	93.8	96.3	101.7	99.0	98.7	102.9	102.5	105.1			
CET15AUG		102.0	101.9	95.3	94.1	95.8	104.6	91.8	105.0	105.2	100.5	102.3	104.9	102.9	98.3	98.3	102.0	101.8	102.0	107.8	104.9	110.2			
CET16AUG		98.7	96.9	89.6	89.6	93.9	100.2	91.8	102.8	99.4	98.4	99.7	100.6	99.5	94.0	95.8	98.8	102.3	98.9	105.1	105.0	109.0			
CET17AUG		97.3	99.6	93.1	92.2	92.9	101.0	92.7	101.6	100.0	101.1	97.3	100.2	101.6	95.1	97.2	100.2	100.4	98.3	104.7	104.6	108.0			
CET18AUG		102.7	97.8	91.9	95.4	83.7	92.5	90.8	108.5	98.5	94.3	95.1	89.4	90.9	98.4	98.5	104.0	101.7	103.6	109.1	101.6	107.1			
CET19AUG		107.8	101.1	104.7	95.8	82.4	97.9	94.8	114.3	104.5	93.4	103.0	93.2	94.2	101.7	102.0	102.7	104.1	107.9	112.9	105.3	110.9			
CET20AUG		113.0	105.1	115.8	97.4	85.0	102.7	99.9	117.9	111.0	94.8	107.4	97.9	101.2	104.3	107.9	99.9	108.1	109.9	118.0	109.8	115.3			
CET21AUG		114.1	106.8	114.4	96.1	89.7	106.8	102.9	117.9	111.5	98.2	108.0	101.8	104.8	102.9	106.8	101.5	102.6	111.2	114.7	112.5	116.0			
CET22AUG		110.7	107.2	108.3	97.0	92.8	105.3	101.6	115.7	109.6	99.1	105.7	101.4	104.0	104.2	104.0	104.3	104.2	110.9	114.0	111.9	115.9			
CETPAUG		98.7	99.6	95.7	90.6	91.8	99.4	91.6	100.9	100.0	97.7	96.2	97.3	98.6	93.1	94.5	102.5	93.2	96.1	102.1	101.2	105.6			
CETTAUG		97.0	94.3	87.2	91.3	88.5	92.6	91.4	103.8	96.2	96.3	94.7	90.6	92.9	93.5	93.1	99.0	99.3	98.2	103.3	99.2	103.2			
CETCAUG		100.4	99.4	92.5	91.9	94.9	102.4	91.8	103.9	102.3	99.5	101.0	102.8	101.2	96.2	97.1	100.4	102.1	100.5	106.5	105.0	109.6			
CETMAUG		107.6	102.9	104.7	95.7	87.8	101.0	97.1	112.7	105.9	96.8	102.8	97.3	99.5	101.1	102.7	102.1	103.5	107.0	112.2	107.6	112.2			
CET01SEP		84.9	93.8	84.4	92.4	86.7	89.2	92.8	90.1	99.2	92.7	92.1	88.3	97.9	93.9	92.0	90.7	90.9	70.6	89.1	101.0	86.5			
CET02SEP		86.3	93.6	85.9	91.8	86.0	88.2	91.7	89.2	97.6	91.5	90.8	89.1	94.7	91.3	90.2	90.3	91.4	74.1	88.6	98.9	85.9			
CET03SEP		91.1	99.0	89.7	98.6	89.9	91.9	96.8	92.2	99.6	95.3	95.6	94.6	103.6	97.7	96.3	94.9	98.0	82.6	97.0	107.3	95.3			
CET04SEP		91.9	94.3	92.6	95.5	88.9	89.6	93.9	94.7	95.7	93.4	94.5	94.2	103.9	94.7	93.7	96.1	101.7	85.9	95.9	105.0	93.3			
CET05SEP		89.5	94.8	88.3	92.7	86.9	88.1	93.6	90.6	95.5	91.9	92.9	92.3	93.6	91.0	89.8	93.5	94.6	80.3	89.6	98.7	88.9			
CET06SEP		87.9	90.4	88.0	90.9	84.7	85.9	88.1	87.9	95.0	92.3	87.6	86.1	97.1	87.5	88.7	87.1	91.3	74.2	87.6	95.6	80.5			
CET07SEP		88.7	100.6	85.8	99.1	92.3	95.5	100.7	94.8	100.2	96.5	94.7	92.7	100.9	97.4	96.6	93.2	92.5	78.0	94.9	107.5	93.9			
CET08SEP		77.8	98.5	76.9	92.5	87.1	89.6	95.4	86.3	98.6	89.7	86.4	84.5	89.1	89.7	87.4	87.0	79.7	71.1	82.3	96.9	82.9			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CET09SEP		72.7	88.1	71.8	86.1	82.6	84.0	87.9	82.5	97.7	87.1	81.5	79.9	85.8	83.2	83.6	78.7	72.4	61.1	76.7	91.5	76.5			
CET11SEP		79.4	88.4	76.5	88.7	83.6	86.0	89.0	86.3	95.0	89.0	84.3	83.9	92.7	86.7	87.0	85.1	81.8	62.4	82.0	98.7	80.2			
CET12SEP		82.6	92.5	81.9	90.6	85.5	87.8	90.2	88.7	98.2	91.1	86.9	87.1	93.8	91.4	89.6	88.1	87.4	68.5	86.9	101.0	84.6			
CET15SEP		94.5	95.4	92.6	99.0	92.5	91.6	95.2	94.4	101.6	98.2	93.8	92.2	104.8	93.0	95.4	95.0	99.0	77.4	93.9	108.3	91.2			
CET16SEP		88.5	90.8	84.6	93.1	88.4	88.9	91.8	91.3	99.5	94.6	92.4	88.4	99.9	89.6	92.2	90.6	89.7	65.8	86.6	105.2	86.3			
CET17SEP		86.2	92.9	84.9	92.0	86.6	89.3	92.9	90.7	99.6	93.5	92.1	88.4	98.7	93.4	91.4	89.9	90.8	70.1	88.8	100.0	85.7			
CET18SEP		84.8	103.8	82.1	100.7	92.1	91.4	100.5	90.2	98.0	93.7	91.1	89.9	95.6	98.5	93.3	91.4	86.9	78.9	90.8	105.7	92.0			
CET19SEP		88.7	109.2	88.9	107.8	97.6	89.8	108.9	96.4	102.9	101.9	95.7	96.5	103.5	100.4	101.9	91.5	89.3	90.0	97.5	110.6	101.3			
CET20SEP		86.5	106.9	89.2	106.8	98.2	86.1	109.9	95.2	99.3	100.7	93.1	97.1	103.0	95.7	101.0	84.9	86.9	92.8	97.2	109.0	102.7			
CET21SEP		96.8	105.9	93.3	105.8	99.4	92.6	108.9	99.2	103.5	104.2	100.0	97.3	109.7	99.2	103.8	89.7	94.7	91.7	103.0	112.5	103.1			
CET22SEP		96.4	105.9	94.2	105.2	98.4	96.2	107.7	98.7	105.3	103.2	100.9	98.2	109.5	101.1	104.5	94.6	97.6	87.6	102.6	113.4	102.9			
CETPSEP		88.6	94.3	88.2	93.7	87.2	88.8	92.8	90.8	97.1	92.9	92.3	90.8	98.5	92.7	91.8	92.1	94.7	78.0	91.3	101.1	88.4			
CETTSEP		80.2	93.6	78.6	91.4	86.2	88.6	92.6	87.7	97.9	90.7	86.8	85.6	92.5	89.7	88.8	86.4	82.8	68.2	84.6	99.1	83.6			
CETCSEP		91.5	93.1	88.6	96.1	90.5	90.3	93.5	92.9	100.6	96.4	93.1	90.3	102.4	91.3	93.8	92.8	94.4	71.6	90.3	106.8	88.8			
CETMSEP		89.9	104.1	88.8	103.1	95.4	90.9	104.8	95.1	101.4	99.5	95.5	94.6	103.3	98.1	99.3	90.3	91.0	85.2	96.7	108.5	98.0			
CET01OCT		90.2	91.5	100.9	83.1	94.7	92.7	91.6	103.0	86.8	96.0	94.1	99.0	94.2	100.6	108.7	103.7	101.2	111.3	98.2	99.3	83.0			
CET02OCT		88.8	90.2	98.9	82.3	91.8	90.8	91.6	101.4	84.6	93.5	91.5	97.3	92.1	97.4	101.4	103.1	100.0	108.5	96.4	96.7	81.7			
CET03OCT		93.8	94.9	105.6	87.4	95.3	98.5	96.6	104.6	86.6	96.3	93.9	101.5	95.2	99.3	105.6	108.1	107.4	114.4	102.7	102.6	86.9			
CET04OCT		89.3	90.0	96.4	84.3	93.2	92.8	91.4	99.6	88.7	92.0	91.8	95.9	90.5	92.7	97.3	104.0	105.6	108.0	95.9	97.3	81.1			
CET05OCT		90.4	91.2	96.7	83.0	91.9	90.5	92.9	101.2	84.9	90.7	89.3	96.8	90.2	94.4	93.8	103.9	99.2	108.0	95.9	95.9	82.4			
CET06OCT		84.4	84.3	93.9	81.0	85.5	88.3	90.0	97.5	82.1	89.1	91.8	94.6	89.6	92.3	97.3	100.0	101.4	99.5	92.2	95.4	78.8			
CET07OCT		97.5	97.1	111.9	91.9	103.5	105.8	100.1	112.9	86.3	105.4	97.5	103.7	99.9	110.1	112.7	110.0	111.2	120.8	109.3	107.9	90.2			
CET08OCT		88.8	91.5	105.8	85.6	99.3	101.1	94.6	111.1	81.9	104.0	95.3	95.9	94.8	109.3	102.9	101.7	103.2	108.3	100.6	99.3	85.4			
CET09OCT		81.4	86.0	100.3	78.1	95.6	91.3	88.6	104.2	78.9	98.5	87.5	92.0	87.1	102.4	104.0	92.7	91.4	101.7	90.7	90.9	77.8			
CET11OCT		84.5	86.2	101.2	78.4	94.6	88.5	87.9	101.2	80.3	95.7	87.8	95.1	88.2	100.2	107.1	97.0	97.3	106.0	94.2	94.2	77.7			
CET12OCT		86.9	89.5	103.0	81.4	95.9	90.5	89.4	101.9	84.2	97.2	90.0	97.3	92.4	101.3	107.1	101.0	99.5	110.4	98.1	95.3	80.9			
CET15OCT		95.5	94.6	105.3	86.3	98.6	93.5	95.1	106.2	91.6	97.6	97.7	100.3	93.0	98.0	111.9	106.6	108.3	114.6	101.6	103.3	84.9			
CET16OCT		93.3	92.9	105.8	83.4	101.3	91.5	93.7	106.5	90.0	99.2	97.2	102.4	92.3	100.3	118.5	104.5	103.5	113.9	99.1	101.9	81.4			
CET17OCT		89.8	91.2	100.0	82.3	94.3	92.0	92.0	103.2	87.0	96.1	94.5	99.4	93.7	100.4	109.1	103.0	101.3	111.4	97.4	99.0	82.5			
CET18OCT		97.4	97.2	114.6	93.6	104.0	110.0	102.8	117.1	83.7	109.4	99.4	103.9	101.4	114.7	113.2	112.3	111.6	121.1	111.0	108.8	92.1			
CET19OCT		99.8	101.2	121.3	97.3	106.2	113.3	104.2	123.7	83.8	109.1	100.9	108.7	103.2	112.8	115.2	111.2	111.5	125.9	115.7	110.3	95.4			
CET20OCT		94.3	97.9	118.0	91.4	101.1	108.9	100.2	118.7	80.1	99.5	96.0	104.8	97.5	102.1	108.1	103.5	103.7	119.1	110.1	103.2	90.0			
CET21OCT		98.2	97.8	114.6	89.7	100.3	106.7	101.5	116.2	83.7	99.0	93.7	103.7	98.2	101.4	108.6	105.5	107.1	121.2	109.4	103.9	90.5			
CET22OCT		100.4	99.4	115.0	92.8	105.0	108.3	102.8	115.3	88.3	102.9	98.0	106.2	100.7	105.4	112.1	110.5	112.1	122.8	110.5	108.0	92.8			
CETPOCT		89.5	90.4	98.7	83.5	92.1	92.3	92.4	101.2	85.6	92.9	92.1	97.5	92.0	96.1	100.7	103.8	102.5	108.3	96.9	97.9	82.3			
CETTOCT		87.8	90.1	104.4	83.1	97.8	95.4	92.1	106.3	82.3	100.2	91.6	96.8	92.5	104.7	106.8	100.5	100.5	109.4	98.6	97.5	82.4			
CETCOCT		94.4	93.8	105.6	84.9	100.0	92.5	94.4	106.4	90.8	98.4	97.5	101.4	92.7	99.2	115.2	105.6	105.9	114.3	100.4	102.6	83.2			
CETMOCT		96.7	97.5	113.9	91.2	101.8	106.5	100.6	115.7	84.4	102.7	97.1	104.5	99.1	106.1	111.1	107.7	107.9	120.3	109.0	105.5	90.6			
CET01NOV		93.1	86.1	106.2	99.4	104.6	88.8	98.7	95.4	96.5	110.8	104.7	111.8	103.7	103.1	114.8	105.1	104.3	105.1	110.1	95.3	103.2			
CET02NOV		86.6	82.3	100.7	96.5	96.6	83.7	93.2	92.6	89.6	103.1	98.1	102.4	96.8	95.1	107.7	95.5	98.1	97.8	105.4	89.0	99.7			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CET03NOV		90.3	86.1	106.0	100.7	101.9	90.3	97.5	94.7	93.5	113.2	101.0	115.4	99.8	105.4	116.2	101.6	104.1	103.2	107.2	94.5	103.2			
CET04NOV		80.6	78.8	98.2	93.8	91.2	80.4	89.1	87.9	90.6	101.9	95.7	97.7	86.6	95.5	107.5	95.3	98.7	90.2	99.3	85.1	98.5			
CET05NOV		81.7	79.3	96.1	93.9	94.7	77.2	89.6	89.6	84.7	97.2	91.9	93.9	88.1	91.1	107.2	95.2	95.2	90.7	99.4	84.5	95.8			
CET06NOV		81.4	78.4	99.0	94.6	84.1	81.5	85.5	91.4	88.5	104.5	98.1	95.7	92.6	92.9	98.2	78.1	91.3	96.0	102.7	84.0	100.3			
CET07NOV		95.4	93.6	109.9	106.8	103.4	101.2	104.4	101.0	93.6	114.2	104.4	109.0	98.8	94.9	111.8	105.9	105.4	106.3	114.5	99.6	98.5			
CET08NOV		90.0	89.7	92.1	100.2	103.2	98.2	97.2	96.4	87.9	94.5	99.5	93.1	95.7	90.2	93.1	95.5	94.2	84.7	104.3	94.7	90.3			
CET09NOV		93.1	86.5	98.7	97.6	101.1	95.9	94.1	95.6	88.6	105.7	103.5	109.3	93.5	94.5	105.9	97.2	92.0	90.4	102.8	93.6	93.7			
CET11NOV		94.5	86.3	106.8	99.5	104.6	92.7	99.5	97.2	91.7	112.9	104.5	115.0	100.1	101.1	118.1	104.9	97.9	100.6	104.4	95.8	101.5			
CET12NOV		90.6	86.0	104.0	97.8	99.9	89.6	97.7	95.6	92.5	104.3	100.4	109.7	101.5	94.3	109.6	101.6	98.3	99.6	106.9	93.0	99.8			
CET15NOV		94.9	89.0	110.9	102.7	116.3	93.2	100.2	98.9	106.5	121.1	112.8	120.6	108.9	112.3	126.6	113.4	108.7	108.7	114.6	95.9	111.6			
CET16NOV		102.5	91.9	115.5	106.1	123.1	98.0	108.0	100.6	107.9	126.6	116.4	119.7	112.4	113.9	137.1	118.4	111.0	115.3	118.0	103.7	114.4			
CET17NOV		93.6	85.9	106.8	99.7	105.7	90.4	98.1	95.2	99.3	112.9	106.3	111.4	106.4	105.1	114.9	104.7	104.0	106.2	110.5	94.9	104.8			
CET18NOV		91.3	93.8	96.6	105.2	100.6	103.0	105.9	98.1	93.4	105.4	101.7	94.0	93.9	92.2	90.9	97.9	96.3	89.7	109.3	99.8	90.8			
CET19NOV		93.4	97.7	114.5	106.6	109.7	102.3	106.3	101.0	99.5	112.5	108.0	108.5	101.6	110.9	115.5	99.2	102.0	103.7	116.2	97.2	104.2			
CET20NOV		84.2	91.9	112.0	98.3	105.6	90.8	98.0	90.3	94.6	111.8	102.4	110.0	99.5	108.4	113.6	88.8	94.7	111.9	107.5	86.4	100.9			
CET21NOV		87.1	90.5	115.0	97.1	106.7	90.9	98.7	93.8	95.1	111.6	102.1	112.7	100.6	110.9	114.1	95.9	98.9	108.8	110.2	89.8	103.2			
CET22NOV		92.5	92.3	116.6	102.4	108.9	95.8	103.9	99.4	97.0	114.7	105.4	116.2	104.8	107.0	119.0	102.9	104.7	108.8	115.0	94.9	106.4			
CETPNOV		85.6	81.8	101.0	96.5	95.5	83.7	92.3	91.9	90.6	105.1	98.3	102.8	94.6	97.2	108.6	95.1	98.6	97.2	104.0	88.7	100.1			
CETTNOV		92.7	88.4	102.3	100.4	102.4	95.5	98.6	97.2	90.9	106.3	102.5	107.2	97.9	95.0	107.7	101.0	97.6	96.3	106.6	95.3	96.8			
CETCNOV		98.7	90.5	113.2	104.4	119.7	95.6	104.1	99.8	107.2	123.9	114.6	120.2	110.7	113.1	131.9	115.9	109.9	112.0	116.3	99.8	113.0			
CETMNOV		90.4	92.0	110.3	101.6	106.2	95.5	101.8	96.3	96.5	111.5	104.3	108.8	101.1	105.8	111.3	98.2	100.1	104.9	111.5	93.8	101.7			
CET01DEC		76.8	84.3	84.0	93.2	81.2	81.2	87.0	86.1	77.7	84.5	89.8	62.0	79.4	66.7	85.0	96.5	82.8	88.7	96.8	77.2	100.0			
CET02DEC		75.6	79.2	77.9	87.1	80.0	78.2	82.9	75.3	75.7	80.7	81.3	64.9	81.5	70.5	78.3	89.8	73.7	84.4	90.3	68.0	92.8			
CET03DEC		83.2	84.3	77.7	92.8	76.5	82.8	87.0	82.0	74.3	86.5	81.3	74.7	79.4	75.9	79.9	88.5	80.2	82.9	92.7	81.2	93.8			
CET04DEC		79.0	89.3	88.3	94.0	82.0	79.9	90.8	89.0	84.3	80.7	85.1	68.8	80.6	84.3	82.2	94.1	72.3	86.6	93.6	77.6	91.9			
CET05DEC		74.8	78.7	78.1	86.2	80.2	80.4	85.6	79.4	81.8	81.7	77.3	67.6	84.2	75.1	79.3	89.6	69.5	86.3	90.5	61.3	94.4			
CET06DEC		81.9	87.7	84.2	91.7	90.2	82.6	85.3	66.7	83.7	95.5	83.2	69.7	89.6	77.5	77.6	90.9	68.4	90.0	88.1	69.6	88.2			
CET07DEC		59.3	60.6	52.0	80.2	47.2	73.6	66.8	63.9	47.0	60.3	60.3	46.6	48.5	42.7	51.2	59.6	60.2	53.3	79.3	67.1	50.9			
CET08DEC		53.3	58.7	41.6	68.5	51.2	65.4	65.8	60.0	48.4	47.2	61.2	42.9	52.8	40.7	41.3	54.9	52.7	41.7	64.7	58.7	48.8			
CET09DEC		61.4	67.4	62.8	87.2	55.3	74.6	64.4	77.1	51.4	56.8	66.7	57.7	53.5	44.6	52.6	55.1	70.7	50.2	74.3	66.2	57.6			
CET11DEC		64.5	68.3	68.3	91.5	65.7	76.0	72.4	85.2	52.7	78.0	67.6	56.4	70.4	48.9	65.7	66.8	74.2	61.9	81.3	75.5	71.3			
CET12DEC		67.9	68.2	66.5	82.1	69.1	75.0	71.0	75.4	60.7	72.9	71.3	58.4	73.5	59.4	68.2	76.7	70.5	69.4	78.1	69.4	71.6			
CET15DEC		95.4	112.5	117.1	109.2	110.4	77.1	98.5	102.3	90.7	120.2	92.1	68.0	106.9	99.5	109.5	113.8	93.4	102.7	110.7	84.8	112.9			
CET16DEC		84.7	99.7	109.9	113.6	108.4	83.9	102.5	106.9	67.6	99.7	86.6	45.2	91.5	57.7	109.9	95.9	92.2	86.5	115.4	89.6	113.1			
CET17DEC		77.9	88.2	89.0	97.2	85.2	82.7	90.1	87.2	82.9	87.9	93.8	61.9	80.8	67.1	87.5	99.7	83.1	93.3	99.1	79.7	102.9			
CET18DEC		48.9	52.5	37.7	61.1	42.3	61.5	62.8	49.2	44.2	45.9	52.8	36.8	42.7	35.0	38.5	46.8	46.2	40.4	56.3	58.7	42.5			
CET19DEC		76.0	68.4	79.3	94.0	60.7	82.0	101.0	70.8	54.3	67.6	67.5	47.6	80.6	57.0	66.3	64.5	70.8	53.3	81.3	77.5	72.3			
CET20DEC		89.1	78.0	100.4	94.1	90.2	90.8	104.9	77.3	74.9	101.3	90.2	82.1	92.0	78.0	97.2	78.1	82.7	90.7	96.0	86.8	99.0			
CET21DEC		79.2	83.8	87.3	93.8	85.2	93.2	104.1	87.5	80.6	101.9	96.5	73.8	78.5	84.7	89.1	77.3	86.1	84.9	97.6	85.0	92.3			
CET22DEC		75.1	75.2	74.2	94.6	74.3	93.0	93.6	82.8	70.3	88.9	79.9	70.8	77.7	70.3	76.5	78.9	79.8	70.5	93.6	84.3	82.8			

Table A-2. Data for REMEW-CAM (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CETPDEC		78.6	83.9	81.7	90.8	81.7	80.9	86.4	79.8	79.6	84.9	83.0	68.0	82.5	75.0	80.4	91.6	74.5	86.5	92.0	72.5	93.5			
CETTDEC		61.3	64.6	58.2	81.9	57.7	72.9	68.1	72.3	52.0	63.0	65.4	52.4	59.7	47.3	55.8	62.6	65.7	55.3	75.5	67.4	60.0			
CETCDEC		90.1	106.1	113.5	111.4	109.4	80.5	100.5	104.6	79.2	110.0	89.4	56.6	99.2	78.6	109.7	104.9	92.8	94.6	113.1	87.2	113.0			
CETMDEC		74.4	74.4	78.0	89.1	73.0	83.9	92.8	75.8	67.9	82.3	80.1	62.2	75.4	65.4	75.9	74.2	74.8	72.2	87.3	78.7	82.0			

Appendix 3

Table A-3. Data for REMEW-THAI

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TYM01	1.379	1.234	1.144	1.028	1.128	1.301	1.385	1.411	1.268	1.242	1.462	1.465	1.643	1.614	1.671	1.592	1.615	1.572	1.397	1.569	1.624	1.577	1.582	1.609	
TYM02	1.062	1.126	1.202	1.158	1.531	1.662	1.363	1.350	1.319	1.525	1.644	1.725	1.563	1.625	1.631	1.599	1.475	1.613	1.555	1.498	1.635	1.373	1.616	1.769	
TYM03	1.366	1.375	1.396	1.333	1.694	1.544	1.481	1.281	1.325	1.363	1.544	1.489	1.419	1.413	1.456	1.515	1.450	1.477	1.669	1.850	1.720	1.693	1.522	1.432	
TYM04	1.340	1.381	1.275	1.301	1.575	1.619	1.866	1.531	1.262	0.323	1.519	1.604	1.600	1.581	1.288	1.534	1.458	1.636	1.563	1.667	1.728	1.725	1.672	1.614	
TYM06	2.343	2.475	2.752	1.746	2.650	2.531	2.056	2.375	2.344	2.550	2.387	2.133	2.881	2.631	1.488	2.543	2.437	2.085	2.057	2.451	2.518	2.720	2.711	1.925	
TYM08	1.037	1.038	1.233	1.007	1.419	1.381	1.556	1.325	1.256	1.325	1.419	1.512	1.487	1.681	1.544	1.339	1.406	1.213	1.631	1.641	1.678	1.778	1.720	1.703	
TYM09	0.785	0.805	0.950	0.895	1.094	1.188	1.238	1.200	1.498	1.244	1.413	1.481	1.400	1.462	1.300	1.544	1.580	1.491	1.560	1.547	1.621	1.677	1.706	1.630	
TYM11	1.381	1.792	1.381	1.546	1.931	1.675	1.700	1.577	1.644	1.742	1.638	1.697	1.744	1.862	1.700	1.788	2.075	1.985	1.982	1.725	1.822	1.917	1.885	2.059	
TYM12	1.578	1.369	1.070	1.502	1.656	1.612	1.506	1.300	1.291	1.506	1.687	1.580	1.644	1.412	1.225	1.443	1.550	1.681	1.568	1.681	1.714	1.649	1.944	1.681	
TYM13	0.843	1.188	1.022	1.101	1.606	1.556	1.294	1.147	1.193	1.287	1.381	1.582	1.544	1.587	1.369	1.435	1.663	1.564	1.750	1.524	1.642	1.718	2.112	1.916	
TYM14	0.980	1.085	1.087	0.939	1.269	1.325	1.413	1.294	1.225	1.306	1.425	1.528	1.463	1.744	1.587	1.638	1.687	1.541	1.774	1.567	1.619	1.694	2.030	1.617	
TYM15	1.304	1.337	1.419	1.251	1.750	1.944	1.890	1.437	1.300	1.300	1.512	1.602	1.506	1.469	1.344	1.547	1.762	1.614	1.554	1.736	1.834	1.914	1.858	1.945	
TYM16	1.412	1.494	1.344	1.200	1.519	1.494	1.569	1.563	1.406	2.304	1.537	1.662	1.494	1.563	1.631	1.888	1.650	1.357	1.931	1.412	1.587	1.798	1.900	1.772	
TYM17	1.059	1.231	1.229	0.962	1.425	1.490	1.700	1.594	1.487	1.744	1.569	1.904	1.806	1.537	1.419	1.712	1.725	1.425	1.854	1.529	1.626	1.729	1.969	2.134	
TYM18	1.536	1.669	1.129	1.404	2.081	1.437	1.450	1.325	1.506	1.562	1.544	1.119	2.081	1.781	1.463	2.043	1.531	1.720	1.558	1.672	1.577	1.838	1.772	1.605	
TYM19	1.210	1.249	1.125	1.342	1.619	1.550	1.556	1.244	1.200	1.321	1.384	0.944	1.744	1.487	1.406	1.437	1.806	1.717	1.698	1.560	1.619	1.637	1.423	1.772	
TYMH01			1.343	1.406	1.535	1.330	1.427	1.459	1.273	1.258	1.475	1.547	1.924	1.746	1.794	1.775	1.843	1.844	1.611	1.729	1.711	1.840	1.783	1.984	
TYMH02			1.333	1.439	1.905	1.730	1.369	1.465	1.348	1.544	1.657	1.877	1.700	1.720	1.703	1.680	1.593	1.684	1.878	1.843	1.672	1.597	1.727	1.901	
TYMH03			1.536	1.552	1.973	1.576	1.575	1.372	1.741	1.402	1.575	1.568	1.711	1.749	1.630	1.724	1.862	1.647	1.774	2.124	1.979	1.985	1.836	1.845	
TYMH04			1.330	1.373	1.662	1.648	1.952	1.687	1.281	0.325	1.556	1.672	1.736	1.687	1.536	1.635	1.620	1.903	1.680	1.810	1.835	1.944	1.870	2.035	
TYMH06			2.816	2.025	3.070	2.620	2.475	2.623	2.375	2.612	2.441	2.258	2.914	2.766	2.013	2.693	2.513	2.139	2.115	2.469	2.663	2.890	2.787	2.582	
TYMH08			1.277	1.053	1.467	1.407	1.570	1.346	1.258	1.339	1.443	1.534	1.612	1.685	1.708	1.530	1.550	1.528	1.631	1.699	1.728	2.014	1.762	1.752	
TYMH09			1.019	0.985	1.203	1.215	1.772	1.213	1.500	1.288	1.419	1.492	1.455	1.491	1.389	1.592	1.748	1.520	1.588	1.564	1.637	1.764	1.733	1.715	
TYMH11			1.472	1.577	2.061	1.755	1.745	1.632	1.716	1.894	1.769	1.850	1.892	2.061	1.874	1.909	2.112	2.115	2.009	1.727	1.829	2.017	2.105	2.114	
TYMH12			1.157	1.555	1.711	1.658	1.632	1.640	1.300	1.757	1.779	1.707	1.706	1.681	1.595	1.661	1.626	1.840	1.739	1.750	1.737	1.676	2.089	2.197	
TYMH13			1.202	1.163	1.709	1.616	1.353	1.334	1.250	1.354	1.443	1.650	1.597	1.683	1.610	1.721	1.726	1.748	1.787	1.786	1.645	2.048	2.176	2.253	
TYMH14			1.164	0.960	1.298	1.350	1.629	1.466	1.257	1.395	1.479	1.642	1.601	1.834	1.738	1.781	1.738	1.678	1.786	1.578	1.651	2.055	2.099	1.992	
TYMH15			1.534	1.413	1.978	1.977	1.928	1.532	1.338	1.383	1.593	1.629	1.506	1.490	1.545	1.769	1.783	1.772	1.626	1.756	1.846	1.990	1.939	2.073	
TYMH16			1.356	1.359	1.727	1.537	1.595	1.659	1.418	2.559	1.558	1.679	1.511	1.618	1.754	2.023	1.727	1.604	1.949	1.762	1.594	1.891	2.004	1.810	
TYMH17			1.246	1.069	1.589	1.525	1.723	1.655	1.503	1.837	1.588	1.907	1.823	1.544	1.525	1.764	1.814	1.717	1.887	1.739	1.690	2.055	2.009	2.206	
TYMH18			1.259	1.643	2.416	1.564	1.462	1.519	1.531	1.625	1.697	1.533	2.262	1.932	1.895	2.281	1.663	2.036	1.585	1.779	1.788	2.446	1.995	1.792	
TYMH19			1.221	1.422	1.722	1.603	1.679	1.363	1.200	1.362	1.554	1.291	1.802	1.856	1.639	1.565	1.871	1.860	1.704	1.702	1.681	1.710	1.601	1.879	
TAPM01	201092	179138	192195	166544	174115	191373	188380	195336	215498	216283	201366	205557	203633	193654	212235	205032	212545	214148	218536	223717	223155	222711	232193	235602	
TAPM02	227358	259311	233431	253435	163858	238096	245793	246402	244155	254556	312317	281725	243352	276167	261835	259588	266773	265860	266255	266121	234838	280715	286187	301043	
TAPM03	146144	144871	173319	200112	204208	186321	132838	150779	140538	151438	145862	188024	156958	188648	173797	171648	181350	186559	153619	160811	176664	176765	165806	185512	
TAPM04	413612	420880	406123	311697	447791	384836	406655	408026	399683	485415	463010	471139	445424	438390	429216	441374	465391	458619	440543	430994	458314	462167	473358	450015	
TAPM06	49179	62095	42464	42450	42856	42403	67536	60938	55915	61489	62696	62248	54893	55342	61356	63182	58451	70095	71443	69939	72773	72892	70609	67248	
TAPM08	188490	157794	155701	113668	159805	159821	173229	149344	161575	168792	175487	169553	170003	179094	165129	179224	176898	159363	157155	172526	173384	174344	161981	161334	
TAPM09	565878	550363	571175	543003	536337	560243	592793	583340	599420	596687	600453	614195	574975	561396	549152	632087	631414	620257	613912	623424	637749	659654	689146	660356	
TAPM11	199365	167437	202381	86047	139050	161774	189789	175664	195952	190202	189948	204417	178478	203515	202411	188062	199177	168921	172660	171690	190250	186546	197207	189305	

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAPM12	356911	314882	312310	263842	356540	321412	275535	243547	238585	278771	294382	294498	294354	280323	256862	275453	316443	309063	298908	316022	316720	350884	340952	337016	
TAPM13	222072	244331	286440	247537	351375	254538	261283	198985	189273	183769	214574	275370	234067	262192	253174	236764	268524	257017	272798	276010	269845	280868	295321	289531	
TAPM14	374771	395533	361752	344455	409564	344825	426151	392043	329877	382108	422185	425057	386790	428669	416650	371706	344378	355915	422646	408320	421393	420241	419868	408824	
TAPM15	409824	394008	399191	367623	414567	419902	481666	449658	294335	431796	397812	419236	386378	412632	435152	423972	452856	448426	456534	457791	452305	457661	434532	426552	
TAPM16	378293	391685	409710	486114	497921	392537	385225	391687	239605	253786	376590	406670	388666	450612	445281	448926	462952	452024	466821	430397	456611	467536	436518	430895	
TAPM17	320557	275376	343092	354952	285883	361747	348984	356385	303373	335304	361647	368278	342548	447538	358432	379250	400382	398273	420832	359942	336828	342290	361661	355356	
TAPM18	248910	228636	90064	163458	258364	151760	149536	183896	182458	195870	239014	218827	210099	231250	203094	210489	200986	203126	189332	163176	170965	206901	201997	190907	
TAPM19	351386	329458	300759	312232	377411	399234	447528	414638	361815	483575	485985	457512	493263	463753	493728	479695	485433	502507	521099	496331	505597	532325	512300	496257	
TLM01			28466	36854	35326	3084	4870	4202	397	2309	1458	10632	29035	12250	13258	14668	25076	29782	29018	20432	9582	28113	19974	19974	
TLM02			22869	49604	32177	9239	1211	19269	5263	3130	2484	22747	19669	15302	10971	12463	19731	11152	45905	49843	5184	39311	18351	18351	
TLM03			15839	28241	28861	3792	7884	10040	33572	4262	2903	9447	26823	36277	18492	20816	40096	19228	9109	20753	23079	25800	28350	28350	
TLM04			16674	16276	23567	6945	17882	37656	5625	2542	11088	18976	34888	27478	69361	15513	33037	56724	7314	21682	18007	48480	32107	32107	
TLM06			968	5851	5861	1441	11427	5764	732	1460	1364	3435	608	2695	16014	3498	1759	1741	1948	510	3955	4283	1925	1925	
TLM08			5377	4892	5232	2897	1489	2366	186	1792	2990	2324	13163	417	15902	22396	16456	32826	0	5934	4996	20438	3818	3818	
TLM09			38812	49592	48510	12904	178712	6286	894	20606	2958	4464	57626	10777	35091	14038	35593	11796	11047	6914	5771	22822	7609	7609	
TLM11			12426	1732	8775	7378	4916	5930	8269	15236	14135	16908	13967	19628	18804	11935	3501	10415	2351	153	770	9228	20576	20576	
TLM12			23531	9080	11473	8788	21206	50507	1626	39840	15192	21938	10665	44772	59643	36052	14846	26606	29412	12412	4117	5613	23717	23717	
TLM13			42958	13206	21117	9411	11438	27923	8627	9087	9114	11257	7838	14831	37976	39430	9903	27094	5626	40457	459	45219	8679	8679	
TLM14			23905	7616	9158	6492	56668	46142	8303	24197	15291	29604	33564	21042	36124	29792	10100	28923	2860	2888	8191	73924	13908	13908	
TLM15			30088	42364	47775	7007	9562	27692	8418	25850	19987	7080	0	5920	56570	53333	5236	39894	20358	5029	2929	17491	18006	18006	
TLM16			3692	56984	60021	11102	6232	22582	2052	25282	5016	4085	4485	15383	31081	29801	20740	69526	4517	85467	1937	22956	22551	22551	
TLM17			4839	35357	29447	8113	4712	13250	3165	17107	4470	533	3238	1895	24911	11212	19579	67689	7280	43419	12732	54252	7218	7218	
TLM18			9338	23849	35783	12257	1231	23454	2987	-5827	21572	59106	16800	18013	46326	21963	15938	31489	3244	9858	20231	51415	22547	22547	
TLM19			23822	17644	22675	13106	32784	36311	0	14435	52934	123124	15873	92038	70060	39402	16844	38647	1626	41465	18733	22825	57202	57202	
TAHM01			163729	93142	89186	136802	131589	141646	165560	165027	148519	142550	124550	136373	138263	130907	127027	124601	126236	137724	157637	135390	155660	138383	
TAHM02			210562	203831	131680	228858	244582	227132	238893	251426	309833	258978	223683	260865	250864	247125	247042	254708	220350	216278	229654	241405	267836	280054	
TAHM03			157479	171872	175347	182529	124954	140739	106966	147175	142959	178577	130135	152372	155305	150832	141253	167332	144509	140059	153585	150805	137456	143988	
TAHM04			389449	295421	424224	377892	388772	370370	394058	482873	451923	452163	410536	410912	359855	305054	297335	269666	300697	275379	310300	282093	291862	248241	
TAHM06			41496	36599	36995	40962	56110	55173	55183	60028	61333	58814	54285	52648	45342	59685	56692	68354	69495	69429	68818	68610	68684	50137	
TAHM08			150325	108776	154574	156925	171740	146978	161390	167000	172497	167230	156840	178677	149228	156828	160442	126537	157155	166593	168388	153906	158163	156779	
TAHM09			532362	493411	487828	547340	414081	577054	598526	576081	597495	609731	553288	550619	514061	457310	435839	450893	465646	479944	489849	482894	530617	486744	
TAHM11			189955	84315	130275	154396	184873	169734	187683	174966	175813	187509	164511	183888	183607	176127	195676	158506	170308	171537	189480	177318	176632	184376	
TAHM12			288779	254761	345067	312624	254373	193041	236959	238931	279190	272560	283689	235551	197219	239401	301597	282457	269496	303609	312603	345271	317235	257871	
TAHM13			243482	234331	330258	245127	249845	171062	180646	174683	205460	264113	226229	247361	215198	197334	258622	229923	267172	235553	269385	235650	286641	246291	
TAHM14			337847	336838	400407	338333	369483	345900	321574	357911	406894	395453	353225	407628	380527	341914	334279	326992	419785	405432	413202	346317	405960	331870	
TAHM15			369102	325260	366793	412896	472104	421966	285917	405945	377825	412155	386378	406711	378582	370638	447620	408532	436176	452762	449376	440170	416525	400202	
TAHM16			406024	429130	437900	381435	378992	369105	237553	228503	371574	402585	384180	435229	414200	419125	442212	382497	462303	344931	454674	444580	413967	421935	
TAHM17			338253	319595	256436	353635	344272	343135	300208	318196	357177	367745	339310	445644	333521	368038	380803	330584	413552	316522	324096	288039	354444	343904	
TAHM18			80726	139610	222581	139503	148305	160442	179472	188285	217442	159721	193299	213237	156769	188526	185048	171637	186087	153319	150734	155487	179450	170926	
TAHM19			276937	294588	354735	386128	414745	378327	361815	469140	433051	334388	477390	371715	423668	440293	468588	463860	519473	454866	486864	509500	455098	468031	

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TQM01	277260	221102	219821	171221	196449	248989	260831	275556	273289	268597	294334	301240	334646	312492	354738	326332	343227	336561	305383	351108	362497	351106	367290	379157	
TQM02	241392	291945	280606	293368	250907	395835	334893	332643	321981	388199	513371	486040	380238	448772	427119	415200	393490	428817	413903	398661	383961	385454	462536	532425	
TQM03	199660	199197	241919	266703	345877	287633	196766	193115	186213	206334	225174	279989	222684	266466	253093	260037	262957	275591	256351	297532	303950	299346	252412	265708	
TQM04	554102	581340	517807	405666	705271	622954	758976	624790	504600	156796	703197	755881	712679	693205	552616	677069	678659	750438	688515	718509	792154	797405	791541	726461	
TQM06	115235	153686	116858	74106	113570	107331	138872	144728	131049	156796	149687	132786	158161	145620	91267	160704	142474	146183	146982	171413	183237	198299	191428	129473	
TQM08	195403	163755	191952	114509	226723	220753	269587	197880	202979	223650	248972	256449	252879	301102	254919	239895	248763	193300	256366	283074	290917	309899	278629	274692	
TQM09	444376	442804	542679	485860	586619	665289	733582	700008	897789	742129	848140	909777	804965	821042	713897	976024	997370	924687	957484	964349	1033660	1106166	1175634	1076117	
TQM11	275393	300084	279538	132987	268540	270972	322641	276962	322096	331343	311040	346847	311221	379047	344099	336197	413293	335240	342159	296197	346569	357649	371805	389769	
TQM12	563052	430995	334121	396213	590519	518277	415024	316612	308047	419854	496769	465284	483844	395956	314656	397609	490487	519612	468591	531311	542992	578777	662717	566441	
TQM13	187161	290143	292631	272601	564396	396125	338035	228139	225808	236603	296380	435678	361341	416230	346532	339661	446422	402008	477526	420751	443167	482609	623687	554807	
TQM14	367199	429304	393405	323293	519635	456893	601939	507205	404100	499128	601614	649359	565680	747492	661432	608896	581138	548545	749614	639707	682329	711722	852247	661125	
TQM15	534412	526986	566352	459740	725493	816185	910331	646383	382635	561334	601691	671606	581982	606053	584735	655767	798158	723862	709343	794841	829513	875986	807506	829513	
TQM16	534045	585079	550548	583201	756218	586352	604321	612217	336945	584686	579007	676088	580569	704082	726365	847740	763871	613464	901210	607735	724760	840774	829488	763664	
TQM17	339320	339103	421553	341492	407383	539167	593274	567989	451267	584686	567333	701129	618727	688090	508525	649307	690658	567660	780191	550509	547628	591820	712205	758503	
TQM18	382340	381616	101656	229417	537719	218155	216828	243662	274828	306046	368978	244813	437269	411914	297026	429982	307759	349422	294969	272821	269536	380371	357935	306329	
TQM19	425266	411479	338263	418893	610933	618812	696466	515710	434178	638875	672785	431778	860128	689832	694305	689239	876813	862601	885008	774393	818435	871314	728758	879326	
TYSH01	0.000	0.000	0.000	1.848	2.172	2.091	2.469	2.451	2.376	2.688	2.337	2.394	1.613	2.134	2.229	2.156	2.021	2.429	3.250	2.067	2.544	2.866	2.050	2.619	2.312
TYSH02	0.000	0.000	0.000	1.897	1.637	2.721	2.822	2.827	2.541	2.162	2.154	1.731	2.818	1.967	0.198	2.113	2.035	2.147	2.243	2.444	2.159	2.043	2.547	2.420	2.485
TYSH03	0.000	0.000	0.000	2.756	1.952	2.175	2.237	2.278	2.006	2.881	2.888	2.615	1.975	2.854	2.542	2.221	2.476	2.563	2.999	3.033	3.552	2.078	2.708	2.411	2.714
TYSH04	0.000	0.000	0.000	1.844	2.666	1.943	2.187	2.175	2.000	2.500	2.501	3.207	2.382	2.377	2.271	1.986	2.414	2.602	1.996	2.577	2.922	2.384	2.934	2.708	2.604
TYSH06	0.000	0.000	0.000	3.454	2.498	2.412	2.500	2.500	2.500	2.740	2.679	2.909	2.289	2.998	2.215	2.393	2.340	4.117	3.554	2.049	2.134	2.851	2.687	3.183	2.815
TYSH08	0.000	0.000	0.000	2.028	2.213	2.333	2.450	2.411	2.250	2.812	2.856	2.849	2.390	3.013	2.756	2.331	2.652	3.606	2.553	3.162	2.081	2.835	2.606	2.675	2.831
TYSH09	0.000	0.000	0.000	1.712	2.012	1.954	2.188	2.149	2.034	2.275	2.317	2.144	1.479	2.307	1.828	2.092	2.136	1.987	2.168	1.664	1.898	1.775	1.805	1.955	1.800
TYSH11	0.000	0.000	0.000	2.794	2.212	2.825	2.624	2.539	2.501	3.000	3.304	3.670	3.461	3.452	2.973	2.232	3.075	3.343	2.978	3.048	3.645	3.957	3.757	2.880	3.366
TYSH12	0.000	0.000	0.000	2.805	2.504	2.746	3.063	3.004	2.752	2.937	3.433	2.260	3.075	3.287	2.223	2.728	2.903	2.833	3.814	2.782	3.193	3.431	2.827	2.948	3.367
TYSH13	0.000	0.000	0.000	1.938	2.357	2.928	2.563	2.490	2.239	2.812	3.550	3.594	3.128	3.505	3.278	3.009	2.990	3.120	3.264	3.722	3.372	3.527	3.600	3.683	3.737
TYSH14	0.000	0.000	0.000	2.161	2.960	3.019	2.744	2.747	2.373	2.969	3.187	4.119	3.670	3.544	2.274	2.624	3.044	3.075	2.836	3.344	2.894	3.138	4.140	4.113	3.050
TYSH15	0.000	0.000	0.000	2.414	2.937	2.380	2.497	2.437	1.937	2.800	1.722	2.431	2.593	2.705	3.438	2.561	2.129	2.171	2.201	1.911	3.330	3.146	1.745	2.134	2.200
TYSH16	0.000	0.000	0.000	2.224	2.302	2.361	2.625	2.592	2.374	2.444	2.482	2.222	3.076	2.712	2.588	2.346	2.412	1.429	3.138	1.568	1.514	2.168	2.723	2.543	2.785
TYSH17	0.000	0.000	0.000	2.284	1.745	2.391	2.188	2.067	2.000	2.313	2.952	2.544	2.375	1.723	2.268	1.712	2.015	2.012	2.797	1.738	1.842	2.330	2.658	2.368	2.473
TYSH18	0.000	0.000	0.000	2.271	3.179	2.532	2.813	2.792	2.298	2.657	3.154	2.739	3.570	3.745	3.321	2.774	2.627	2.663	2.513	1.978	2.888	3.063	3.516	2.262	2.902
TYSH19	0.000	0.000	0.000	2.732	2.304	3.073	2.812	2.847	2.887	3.131	3.477	2.790	2.358	3.694	2.857	2.538	2.621	2.518	2.976	2.816	2.802	3.229	3.495	2.980	3.712
TAPS01		1152	511	1647	2934	2869	1508	1154	685	1526	1254	960	1009	1069	1472	1312	2522	2236	2392	4517	4780	4216	2456	2636	2674
TAPS02		337	334	368	318	513	147	202	272	2681	2383	1468	2136	1571	1563	680	378	734	1040	2956	4265	2299	3115	2050	3035
TAPS03		1523	1824	1892	3267	3724	2971	1442	1223	2232	2976	2007	1036	2001	2161	876	2667	4934	2269	6877	8307	4683	5159	7312	6493
TAPS04		196	1061	482	1000	4742	2810	2673	1139	1938	2454	1601	3309	1836	3345	760	986	2629	1712	2733	4511	3111	4253	4181	4608
TAPS06		223	59	109	717	725	294	69	2	164	229	35	96	190	152	289	181	188	190	276	413	605	330	239	297
TAPS08		391	827	866	1575	2601	1198	263	391	657	357	1190	1140	2696	2205	432	59	180	924	1595	1448	1433	2356	4559	2671
TAPS09		2560	4765	2717	3668	11781	6411	4701	2495	5434	6641	5375	4830	4830	7092	5011	3999	4403	5294	8071	9962	10734	10259	1161	9413
TAPS11		238	1357	936	975	825	676	367	332	2624	7396	9385	13075	19942	22011	793	10717	14660	18387	26464	2065	23077	32374	31375	35012

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAPS12		2196	6264	2967	11807	14033	4423	10129	4554	16529	17596	13761	14408	19047	11428	199	890	8862	10635	7854	13121	13401	20312	14382	19280
TAPS13		405	2560	357	3012	2941	749	2239	1886	4687	13634	17447	19399	20512	14353	650	552	6691	8078	4966	8674	13238	17504	14010	22054
TAPS14		183	1715	1605	2679	7111	3332	3254	3075	4916	7015	5379	4447	12203	8194	1776	1645	3877	4947	4576	5849	5740	11093	5011	10905
TAPS15		174	238	110	438	332	475	554	150	1196	2141	1465	1003	1768	703	62	102	194	328	379	107	107	110	15	56
TAPS16		95	142	26	96	386	771	736	946	1703	2349	1646	794	1376	1213	662	64	129	480	823	394	698	743	70	74
TAPS17		540	382	42	533	4943	4563	3851	1230	2536	1239	1833	1212	3097	1085	969	114	959	1203	2261	2119	1945	3325	933	1760
TAPS18		1171	579	446	544	517	128	316	123	1995	2115	1607	2196	3470	772	373	741	921	1000	1862	2793	1745	5619	2431	4122
TAPS19		173	1083	904	1465	3572	3880	2284	2776	7032	7764	3079	10240	9589	384	147	40	1899	5345	4051	2180	15326	20492	3685	18255
TLS01		1152	511	1	12	112	7	3	0	25	21	104	0	152	143	60	80	15	163	916	1340	1174	0	419	0
TLS02		337	334	60	2	3	0	0	0	91	68	81	9	278	132	36	13	0	0	372	604	473	0	63	125
TLS03		1523	1824	528	14	0	0	0	3	391	37	14	82	103	126	8	89	311	98	758	506	30	0	277	0
TLS04		196	1061	0	88	0	0	0	0	102	105	99	19	165	374	124	24	0	3	111	408	33	7	165	172
TLS06		223	59	1	321	15	0	0	0	18	29	1	0	61	0	0	0	0	13	0	0	0	0	0	0
TLS08		391	827	58	0	135	0	0	0	8	0	2	1	0	0	0	0	0	6	0	0	195	0	0	0
TLS09		2560	4765	125	0	210	288	16	0	257	9	220	13	41	0	131	84	199	196	222	0	57	210	-6343	0
TLS11		238	1357	22	0	0	1	0	0	211	309	101	111	370	661	0	100	164	907	80	5	1016	238	452	101
TLS12		2196	6264	5	17	201	0	56	0	1568	324	835	87	1117	516	21	12	0	83	279	226	1685	518	0	104
TLS13		405	2560	0	664	28	2	0	20	97	321	333	407	1163	121	10	5	0	17	589	75	1299	0	69	0
TLS14		183	1715	13	3	16	0	33	28	171	108	628	25	1035	580	130	0	0	140	2	227	412	309	191	0
TLS15		174	238	0	9	0	0	0	0	4	13	30	0	78	0	0	0	0	0	56	0	37	7	2	2
TLS16		95	142	0	0	0	0	0	0	66	0	3	0	0	0	31	0	0	0	0	0	0	0	0	0
TLS17		540	382	0	4	98	0	0	0	15	5	45	0	147	8	7	2	0	6	528	0	0	89	0	10
TLS18		1171	579	4	3	4	0	4	0	0	0	242	16	204	243	51	32	0	0	504	0	0	10	0	123
TLS19		173	1083	0	166	114	5	28	25	0	78	223	90	49	33	0	0	42	11	0	202	4	5	103	64
TAHS01				1646	2919	2756	1501	1151	685	1495	1220	847	1005	911	1328	1253	2442	2221	2229	3601	3440	3042	2456	2207	2672
TAHS02				307	316	510	147	202	272	2589	2315	1387	2127	1292	1431	644	365	734	1040	2583	3661	1826	3115	1987	2910
TAHS03				1364	3253	3724	2971	1442	1221	1841	2939	1993	955	1898	2034	867	2579	4623	2170	6120	7801	4653	5159	7035	6493
TAHS04				482	912	4742	2810	2673	1139	1836	2349	1502	3289	1671	2971	636	962	2629	1708	2594	3852	3078	4246	4016	4392
TAHS06				108	396	710	294	69	2	146	200	35	96	130	152	289	181	188	177	276	413	605	330	239	297
TAHS08				808	1575	2466	1198	263	391	649	357	1188	1139	2696	2205	432	59	180	918	1595	1448	1239	2356	4559	2671
TAHS09				2592	3668	11572	6123	4684	2495	5177	6632	5155	4817	4789	7092	4880	3914	4204	5099	7849	9958	10677	10049	7504	9413
TAHS11				914	975	825	675	367	332	2414	7087	9284	12964	19572	21350	793	10617	14496	17480	26384	2060	22062	32136	30924	34911
TAHS12				2962	11789	13832	4423	10073	4554	14962	17272	12926	14321	17930	10913	178	878	8862	10552	7575	12895	11716	19794	14382	19176
TAHS13				357	2348	2913	747	2239	1866	4590	13312	17114	18992	19349	14232	640	546	6691	8061	4377	8599	11939	17504	13940	22054
TAHS14				1592	2676	7094	3332	3221	3047	4745	6907	4750	4422	11168	7613	1646	1645	3877	4807	4575	5622	5327	10784	4820	10905
TAHS15				110	429	332	475	554	150	1192	2128	1435	1003	1691	703	62	102	194	328	323	107	70	103	13	54
TAHS16				26	96	386	771	736	946	1637	2349	1643	794	1376	1213	632	64	129	480	823	394	698	743	70	74
TAHS17				42	529	4845	4563	3851	1230	2521	1233	1788	1211	2951	1077	963	112	959	1198	1732	2119	1945	3236	933	1751
TAHS18				443	541	513	128	312	123	1995	2115	1365	2180	3266	529	322	709	921	1000	1358	2793	1745	5609	2431	3998
TAHS19				904	1299	3458	3875	2256	2751	7032	7687	2856	10151	9540	350	147	40	1857	5333	4051	1979	15322	20487	3582	18191

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TQS01				3041	6137	5523	3177	2789	1599	3556	2290	1364	1448	1690	2813	2350	4910	5363	7113	6963	8654	8634	4958	5672	6117
TQS02				583	517	1389	415	570	692	5599	4987	2401	5995	2542	283	1360	743	1577	2333	6315	7903	3730	7936	4808	7233
TQS03				3759	6351	8099	6648	3285	2449	5304	8489	5212	1885	5415	5172	1926	6385	11849	6508	18560	27709	9670	13969	16961	17624
TQS04				889	2431	9215	6147	5814	2278	4591	5875	4816	7837	3971	6747	1263	2081	5273	2030	5441	7976	5361	9265	9486	9666
TQS06				373	990	1713	734	172	4	399	537	101	219	389	336	691	423	774	629	565	882	1724	887	762	836
TQS08				1639	3485	5754	2935	633	879	1825	1021	3386	2721	8122	6076	1006	157	649	2345	5044	3013	3511	6138	12195	7562
TQS09				4438	7382	22605	13395	10069	5075	11778	15365	11051	7124	11049	12962	10210	8105	7848	10589	12845	17942	18452	17721	14138	16660
TQS11				2555	2156	2332	1772	932	831	7242	23415	34072	44864	67552	63476	1770	32645	48465	52061	80424	7509	87293	120740	89048	117511
TQS12				8308	29517	37977	13547	30262	12532	43950	59294	29211	44033	58928	24256	485	2548	25103	40245	21071	41177	40196	55956	42399	64574
TQS13				691	5535	8528	1914	5574	4179	12908	47263	61514	59409	67818	46647	1925	1634	20877	26306	16291	28996	42112	63009	51345	82426
TQS14				3441	7921	21421	9144	8848	7230	14087	22011	19565	16232	39581	17309	4319	5006	11923	13635	15296	16268	16717	44648	19825	33260
TQS15				265	1259	791	1185	1349	291	3337	3665	3488	2600	4573	2418	159	218	422	722	617	357	221	179	28	119
TQS16				58	221	912	2023	1909	2247	4000	5831	3652	2442	3731	3140	1482	154	184	1505	1291	596	1513	2023	177	205
TQS17				95	923	11584	9981	7961	2459	5831	3641	4549	2877	5085	2444	1648	226	1930	3350	3010	3903	4531	8602	2210	4330
TQS18				1005	1719	1298	360	871	282	5299	6672	3738	7783	12232	1757	894	1862	2452	2512	2686	8064	5344	19721	5499	11604
TQS19				2468	2994	10625	10899	6423	7942	22018	26725	7966	23937	35241	1001	374	104	4677	15873	11409	5545	49473	71593	10675	67523
TYM_C	1.916	2.011	2.149	2.083	2.050	2.175	2.241	2.312	2.120	2.365	2.461	1.424	2.649	2.551	2.595	2.712	2.427	2.538	2.803	2.940	2.973	2.881	3.122	3.136	
TYM_N	2.180	2.322	2.597	2.168	2.364	2.392	2.389	2.357	2.170	2.509	2.607	1.930	2.350	2.303	2.149	2.483	2.245	2.366	2.471	2.580	2.505	2.704	2.823	2.416	
TYM_NE	1.211	1.273	1.203	1.167	1.537	1.525	1.549	1.388	1.363	1.315	1.513	1.530	1.609	1.582	1.449	1.613	1.646	1.574	1.679	1.606	1.675	1.726	1.793	1.754	
TYM_S	1.876	1.720	1.686	1.736	1.550	1.560	1.575	1.525	1.772	1.545	1.600	1.524	1.956	1.924	1.920	1.895	2.010	2.022	2.089	2.049	2.098	1.937	2.097	2.239	
TYMH_C	0.000	0.000	2.196	2.269	2.231	2.273	2.278	2.419	2.188	2.430	2.522	1.864	2.732	2.697	2.813	2.850	2.873	2.748	2.921	3.082	3.044	3.043	3.207	3.405	
TYMH_N	0.000	0.000	2.646	2.294	2.504	2.485	2.446	2.586	2.294	2.594	2.650	2.285	2.555	2.371	2.431	2.772	2.834	2.718	2.518	2.634	2.642	2.894	2.930	2.815	
TYMH_NE	0.000	0.000	1.290	1.291	1.690	1.568	1.680	1.499	1.393	1.375	1.571	1.642	1.700	1.696	1.636	1.754	1.759	1.751	1.748	1.737	1.726	1.910	1.914	1.963	
TYMH_S	0.000	0.000	1.996	1.766	1.574	1.712	1.623	1.640	1.899	1.847	1.803	1.648	2.030	1.984	2.243	2.067	2.109	2.087	2.230	2.112	2.134	2.040	2.188	2.279	
TAPM_C	1909280	1925120	1865749	1964109	1840233	1963746	2009423	1953666	1946774	2003813	1915878	1685786	1635511	1571521	1635417	1581791	1562017	1577108	1549356	1573980	1570849	1551525	1577268	1565126	
TAPM_N	1956800	2008000	2024930	2111842	2058986	2129714	2135562	2140254	2055964	2259170	2089958	2087980	1947200	1901348	1940668	2004318	2043638	2058190	1978190	1979394	1979945	2002556	2040666	2015808	
TAPM_NE	4653842	4515797	4480106	4257170	4819645	4570824	4772921	4600668	4152058	4669840	4943328	5062306	4763880	5073177	4917505	4966452	5123954	5070174	5143091	5027211	5097391	5294500	5279636	5185753	
TAPM_S	579040	652160	651972	654238	579480	602059	591077	576311	578537	565738	522000	476675	481702	461084	490901	467147	455509	461102	442649	417866	405015	395363	356511	338525	
TLM_C	1909280	1925120	39278	161105	149972	84553	32278	85723	60935	53366	46494	398199	49706	85010	126457	76772	242740	120498	62859	72612	36823	82566	42008	123457	
TLM_N	1956800	2008000	37389	115953	115136	79406	50007	189248	110634	73756	34268	324254	155832	55018	225001	209552	424880	266379	37433	40890	102588	131907	74371	285566	
TLM_NE	4653760	4515840	303599	407092	436566	124983	372861	341600	90495	201836	183368	345903	252938	341180	561822	399515	328393	513227	205206	379720	151484	509389	333915	554039	
TLM_S	579040	652160	101166	11010	8803	53421	17175	40555	38821	92534	58786	35857	17542	14040	70821	38761	21395	14235	27948	12497	6891	19946	14858	5909	
TAHM_C	0	0	1826471	1803004	1690261	1879193	1977145	1867943	1885839	1950447	1869384	1287587	1585806	1486512	1508960	1505019	1319277	1456609	1486496	1501368	1534026	1468960	1535260	1441668	
TAHM_N	0	0	1987541	1995889	1943850	2050308	2085555	1951006	1945329	2185414	2055690	1763726	1791368	1846330	1715666	1794765	1618758	1791810	1940756	1938504	1877357	1870649	1966295	1730243	
TAHM_NE	0	0	4176507	3821478	4344285	4395383	4348821	4211806	4012401	4406172	4708984	4664271	4461528	4689429	4296208	4249136	4480074	4217080	4628441	4323935	4628645	4457433	4616229	4329731	
TAHM_S	0	0	550806	643228	570677	548638	573901	535756	539716	473204	463214	440818	464160	447044	420081	428385	434115	446867	414700	405369	398123	375417	341653	332616	
TQM_C	3659000	3872000	4010097	4090553	3771706	4271568	4503815	4517769	4126393	4739641	4714625	2400613	4331920	4009598	4244548	4289886	3790644	4002138	4342743	4627801	4669353	4469952	4924125	4908707	
TQM_N	4266000	4663000	5258621	4578207	4866553	5095039	5100863	5045162	4462345	5668264	5448236	4030558	4576672	4378481	4170424	4975721	4586988	4869251	4887740	5105916	4959508	5413972	5760935	4871102	
TQM_NE	5635616	5748618	5389709	4969270	7406252	6969722	7392366	6383599	5657804	6305056	7478472	7744744	7667013	8027395	7125324	8009659	8435539	7977991	8633595	8072911	8555305	9138697	9465818	9093510	
TQM_S	1086000	1122000	1099318	1135988	898191	939248	931165	878779	1025005	874114	835339	726508	942287	886991	942367	885449	915446	932503	924710	856236	849694	765748	747680	757902	

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TYSH_C	0.000	0.000	0.000	3.635	3.501	3.894	3.898	3.822	3.667	4.027	4.200	2.353	4.062	4.197	4.287	4.208	4.483	4.718	4.678	4.482	4.575	4.601	4.460	4.384	4.478
TYSH_N	0.000	0.000	0.000	3.298	3.197	3.712	3.642	3.569	3.359	4.129	4.020	4.281	4.385	4.536	4.301	4.199	4.398	4.597	4.525	4.191	4.211	4.090	4.616	4.231	4.191
TYSH_NE	0.000	0.000	0.000	2.335	2.370	2.472	2.486	2.566	2.405	2.777	3.123	3.013	2.915	3.275	2.659	2.247	2.686	2.871	3.032	2.765	2.842	3.137	3.266	2.912	3.211
TYSH_S	0.000	0.000	0.000	2.953	2.578	2.593	2.545	2.510	2.402	2.627	2.917	2.265	2.802	2.583	2.573	2.519	2.441	2.457	3.019	3.043	2.920	2.992	2.854	2.951	2.880
TAPS_C	554240	280960	424320	484160	506880	535709	537819	503020	454512	501828	568437	554533	389273	429844	423997	371763	487278	600390	605171	614928	548704	657710	741138	814901	822754
TAPS_N	91840	40800	56320	58240	66560	89660	98517	69937	76897	136692	167685	192100	106418	170258	137616	86990	154912	278983	331999	439283	367484	459185	477737	415019	537661
TAPS_NE	0	11558	23702	15473	35028	61615	34336	34233	21279	57849	77543	68237	80329	105197	78132	14992	25657	53497	64223	80261	70988	102358	139500	94049	140710
TAPS_S	9760	3200	12000	14560	25600	30030	35837	30457	27786	33869	35254	24140	16856	13745	25558	21966	20788	18492	28463	22514	46081	38516	36420	18968	24101
TLS_C				2720	4960	7549	45	374	0	3267	3409	95547	5833	6920	9821	9230	3946	2726	5785	9140	9094	29797	798	5287	5460
TLS_N				320	3680	2792	271	157	118	2963	1071	3704	2771	6484	3694	2480	3308	2658	6085	9876	972	6146	859	5589	1259
TLS_NE				817	1307	936	303	140	76	3029	1439	2970	862	4969	2937	609	443	730	1644	4445	3849	6415	1393	-4593	748
TLS_S				0	0	186	0	0	32	196	726	6004	61	0	996	1350	815	7	1431	574	661	881	775	157	467
TAHS_C				481440	501920	528159	537775	502646	454512	498561	565028	458985	383440	422924	414176	362532	483332	597664	599385	605788	539609	627912	740340	809614	817294
TAHS_N				57920	62880	86868	98246	69780	76779	133729	166614	188395	103648	163774	133923	84510	151604	276325	325913	429406	366512	453039	476878	409429	536402
TAHS_NE				14656	33721	60678	34033	34093	21203	54820	76104	65267	79467	100228	75195	14383	25215	52767	62579	75816	67139	95943	138107	98642	139963
TAHS_S				14560	25600	29844	35837	30457	27754	33673	34528	18136	16796	13745	24563	20616	19973	18485	27032	21940	45420	37635	35645	18811	23634
TQS_C	1927000	958000	1672000	1750000	1757000	2056395	2096412	1921124	1666616	2007639	2372971	1080101	1557621	1774955	1775626	1525466	2166704	2819655	2803744	2715164	2468650	2889187	3301594	3549156	3659856
TQS_N	240000	119000	197000	191000	201000	322459	357780	249057	257885	552173	669735	806574	454514	742864	576026	354884	666827	1270301	1474665	1799703	1543477	1852948	2201129	1732304	2248317
TQS_NE	0	0	0	33608	79538	149766	84276	87461	50969	151724	237081	196086	231406	327919	196837	31862	67201	149366	187756	207828	186494	298482	447345	285228	447250
TQS_S	31000	8000	32000	43000	66000	77388	91205	76448	66672	88454	100701	41074	47057	35508	63202	51924	48748	45425	81619	66757	132628	112598	101720	55508	68075
TQM	14646616	15405618	15757745	14774018	16942702	17275577	17928209	16825309	15271547	17587075	18476672	14902423	17517892	17302465	16482663	18160715	17728617	17781883	18788788	18662864	19033860	19788369	20898558	19631221	
TQS	2198000	1085000	1901000	2017608	2103538	2606008	2629673	2334090	2042142	2799990	3380488	2123835	2290598	2881246	2611691	1964136	2949480	4284747	4547784	4789452	4331249	5153215	6051788	5622196	6423498
TQ	16844616	16490618	17658745	16791626	19046240	19881585	20557882	19159399	17313689	20387065	21857160	17026258	19808490	20183711	19094354	20124851	20678097	22066630	23336572	23452316	23365109	24941584	26950346	25253417	26054719
TIMP	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	68	188	325	836	1406	524	265	898	7918
TEXP	2796868	2796964	3027342	3782775	3476230	4615730	4061715	4523597	4443054	5267008	6311409	4017079	4333072	5151371	4989219	4858631	6197990	5454350	5567519	6537492	6838900	6141356	7685051	7337561	8394979
TSTC1	-736732	156644	118241	-1234428	443177	-519132	773114	-528175	-866727	-313820	-1040659	-439986	1190706	-77923	-607427	882419	60636	1010606	1515910	384030	404242	1970681	975235	751891	751891
TQD	9175223	8045634	8632800	8651668	8784435	9164419	8877278	8783897	7971904	8644984	9307976	7779421	7688499	8389087	8354142	7682226	7533733	8253674	8482390	8722009	8342792	8524524	9315860	8755475	8239546
TQC	200.73	172.22	181.02	177.90	177.34	181.91	173.57	169.08	150.99	161.03	170.42	139.93	136.19	146.69	144.54	131.83	128.54	139.95	142.87	145.87	138.48	140.37	152.26	142.10	132.78
TFPRM	2.687	3.146	2.921	2.954	2.768	2.308	2.330	2.560	3.856	3.934	3.662	3.575	3.866	3.395	3.818	3.810	4.830	5.634	6.973	5.608	4.607	4.665	4.733		
TFPRS	2.256	3.253	3.562	2.729	3.027	3.097	2.606	2.250	2.720	3.790	4.225	3.342	3.825	3.459	2.563	2.961	4.146	4.490	4.673	6.891	5.023	4.241	4.086	4.515	
TFPR	2605	3082	2839	2723	2837	2843	2683	2282	2753	4050	4036	3831	4089	3822	3215	3854	4132	5372	5472	6629	5579	4808	4484		
TPI	51.46	61.81	67.7	68.31	69.7	67.55	67.53	67.24	71.24	77.08	80.63	83.41	89.08	89.28	88.91	92.45	100	101.83	106.97	120.01	114.34	118.82	121.8	123.83	
TRPR	273.02	340.29	398.55	258.63	252.25	237.66	204.16	170.76	198.64	269.37	288.07	270.2	287.14	291.03	257.18	484.96	314.85	366.67	216.85	321.01	264.11	265.95	205.37	222.39	
TRPRB	5809	7798	7900	7690	7321	7283	7099	7103	7049	8579	9412	9778	9774	10197	10107	10463	11072	12904	15045						
TRPRIMF	0	0	0	5948	5802	6452	5441	4462	4980	6799	7401	6833	7259	7427	6568	12168	7931	9390	10246	11778	9896	11508			
TCPI	35.55	42.54	47.95	50.45	52.35	52.79	54.08	55.08	56.44	58.63	61.77	65.50	69.20	72.10	74.50	78.20	83.00	87.60	92.50	100.00	100.30	101.90	103.50	104.20	
TEXR	20.43	20.63	23.00	23.00	23.00	27.15	26.65	26.13	25.07	25.24	25.69	25.29	25.28	25.52	25.54	25.09	25.19	25.61	47.25	36.69	37.47	43.27	44.22	43.15	
TGDP	868790	913730	967710	1019500	1076400	1138400	1191300	1257200	1376800	1559800	1750000	1945400	2111900	2282600	2470900	2693000	2941700	3115300	3072600	2749700	2872000	3008700	3072900	3239000	
TPOP	45710	46718	47689	48633	49535	50378	51146	51952	52799	53687	54619	55595	56454	57190	57797	58272	58610	58976	59370	59794	60246	60728	61184	61613	
TET01JAN	22.0	7.6	20.1	23.9	25.1	18.1	15.5	14.0	17.5	15.8	24.6	19.6	21.1	20.3	19.5	11.8	18.0	20.8	16.9	15.8	21.4	24.2			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TET02JAN	23.3	6.5	18.7	19.0	13.9	12.2	12.3	11.4	14.7	11.8	17.8	18.9	19.6	21.2	16.1	9.4	17.6	19.5	15.5	14.8	24.5	20.9			
TET03JAN	23.6	8.3	17.7	29.9	25.1	20.9	19.9	13.8	21.4	16.8	21.7	18.6	21.6	24.0	18.4	10.5	23.6	27.5	25.2	16.6	27.0	30.0			
TET04JAN	20.7	7.4	14.9	22.7	17.1	15.4	15.3	12.5	15.7	15.2	15.9	15.8	18.0	17.5	13.1	8.8	17.6	19.1	20.6	12.8	19.5	21.6			
TET06JAN	20.6	10.4	17.0	34.4	24.4	22.3	25.4	20.3	28.0	23.8	22.3	18.8	24.2	21.2	16.1	12.1	21.2	29.4	29.7	17.1	26.6	28.1			
TET08JAN	11.9	5.6	19.8	16.5	11.4	11.9	10.9	10.8	10.7	13.5	16.9	13.4	11.5	10.0	8.7	9.4	8.9	18.0	15.6	9.1	12.6	17.7			
TET09JAN	18.3	8.1	26.0	26.7	27.4	27.8	17.7	18.4	25.6	21.6	31.7	24.9	20.6	17.8	28.7	18.5	13.1	25.2	23.0	14.9	24.5	32.7			
TET11JAN	14.4	5.9	13.8	18.9	10.0	8.9	9.9	9.5	10.6	12.4	13.7	11.7	13.5	11.2	7.9	6.9	12.5	13.6	13.6	10.8	16.2	16.9			
TET12JAN	13.8	7.1	12.0	23.2	16.0	17.9	16.0	13.8	18.2	15.5	16.1	12.2	14.9	12.4	12.3	8.3	12.5	17.8	18.2	9.5	15.6	20.1			
TET13JAN	10.9	6.3	14.3	21.4	13.6	12.9	13.4	12.1	15.6	15.6	15.7	11.4	15.4	11.2	11.8	7.7	9.5	15.1	13.4	8.6	12.9	19.7			
TET14JAN	13.0	6.7	16.7	18.1	12.4	12.5	11.9	11.9	14.5	15.4	17.5	13.8	14.0	11.5	10.2	9.1	9.8	15.8	14.7	9.7	12.5	19.0			
TET15JAN	14.5	7.1	13.8	23.7	21.3	18.9	15.8	17.0	19.8	18.1	19.8	11.9	15.6	12.3	12.6	9.9	8.6	18.0	15.1	7.6	17.7	23.1			
TET16JAN	14.8	6.9	18.4	22.8	13.5	18.5	13.7	15.3	16.6	18.2	18.5	12.9	14.6	10.8	12.3	11.5	8.0	16.5	16.3	9.0	12.6	20.2			
TET17JAN	13.4	7.2	23.0	22.7	12.1	20.6	15.1	16.5	18.1	19.4	21.6	16.9	15.6	13.4	12.0	13.5	8.6	20.5	19.6	10.5	13.5	21.2			
TET18JAN	13.4	7.5	12.2	25.6	21.2	19.8	16.2	15.5	18.9	15.8	15.9	12.0	13.8	12.3	11.7	9.1	12.9	18.7	20.0	10.3	15.6	20.3			
TET19JAN	13.4	8.4	13.8	27.7	21.7	20.3	17.2	18.2	17.7	19.6	19.0	13.3	15.8	12.7	14.6	10.7	11.2	21.4	19.1	9.8	20.6	24.4			
TET01FEB	25.8	6.9	14.9	24.7	16.7	12.4	31.2	17.1	15.2	13.4	11.9	25.2	10.1	25.5	16.7	21.6	9.6	13.1	22.0	26.2	12.0	12.2			
TET02FEB	27.1	8.4	14.2	27.3	10.3	8.0	25.8	20.6	18.9	7.7	8.9	30.8	9.2	28.6	15.5	23.8	8.7	11.5	29.5	30.7	9.5	11.9			
TET03FEB	30.9	10.6	12.5	30.1	19.2	13.1	31.3	21.7	24.4	13.0	12.5	25.9	11.1	34.0	17.9	23.8	12.3	14.4	32.3	29.8	14.9	15.2			
TET04FEB	28.6	6.9	10.9	27.5	12.5	11.3	30.5	22.5	20.8	15.7	9.3	24.9	9.5	23.7	12.7	20.7	9.5	10.8	27.7	24.6	11.3	13.1			
TET06FEB	26.2	11.2	15.4	35.6	19.1	19.4	37.3	26.0	26.7	21.9	14.9	27.5	14.6	32.0	17.6	25.0	14.5	19.6	34.0	31.3	20.4	18.6			
TET08FEB	10.3	3.9	19.4	24.1	10.6	12.5	26.8	17.1	8.0	10.3	11.5	10.4	8.3	15.5	8.2	16.2	6.8	11.9	16.9	11.6	9.2	10.6			
TET09FEB	11.5	6.7	17.1	22.8	20.9	17.3	26.5	15.2	12.3	11.4	15.5	14.2	10.1	15.8	14.0	17.5	8.2	13.5	19.1	18.3	12.8	18.6			
TET11FEB	25.2	3.8	12.2	31.7	11.7	7.6	29.6	19.7	13.0	14.3	8.5	14.4	8.3	12.5	6.6	16.3	7.3	8.1	17.3	13.6	7.8	9.3			
TET12FEB	15.1	7.2	16.4	30.0	13.8	15.3	33.0	18.4	23.1	16.4	9.9	23.0	9.3	23.1	14.8	21.7	8.0	12.6	25.4	26.6	10.4	13.9			
TET13FEB	19.7	5.7	21.3	31.6	13.4	12.4	24.3	14.8	11.9	13.5	11.7	16.1	11.4	18.1	16.4	8.6	7.4	11.8	18.8	23.4	9.1	16.8			
TET14FEB	18.9	5.5	22.9	27.9	14.0	14.0	22.3	19.1	11.2	14.6	12.2	16.0	10.0	17.0	13.7	12.3	7.8	12.0	18.2	25.2	9.8	16.5			
TET15FEB	12.1	5.3	25.2	28.0	19.0	17.0	25.4	14.1	13.2	13.9	11.4	8.8	10.0	13.1	10.6	13.1	6.6	12.0	12.8	17.0	9.6	25.8			
TET16FEB	13.8	6.5	25.4	25.6	17.2	14.7	28.7	13.9	12.1	14.9	11.8	9.8	10.3	12.4	11.3	17.5	7.0	11.8	15.2	15.9	9.5	20.5			
TET17FEB	9.8	5.4	19.8	16.0	12.4	13.6	22.2	12.4	11.6	12.6	12.7	11.9	9.7	11.7	8.7	12.8	6.8	12.9	16.6	14.9	9.9	13.2			
TET18FEB	13.9	8.7	17.7	29.9	16.8	16.9	33.5	17.8	23.3	16.5	9.4	22.6	8.3	23.3	15.4	21.1	7.8	12.1	26.9	26.1	9.5	12.3			
TET19FEB	13.5	7.5	24.2	29.7	20.8	17.8	30.5	15.5	14.1	16.7	11.7	12.6	9.9	16.1	15.4	14.9	7.6	13.4	16.0	28.2	12.3	27.0			
TET01MAR	17.1	18.9	30.7	31.4	31.6	26.7	34.8	14.5	24.1	16.9	22.0	45.5	13.9	18.3	15.5	40.1	19.9	20.1	44.1	50.8	31.4	27.1			
TET02MAR	20.8	21.4	41.8	37.0	40.7	25.9	34.6	10.3	31.9	16.3	25.2	58.2	8.7	19.7	14.7	31.8	17.0	18.4	52.0	52.7	43.6	28.1			
TET03MAR	25.7	26.8	46.3	45.5	42.7	28.4	35.2	12.4	35.3	23.2	28.6	66.0	15.6	21.7	18.5	31.4	18.2	21.7	51.0	55.5	50.4	34.2			
TET04MAR	16.9	19.9	39.5	37.0	33.1	26.2	24.0	11.4	34.5	17.9	20.9	58.2	16.2	15.6	10.6	33.3	15.5	19.8	46.4	57.2	46.5	33.6			
TET06MAR	15.1	23.1	52.1	42.9	35.2	26.6	23.3	15.8	35.1	17.5	20.0	62.6	14.9	18.3	12.1	35.3	14.9	26.1	42.9	38.0	51.5	36.6			
TET08MAR	9.9	12.7	21.0	25.6	11.9	21.1	17.3	10.3	21.9	14.7	20.5	32.6	10.5	11.5	12.7	34.2	15.8	12.4	33.6	39.7	17.9	18.2			
TET09MAR	10.3	20.0	13.5	24.4	16.4	24.9	19.6	10.3	20.3	14.1	26.4	30.3	10.0	9.7	14.3	29.7	17.8	17.7	29.9	40.2	18.0	18.8			
TET11MAR	14.0	18.9	34.5	30.4	37.0	22.0	26.3	11.0	27.7	20.0	20.7	57.2	18.7	10.5	7.2	37.9	10.7	17.8	47.6	63.5	28.2	35.6			
TET12MAR	10.7	25.5	44.4	42.1	26.4	28.2	28.2	17.1	35.1	19.7	25.2	46.2	15.3	12.4	10.9	33.2	16.3	17.9	48.1	55.7	42.0	29.7			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TET13MAR	11.9	18.8	28.1	36.5	26.6	16.8	24.4	12.9	24.5	22.3	20.1	38.0	19.9	12.0	12.1	35.7	18.5	20.1	37.2	56.0	35.3	28.8			
TET14MAR	13.6	31.1	24.0	31.6	24.5	26.4	23.0	13.9	26.5	21.6	28.5	36.2	19.8	13.3	13.0	31.4	19.2	17.3	33.2	45.6	22.4	24.6			
TET15MAR	9.3	32.8	20.6	25.5	15.6	23.2	22.5	14.5	22.4	24.3	31.3	25.7	17.3	9.4	16.0	22.6	12.7	16.8	44.8	38.5	17.0	19.3			
TET16MAR	11.0	30.6	18.5	26.4	16.1	19.1	26.5	14.0	22.1	23.3	24.4	21.7	17.0	10.3	16.6	27.5	16.3	16.1	34.0	36.9	13.7	18.5			
TET17MAR	9.7	26.5	15.5	20.1	13.2	16.6	26.2	10.6	16.2	16.0	29.8	23.6	13.7	10.5	13.8	22.8	16.3	11.5	31.9	28.4	15.1	13.8			
TET18MAR	9.3	31.0	44.8	43.3	26.2	27.9	31.5	16.6	36.5	20.3	32.5	53.9	11.4	11.1	13.3	32.2	17.1	15.1	50.0	58.2	42.1	30.3			
TET19MAR	8.5	41.5	34.5	35.3	20.7	22.9	33.4	15.3	27.1	22.9	32.7	35.6	11.9	8.7	19.3	29.3	14.1	19.2	52.9	46.2	26.0	26.5			
TET01APR	33.9	53.7	58.5	29.0	64.8	57.6	65.7	45.7	47.9	62.1	54.1	63.9	16.2	14.8	44.5	42.6	33.1	45.6	79.3	37.7	52.6	79.3			
TET02APR	33.7	52.4	62.7	30.4	63.1	66.0	66.1	47.4	46.8	58.7	67.1	59.8	12.5	13.3	28.2	52.2	39.1	54.9	82.9	35.9	65.0	90.5			
TET03APR	36.1	46.8	69.0	32.9	62.1	71.5	78.6	39.7	41.9	46.7	55.8	69.6	13.9	14.6	33.8	52.6	33.8	52.8	88.2	44.7	63.0	89.6			
TET04APR	40.6	44.9	65.8	25.3	58.2	60.6	72.6	33.3	38.7	48.7	51.8	68.8	14.5	15.7	31.3	47.3	20.2	41.4	70.8	42.4	62.7	92.4			
TET06APR	34.7	44.0	61.4	28.8	47.3	55.5	75.9	38.4	53.7	58.0	44.7	68.6	23.0	14.7	34.7	40.4	21.9	53.6	70.2	48.2	70.0	101.8			
TET08APR	43.7	31.8	53.4	32.9	39.2	56.2	50.7	38.5	42.4	73.7	35.4	53.9	14.1	18.5	55.0	24.2	26.1	35.6	70.2	34.4	35.5	56.3			
TET09APR	40.0	40.2	56.2	33.7	43.5	36.8	59.0	42.9	45.2	79.5	51.5	48.5	20.6	17.9	41.9	23.0	25.8	34.4	53.9	30.9	38.4	44.5			
TET11APR	34.5	48.5	63.3	30.3	48.7	64.8	78.5	26.1	42.9	66.1	48.4	62.5	17.7	16.7	42.9	36.5	16.6	49.8	72.8	43.5	60.7	82.5			
TET12APR	36.2	42.0	53.8	35.8	44.3	51.9	60.5	26.4	40.0	56.0	43.0	66.0	18.7	20.9	39.4	44.6	23.8	58.2	65.3	50.5	60.2	97.7			
TET13APR	29.2	39.3	55.5	28.7	42.9	61.1	58.5	34.3	47.4	58.6	50.5	58.4	23.1	23.5	50.6	34.8	22.5	54.2	67.6	46.0	42.7	69.5			
TET14APR	39.3	41.1	41.9	35.2	45.4	56.0	44.0	33.7	45.3	70.9	38.4	51.1	22.7	17.7	60.0	31.2	26.1	41.1	62.7	43.2	35.8	64.5			
TET15APR	44.2	51.6	47.7	44.2	35.5	47.5	68.1	31.5	45.2	80.3	43.1	40.8	25.2	31.3	59.5	27.0	26.3	43.9	61.5	71.1	59.0	73.6			
TET16APR	36.4	48.5	47.1	39.3	32.1	45.2	50.9	29.1	44.0	82.3	46.9	48.4	28.3	27.1	59.8	22.2	29.8	36.2	63.3	56.0	48.6	73.4			
TET17APR	32.7	46.0	49.1	34.9	29.6	44.8	57.9	35.4	43.8	74.7	49.8	40.9	22.9	21.6	55.4	23.6	28.1	37.9	58.0	48.4	46.1	69.4			
TET18APR	32.8	31.3	52.2	41.6	38.3	46.3	49.9	27.4	45.0	58.9	38.5	60.5	21.5	20.7	45.1	44.0	24.7	63.3	63.5	57.9	51.2	107.0			
TET19APR	33.6	42.2	45.3	43.2	31.6	45.5	59.3	33.4	51.6	83.3	45.1	48.4	30.6	36.6	65.9	32.6	21.6	49.8	74.1	76.1	71.4	81.7			
TET01MAY	87.1	101.5	91.9	70.7	57.1	89.6	109.2	74.7	90.3	106.1	94.6	77.4	62.1	65.8	100.2	81.2	81.7	86.2	95.8	81.9	78.2	96.6			
TET02MAY	86.4	106.4	86.0	76.8	63.8	94.4	103.3	78.7	89.2	98.1	94.8	84.1	67.4	74.0	98.1	83.8	80.1	91.6	92.7	90.6	72.0	90.5			
TET03MAY	87.9	110.1	87.9	86.5	70.2	92.4	99.1	89.7	104.0	96.5	95.8	87.3	60.8	77.0	98.0	90.6	86.9	90.0	99.1	98.3	70.5	91.6			
TET04MAY	87.8	104.2	87.5	83.8	56.6	86.0	96.9	84.1	102.9	94.2	95.9	80.0	53.3	72.1	101.4	89.1	82.0	91.0	95.6	83.1	70.1	91.1			
TET06MAY	91.7	111.8	86.9	92.8	56.6	84.3	96.8	84.2	98.7	92.9	91.1	78.4	42.5	70.1	85.5	89.2	74.5	97.0	101.8	90.1	67.7	89.5			
TET08MAY	77.6	90.7	90.6	53.5	62.6	82.6	95.9	74.6	83.0	97.2	95.3	85.0	69.2	55.7	107.7	73.7	96.9	78.6	85.9	85.0	76.2	91.0			
TET09MAY	79.3	83.7	87.6	55.6	72.0	89.3	100.4	66.5	78.3	102.7	85.7	89.2	70.9	81.8	106.4	75.7	104.1	84.2	93.1	76.2	82.1	101.7			
TET11MAY	89.4	93.4	86.4	63.6	52.3	74.7	104.1	85.5	86.3	96.7	91.1	83.5	49.6	72.9	102.1	86.4	81.9	72.3	83.9	76.1	72.3	92.9			
TET12MAY	93.6	97.3	87.3	74.6	58.5	90.3	91.1	82.1	90.9	101.4	87.3	81.2	57.7	63.4	100.9	78.9	85.6	82.8	87.7	79.2	72.6	91.7			
TET13MAY	80.9	83.3	78.7	64.0	51.1	75.9	93.7	70.7	76.1	96.4	82.5	76.4	56.1	45.7	98.8	75.5	76.6	57.3	77.0	78.6	64.4	88.4			
TET14MAY	75.4	78.3	87.1	55.8	50.3	78.8	94.0	71.2	85.6	93.9	86.2	85.8	56.4	61.2	92.7	74.2	89.9	67.5	86.6	81.5	74.1	87.1			
TET15MAY	69.7	76.7	79.8	59.6	47.7	83.1	81.6	63.2	96.1	101.5	82.0	72.7	73.7	80.9	101.8	77.7	79.6	73.4	90.6	77.7	77.2	91.3			
TET16MAY	77.1	72.3	84.3	55.8	59.3	81.0	90.7	63.7	93.9	94.4	90.9	78.7	70.0	78.0	102.1	70.7	90.6	77.5	87.0	77.7	77.0	92.9			
TET17MAY	70.2	71.6	80.9	57.1	56.5	78.8	97.2	64.7	102.9	98.3	86.1	83.4	76.8	88.8	108.2	67.6	99.6	87.9	90.1	93.7	76.6	97.0			
TET18MAY	99.2	95.8	88.9	76.9	56.1	92.6	91.3	85.8	80.4	103.2	80.2	85.5	62.2	64.4	104.6	68.3	85.7	93.3	88.8	79.9	74.9	92.9			
TET19MAY	81.4	90.6	86.7	70.7	46.0	91.9	92.3	73.3	96.3	99.8	80.7	73.0	72.9	82.5	104.3	68.3	85.5	83.2	91.9	89.8	76.6	91.9			
TET01JUN	74.4	77.2	79.5	86.1	98.3	88.9	80.1	91.0	92.0	90.9	93.6	79.3	84.4	80.7	94.3	71.5	89.4	90.7	95.1	91.2	81.5	87.7			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TET02JUN	71.5	73.5	74.8	83.5	95.4	82.0	78.3	85.5	85.5	86.2	86.3	76.3	82.3	79.2	87.0	70.3	86.3	87.6	92.4	90.4	76.7	83.4			
TET03JUN	71.4	74.5	78.1	84.4	97.8	82.4	79.4	85.8	84.7	86.4	85.6	77.4	81.9	81.4	90.8	70.1	86.4	89.5	95.7	92.5	78.7	81.6			
TET04JUN	72.1	76.6	77.2	87.9	98.0	81.6	79.1	88.6	87.6	85.4	88.1	77.5	73.3	76.1	96.1	71.6	88.9	90.7	98.6	95.1	77.4	79.7			
TET06JUN	73.1	77.5	77.1	90.6	94.7	81.9	80.4	88.4	89.6	86.8	87.2	76.4	76.9	69.3	98.7	72.9	91.9	89.7	103.4	93.7	77.5	75.6			
TET08JUN	69.0	79.1	74.3	84.2	82.6	82.5	76.5	89.3	84.4	86.0	94.0	74.3	78.6	80.7	95.6	70.0	92.2	88.0	93.0	84.3	84.0	85.7			
TET09JUN	73.4	79.2	76.2	84.8	97.1	82.8	75.6	92.7	89.2	87.0	93.4	78.3	76.0	82.1	97.1	75.2	98.6	92.4	94.8	90.9	91.1	86.7			
TET11JUN	74.5	76.5	76.6	91.2	96.9	85.7	79.0	91.6	90.4	88.0	91.8	81.2	83.7	79.3	96.4	72.2	88.6	91.2	96.3	95.0	79.4	84.0			
TET12JUN	69.4	80.0	81.3	91.7	88.5	83.8	80.0	95.0	95.5	89.4	92.5	82.1	76.5	78.6	94.3	75.7	96.4	91.1	102.2	87.2	80.8	80.5			
TET13JUN	68.6	74.5	75.0	76.9	82.7	78.2	72.1	85.7	86.8	82.8	89.1	77.9	74.1	78.5	90.1	69.0	91.1	90.4	91.6	80.4	77.9	79.7			
TET14JUN	72.3	77.1	75.2	81.4	87.6	82.7	75.0	87.5	87.1	85.9	89.6	76.1	75.1	79.0	91.8	71.0	91.5	89.8	95.4	81.7	79.4	81.4			
TET15JUN	71.0	76.5	77.6	77.4	76.7	82.6	74.2	70.4	84.0	86.0	93.6	80.1	79.2	79.2	95.4	73.7	99.6	92.5	86.4	73.5	83.9	84.4			
TET16JUN	66.1	78.4	76.3	71.1	80.6	80.3	71.4	76.7	84.6	81.7	89.6	75.0	74.2	79.2	92.9	73.6	99.9	91.1	93.1	80.0	82.7	81.3			
TET17JUN	73.2	81.3	77.6	80.8	86.6	83.0	73.1	85.2	88.0	84.3	92.1	77.4	80.7	82.5	96.2	76.4	103.7	91.2	96.8	84.9	89.7	85.4			
TET18JUN	68.0	80.2	82.7	93.2	90.3	84.4	80.9	98.0	96.9	91.5	93.4	84.0	78.4	77.2	92.4	78.5	96.2	88.4	102.0	82.6	82.0	78.4			
TET19JUN	72.3	77.7	80.1	83.8	77.7	83.1	78.2	76.2	87.1	88.5	92.7	83.9	79.7	74.1	96.8	76.3	93.5	88.6	88.5	73.5	83.6	81.9			
TET01JLY	105.5	81.6	78.0	96.4	106.5	94.2	97.5	90.8	86.7	100.6	92.5	80.8	87.6	87.6	97.5	80.6	84.6	87.6	87.0	93.2	84.1	94.5			
TET02JLY	100.4	81.1	77.4	91.4	99.3	90.0	90.0	88.1	82.2	96.7	89.9	78.3	85.9	87.7	92.2	80.2	81.7	84.1	84.9	88.6	81.2	90.9			
TET03JLY	98.5	81.9	78.4	89.1	97.5	88.5	89.1	84.8	82.8	93.2	88.6	77.0	85.5	88.0	92.8	81.4	80.1	84.3	82.7	88.4	80.6	86.5			
TET04JLY	101.6	83.2	79.2	88.2	100.4	90.2	91.9	88.3	85.4	92.9	87.5	76.9	87.9	94.7	96.9	86.0	81.1	88.7	84.3	91.4	83.0	88.1			
TET06JLY	102.2	82.9	76.9	83.9	98.8	87.4	89.5	86.5	87.7	86.9	83.9	73.7	81.4	93.9	95.0	82.8	75.5	86.8	80.8	88.1	80.0	82.6			
TET08JLY	97.5	86.3	75.1	90.8	102.7	91.0	91.0	87.8	76.1	95.0	88.4	84.5	77.7	90.6	96.3	80.9	89.9	88.4	85.3	92.6	82.9	90.1			
TET09JLY	100.7	90.2	79.8	96.3	107.5	96.3	96.1	89.8	83.7	99.9	92.0	90.3	85.5	91.5	98.2	83.8	94.6	91.9	92.7	95.9	87.1	92.4			
TET11JLY	99.5	83.8	75.7	92.5	103.5	89.3	91.6	88.9	81.6	96.7	89.6	78.3	85.4	92.5	98.9	83.0	83.6	86.8	84.6	90.6	84.1	92.1			
TET12JLY	103.6	90.0	79.5	95.8	103.0	94.7	95.2	93.3	92.9	94.3	88.8	84.8	75.0	97.4	101.5	88.6	83.8	88.9	89.0	89.0	86.6	89.5			
TET13JLY	91.9	84.6	71.3	91.2	97.8	92.9	89.5	89.3	83.1	96.7	84.7	83.5	79.3	91.6	100.5	79.5	87.2	86.8	85.3	87.8	82.9	88.2			
TET14JLY	96.0	85.3	72.5	90.5	98.2	91.6	92.5	86.9	82.3	96.3	86.4	82.4	79.3	91.7	98.5	80.6	88.9	86.9	84.7	90.7	82.6	90.1			
TET15JLY	93.8	87.8	77.2	95.8	101.8	98.9	94.8	75.6	83.5	94.8	91.9	89.6	74.6	92.8	102.6	83.5	92.1	92.3	94.3	81.3	90.4	90.4			
TET16JLY	93.5	87.5	75.8	93.1	99.8	96.3	89.4	82.8	81.1	95.0	89.5	86.5	79.9	92.9	99.3	80.8	93.6	91.9	91.4	90.6	85.9	86.7			
TET17JLY	95.8	87.8	77.1	92.2	102.2	95.7	89.2	88.4	80.0	95.1	90.5	88.9	83.7	91.1	97.3	82.9	98.3	91.5	93.2	91.8	87.1	86.0			
TET18JLY	105.5	93.7	80.0	96.9	105.6	94.1	94.9	94.1	94.3	93.0	89.8	86.1	62.9	96.2	100.8	87.3	82.6	86.8	88.2	87.8	85.7	88.0			
TET19JLY	96.4	93.9	77.2	96.8	101.5	94.0	93.6	70.4	82.8	95.0	88.9	89.2	69.4	90.6	102.7	81.0	85.3	85.5	80.2	77.7	88.7	87.6			
TET01AUG	79.6	82.8	80.4	77.3	88.7	74.1	77.8	91.4	98.2	79.2	82.6	87.2	74.4	87.0	82.8	76.7	77.5	82.5	87.4	104.2	80.5	95.9			
TET02AUG	78.9	80.0	77.9	76.4	86.6	75.4	74.2	90.2	93.4	74.5	82.0	86.6	72.6	86.5	81.0	74.1	76.6	81.3	84.3	102.1	77.5	88.2			
TET03AUG	77.0	78.8	79.1	76.3	86.2	75.5	72.7	89.0	89.9	69.5	81.6	90.5	74.1	90.2	80.0	75.4	76.5	79.5	81.4	102.2	76.1	87.2			
TET04AUG	82.2	82.9	78.6	76.6	87.7	77.2	75.1	92.5	91.1	72.5	80.9	91.1	75.4	91.1	83.3	78.2	80.0	84.1	82.8	102.9	78.0	85.8			
TET06AUG	78.6	81.0	78.1	73.8	81.3	75.9	72.2	89.7	88.1	70.5	77.7	88.0	72.5	88.2	81.8	75.3	77.4	81.7	77.1	97.7	74.9	80.5			
TET08AUG	79.2	84.8	83.2	75.8	87.2	71.1	80.1	84.5	97.9	85.1	83.9	86.3	76.2	84.1	89.1	81.7	86.0	83.5	90.8	101.5	85.0	96.4			
TET09AUG	80.5	91.5	91.5	81.6	89.2	72.9	84.0	84.8	101.8	88.1	87.4	89.1	79.8	83.8	92.1	90.0	94.8	92.3	95.5	103.8	93.4	98.3			
TET11AUG	82.5	85.4	79.1	74.0	85.9	74.1	78.8	91.4	94.2	79.9	82.9	88.8	75.4	86.5	83.3	78.6	79.0	84.9	87.6	101.3	79.6	92.0			
TET12AUG	89.0	91.8	88.3	79.6	85.0	84.2	79.3	93.7	96.1	83.5	89.7	94.1	80.2	90.3	89.4	82.6	84.3	87.2	85.7	103.5	83.3	90.6			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TET13AUG	84.6	90.5	86.9	76.5	83.7	79.4	79.3	87.0	99.0	86.0	87.6	88.0	74.9	84.6	88.8	84.8	86.7	90.6	88.4	100.1	84.1	93.2			
TET14AUG	83.4	88.4	82.8	74.8	85.3	75.2	79.8	85.9	98.9	85.3	84.7	86.3	76.6	82.5	86.9	81.7	84.3	87.0	89.7	103.4	83.3	93.9			
TET15AUG	82.5	95.4	93.9	80.1	89.3	87.7	86.8	89.3	107.4	93.8	97.1	95.9	83.8	87.5	97.1	89.2	91.2	97.2	94.7	103.1	89.8	99.4			
TET16AUG	82.9	94.8	91.1	79.1	89.7	79.6	83.5	85.8	105.9	91.4	92.6	91.1	81.8	84.7	94.7	91.1	98.1	95.3	95.5	102.6	90.4	97.8			
TET17AUG	80.5	91.7	89.5	79.2	90.9	73.2	81.9	80.4	101.5	89.4	88.3	87.9	79.1	82.5	93.0	92.7	97.7	92.7	95.2	101.7	91.1	96.3			
TET18AUG	91.7	94.7	90.8	82.1	83.6	87.4	81.4	94.2	95.6	85.2	92.9	95.2	81.8	90.5	88.5	82.8	83.4	83.8	85.4	102.3	83.1	89.2			
TET19AUG	81.9	96.4	90.6	81.0	84.2	87.4	85.6	87.5	96.2	88.2	93.5	93.4	81.2	87.3	92.2	85.8	82.8	85.2	89.8	100.1	87.0	94.2			
TET01SEP	91.1	73.3	97.3	75.3	95.9	96.2	87.1	104.5	91.9	97.1	96.3	86.6	95.4	87.6	95.4	79.3	99.5	80.2	90.1	87.6	90.8	88.7			
TET02SEP	89.5	77.3	93.8	72.4	94.2	95.2	86.4	102.2	89.2	94.6	91.1	84.3	93.7	88.0	91.2	78.2	98.3	78.8	88.3	88.2	87.8	85.2			
TET03SEP	85.1	78.8	93.3	73.4	89.9	93.1	83.4	98.1	88.9	92.0	89.0	83.8	92.0	88.5	91.2	78.9	97.3	80.7	89.6	91.5	86.9	84.1			
TET04SEP	81.6	73.3	84.9	67.9	82.7	90.3	81.0	96.3	83.7	87.4	83.2	77.8	87.6	83.9	90.8	79.1	99.3	78.5	85.2	86.0	83.4	78.7			
TET06SEP	75.4	70.5	78.0	63.9	76.2	82.9	76.3	88.7	77.5	82.1	73.7	72.0	79.6	80.5	85.5	75.4	90.5	72.9	78.2	82.5	78.2	69.9			
TET08SEP	89.8	65.3	97.7	71.2	91.4	88.7	83.2	99.7	86.9	96.3	91.8	82.6	89.9	83.3	95.6	83.1	96.1	76.4	91.2	81.4	89.0	86.3			
TET09SEP	93.0	73.4	102.5	76.9	98.3	89.4	83.8	100.5	87.9	93.4	92.2	84.9	88.2	86.3	94.4	86.1	91.2	78.9	89.9	84.2	96.6	90.6			
TET11SEP	83.6	66.6	87.0	67.8	85.0	90.1	81.7	98.6	86.4	90.0	88.2	79.4	88.2	78.6	89.7	77.7	99.5	76.8	86.2	80.7	84.6	78.9			
TET12SEP	79.2	69.3	84.0	66.4	80.7	83.5	78.2	94.0	80.3	90.8	81.6	77.3	80.9	80.2	85.8	77.4	91.2	72.5	81.6	80.2	81.3	73.6			
TET13SEP	80.0	64.1	86.8	64.4	79.5	81.5	78.6	93.7	81.7	94.5	83.8	80.4	82.7	77.9	86.7	78.6	91.2	74.5	82.8	77.7	84.0	77.3			
TET14SEP	84.5	64.5	90.8	66.9	84.2	83.6	80.6	98.5	84.9	92.8	86.9	80.3	85.6	81.3	91.3	79.9	95.8	75.4	86.4	78.6	87.2	82.1			
TET15SEP	78.5	68.2	91.0	69.5	81.5	81.6	82.7	94.8	81.3	97.4	86.5	81.5	81.5	82.1	85.4	83.3	84.7	72.3	79.3	78.0	87.7	76.3			
TET16SEP	83.7	69.8	92.8	69.4	86.6	81.6	81.9	95.2	83.1	94.8	85.5	79.8	81.9	83.4	90.8	85.6	88.7	74.5	80.5	79.1	91.1	78.7			
TET17SEP	89.4	73.2	98.7	73.5	91.4	84.3	84.7	96.1	82.6	91.5	86.3	82.2	83.7	84.4	93.9	86.7	89.8	78.1	82.9	82.4	95.5	85.2			
TET18SEP	77.5	69.7	83.6	67.1	81.1	80.9	78.7	93.7	79.4	93.5	81.7	77.8	78.6	80.1	82.9	77.5	87.7	68.9	81.2	80.0	80.4	72.3			
TET19SEP	78.0	69.2	83.4	68.2	78.9	79.3	79.4	94.1	78.9	91.0	82.1	78.6	76.9	79.8	80.7	77.2	80.2	66.8	77.6	77.4	84.0	71.2			
TET01OCT	104.3	100.7	94.9	108.3	96.0	104.1	111.7	106.0	121.9	83.3	103.3	99.8	105.7	97.8	115.0	114.0	109.9	106.2	115.6	110.4	99.0	96.0			
TET02OCT	100.7	97.4	91.1	103.2	92.0	101.1	106.4	101.3	113.7	78.8	97.1	95.9	102.6	92.4	109.9	111.1	107.7	102.6	108.9	105.3	93.3	94.3			
TET03OCT	99.0	94.2	88.0	97.5	88.1	94.1	100.6	93.7	107.9	77.8	92.5	92.6	95.4	88.8	102.6	106.4	103.6	98.0	103.8	100.6	88.2	91.2			
TET04OCT	96.3	92.9	86.2	95.6	85.3	91.2	96.5	92.6	105.0	74.1	90.4	90.6	92.6	87.5	101.4	106.6	100.3	97.3	102.5	97.2	85.9	89.6			
TET06OCT	89.6	83.6	77.7	89.9	78.9	83.3	85.7	83.4	95.3	69.7	83.4	84.3	83.7	81.6	96.1	99.9	92.1	90.8	93.0	90.8	79.1	82.0			
TET08OCT	116.4	98.0	92.4	109.0	95.5	102.4	108.3	104.6	119.4	82.2	107.1	99.4	102.6	99.7	116.9	116.7	111.1	107.4	116.5	109.7	101.8	94.5			
TET09OCT	115.6	96.9	95.1	113.8	96.4	102.4	109.7	100.3	116.1	81.9	108.5	99.9	106.2	100.3	115.5	116.2	107.3	107.2	120.3	111.7	106.7	93.6			
TET11OCT	103.7	96.0	89.7	101.6	88.5	96.0	102.7	100.7	113.9	78.1	95.9	93.0	98.1	91.6	107.4	110.8	103.3	102.5	107.8	100.8	92.2	93.9			
TET12OCT	102.0	91.8	85.9	97.9	84.1	93.4	94.9	95.0	106.1	76.4	93.4	92.0	95.5	87.0	106.8	111.2	96.3	94.7	101.2	98.8	87.5	88.7			
TET13OCT	106.5	90.8	86.1	99.6	83.6	95.1	98.4	96.8	110.8	80.3	98.6	96.2	95.3	90.1	109.8	113.5	100.0	100.3	107.4	100.7	92.4	89.6			
TET14OCT	112.0	95.2	89.6	104.1	89.2	98.1	103.0	100.8	116.5	81.0	102.2	98.2	99.1	94.5	113.8	116.1	105.1	105.2	112.6	105.0	97.9	91.6			
TET15OCT	112.6	85.0	90.1	101.0	81.2	94.2	97.0	93.6	109.0	81.3	100.2	92.7	94.5	89.3	109.9	111.0	96.1	97.2	106.2	98.3	91.5	86.6			
TET16OCT	112.2	88.7	91.1	104.1	86.1	96.5	101.7	94.2	110.7	78.6	103.2	95.2	95.1	91.4	112.8	112.6	102.7	101.6	109.6	101.5	96.5	88.5			
TET17OCT	113.9	92.5	93.4	109.8	90.9	98.4	106.4	96.4	113.2	77.5	106.7	96.6	99.3	96.9	115.8	113.1	108.0	106.3	116.4	106.7	102.8	91.7			
TET18OCT	103.4	92.1	87.8	99.3	85.5	92.8	93.5	96.3	104.7	77.2	94.5	91.2	97.1	87.5	108.8	111.5	93.9	92.1	100.8	98.5	87.4	88.8			
TET19OCT	108.6	85.0	87.3	98.7	80.4	92.0	91.8	91.4	102.1	79.7	96.1	86.9	93.6	85.6	106.3	107.8	88.5	88.1	102.4	94.5	86.6	85.3			
TET01NOV	41.9	80.8	86.0	86.6	85.3	86.3	78.2	80.1	81.7	87.1	93.0	90.5	77.5	69.0	66.0	77.2	86.6	70.3	80.6	75.6	79.9	80.7			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TET02NOV	43.3	73.8	76.9	78.5	78.9	79.3	71.7	72.6	68.4	75.7	81.9	85.6	74.7	67.8	64.0	79.9	82.2	64.8	75.7	66.2	77.4	73.6			
TET03NOV	44.3	71.9	74.8	79.7	75.2	79.3	68.5	75.1	70.1	73.9	78.5	82.3	67.2	60.8	55.3	80.3	81.1	70.0	74.0	62.1	75.4	73.3			
TET04NOV	44.5	70.9	75.1	75.5	71.3	74.6	71.6	75.8	72.5	71.1	76.1	80.1	76.8	63.4	52.8	79.5	81.7	70.5	76.5	64.8	73.7	70.8			
TET06NOV	42.9	73.1	69.7	78.3	71.0	79.3	73.0	76.6	71.1	72.7	73.7	79.2	73.8	65.5	53.3	83.1	77.8	71.7	74.9	73.5	72.9	72.0			
TET08NOV	47.9	83.1	85.6	81.5	85.7	83.7	81.3	88.2	78.0	83.9	91.3	84.6	76.1	76.4	76.6	77.3	85.2	77.6	83.1	84.2	83.3	81.9			
TET09NOV	57.9	86.2	93.2	96.1	96.8	88.1	91.3	97.9	85.0	91.9	106.5	93.5	97.2	89.0	89.9	87.3	90.5	87.2	92.5	92.3	92.8	88.0			
TET11NOV	43.7	73.4	80.4	77.6	70.2	72.6	72.6	78.9	76.7	77.1	78.2	82.1	81.7	68.4	56.7	74.6	83.7	68.4	83.7	70.5	76.3	75.0			
TET12NOV	49.6	74.3	80.0	83.8	82.3	86.4	85.0	88.2	81.3	79.3	82.5	88.8	79.2	74.0	59.8	84.9	86.9	79.8	76.4	79.0	83.1	75.1			
TET13NOV	53.5	77.3	77.6	82.4	78.5	81.6	79.0	85.4	79.9	77.2	81.8	85.1	79.4	76.2	65.7	85.2	85.5	74.3	75.7	75.7	80.6	74.0			
TET14NOV	52.2	77.3	79.7	79.1	80.4	76.1	76.4	85.7	80.1	81.4	86.3	83.2	81.2	72.8	68.4	78.8	84.5	73.8	75.3	77.9	80.1	74.6			
TET15NOV	62.6	80.4	82.3	90.2	89.9	90.4	90.2	91.9	88.4	84.3	88.1	92.0	80.9	80.3	78.1	90.2	88.1	81.9	71.2	91.2	88.8	80.2			
TET16NOV	59.1	81.9	84.4	86.4	88.6	85.3	86.0	88.0	85.4	80.9	88.3	87.2	81.1	81.9	83.2	81.6	86.2	78.4	79.2	87.4	86.6	77.7			
TET17NOV	58.0	84.1	89.6	84.7	95.3	92.5	89.3	96.0	85.3	88.1	95.7	90.8	97.2	81.9	86.4	80.6	88.6	83.5	82.3	92.9	89.8	86.2			
TET18NOV	49.8	78.6	81.7	85.8	87.9	90.5	89.5	92.6	81.8	83.4	86.5	89.7	79.4	81.9	61.1	82.8	89.0	83.1	84.3	85.2	86.8	78.4			
TET19NOV	61.9	85.1	80.8	88.0	90.8	93.7	90.9	94.3	86.1	84.9	90.4	93.3	83.2	86.3	78.0	85.9	90.4	84.2	81.7	94.3	90.0	84.0			
TET01DEC	17.1	39.1	52.1	41.4	36.6	36.0	34.6	42.5	36.9	47.1	45.2	47.9	35.7	36.6	26.4	39.7	44.1	33.8	35.8	31.6	41.9	37.8			
TET02DEC	17.7	37.9	47.2	36.5	32.4	34.0	32.5	34.8	31.9	41.1	41.3	44.5	34.6	34.9	25.6	38.6	43.1	33.2	35.7	29.0	38.1	36.9			
TET03DEC	18.0	36.1	57.7	44.6	42.4	44.4	34.0	48.2	37.4	43.6	40.1	48.2	35.5	34.4	23.8	51.6	56.4	46.3	35.1	26.1	47.1	39.3			
TET04DEC	17.8	35.1	48.5	33.4	37.6	37.6	35.0	40.7	38.1	40.4	38.7	42.5	36.3	31.0	21.5	45.0	51.2	42.6	35.1	29.2	39.6	35.6			
TET06DEC	17.6	38.4	57.6	39.7	42.4	53.5	45.5	55.8	49.7	49.2	41.7	51.2	36.8	33.9	21.6	50.9	63.5	56.5	38.2	38.0	46.7	39.9			
TET08DEC	17.0	43.6	43.4	35.6	35.5	32.3	36.3	35.3	35.8	40.7	39.9	36.0	31.1	28.9	26.5	29.1	41.8	35.2	31.3	34.1	37.7	34.9			
TET09DEC	20.4	51.1	50.8	49.2	49.8	43.6	45.8	58.0	43.2	49.7	55.2	49.5	42.3	44.6	36.0	37.0	50.7	43.4	37.0	42.1	57.2	41.3			
TET11DEC	16.7	35.4	44.8	29.4	27.9	31.2	31.6	34.3	36.1	38.8	34.9	39.1	35.1	27.1	20.8	33.4	40.2	33.8	35.9	29.7	36.1	33.7			
TET12DEC	18.4	35.1	52.4	33.3	44.8	43.0	42.4	52.2	42.0	42.3	36.8	42.5	33.8	32.6	22.1	37.7	50.0	46.3	31.0	34.0	42.2	34.2			
TET13DEC	17.7	36.5	44.8	30.5	36.3	36.5	35.9	43.0	38.9	37.4	33.7	40.1	32.3	33.7	22.4	31.6	39.8	34.1	28.3	31.3	39.6	33.1			
TET14DEC	17.4	37.4	39.6	29.3	32.6	30.5	32.9	37.4	36.6	38.0	36.9	36.6	32.1	28.0	23.2	28.5	38.3	34.1	28.4	30.1	37.3	31.8			
TET15DEC	21.0	42.0	54.5	33.9	52.6	42.9	50.6	57.4	50.1	43.7	39.6	46.6	32.7	37.1	28.8	29.9	44.4	40.6	27.4	41.2	49.5	38.3			
TET16DEC	19.3	42.3	48.3	30.6	45.6	36.8	42.4	46.9	44.7	39.8	36.7	39.8	30.4	34.6	29.5	26.0	41.0	36.3	28.7	35.0	44.9	33.9			
TET17DEC	18.9	46.9	47.5	31.1	47.4	38.1	43.9	47.8	42.7	43.5	41.3	40.8	37.4	30.9	29.3	26.1	44.2	38.7	29.7	36.9	43.9	38.9			
TET18DEC	18.9	37.3	58.4	34.9	49.9	47.4	47.6	55.6	44.0	44.8	37.7	41.9	33.6	37.0	23.6	37.9	53.9	52.5	34.4	39.6	45.2	35.7			
TET19DEC	21.7	44.1	62.8	39.0	56.0	49.6	57.5	51.6	56.1	48.0	43.5	48.9	34.2	40.0	29.6	35.7	55.1	51.0	32.9	47.4	52.4	41.3			
TETCJAN	21.0	11.7	29.3	41.5	38.3	46.5	23.5	28.8	29.8	41.7	30.3	23.6	26.2	24.4	32.0	18.9	25.7	27.4	38.7	26.5	39.5	39.8			
TETNJAN	20.2	16.9	33.1	44.9	30.7	44.2	27.3	38.1	35.3	38.0	30.4	25.6	40.4	28.5	24.9	17.1	33.1	34.8	38.2	28.6	39.5	38.9			
TETNEJAN	16.4	7.3	17.0	23.6	17.9	17.4	15.4	14.4	17.7	16.8	19.3	15.4	16.9	15.0	14.1	10.5	13.4	19.8	18.5	11.7	18.3	22.5			
TETSJAN	89.2	79.3	105.6	102.9	112.0	97.8	124.9	103.6	94.6	106.3	104.2	91.5	90.8	104.4	115.1	111.8	113.5	108.3	113.8	110.9	107.1	111.2			
TETCFEB	13.9	13.6	25.3	29.1	19.1	29.0	25.2	15.6	20.1	23.1	18.1	16.4	13.9	18.3	17.1	12.8	14.3	23.6	27.8	31.8	34.1	33.8			
TETNFEB	16.4	14.1	22.0	31.7	21.1	34.1	26.9	24.8	23.9	24.1	18.8	19.5	22.5	27.4	18.4	14.4	19.5	24.4	25.9	25.5	27.5	25.4			
TETNEFEB	18.9	6.9	18.1	27.7	15.5	14.0	28.7	17.9	16.2	14.2	11.5	18.4	10.0	20.2	13.5	17.9	8.5	12.6	21.8	22.7	11.1	16.0			
TETSFEB	51.5	41.6	73.2	46.3	52.2	81.6	75.0	66.6	40.3	74.5	59.5	45.2	54.4	68.1	67.9	58.5	74.5	81.6	65.9	58.4	112.8	110.8			
TETCMAR	8.1	25.1	32.5	29.7	19.6	29.7	26.6	11.7	37.5	29.4	39.5	50.4	18.5	10.3	44.3	34.1	30.4	19.9	50.7	25.0	38.9	37.1			

Table A-3. Data for REMEW-THAI (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TETNMAR	10.8	21.5	33.6	21.9	18.0	22.8	17.4	16.0	30.6	17.5	21.2	49.0	16.6	18.2	17.2	35.9	14.6	21.7	30.4	23.9	24.2	27.6			
TETNEMAR	13.4	25.0	31.9	33.4	26.1	23.9	26.9	13.2	27.6	19.4	25.6	43.2	14.7	13.3	13.8	31.8	16.3	18.0	42.5	47.7	31.3	26.5			
TETSMAR	27.5	27.0	44.0	59.1	71.5	97.4	83.8	27.3	34.3	54.8	55.9	36.0	38.2	26.1	86.9	66.4	75.8	45.3	53.1	34.1	110.1	108.5			
TETCAPR	30.4	31.6	63.7	71.4	17.1	49.4	50.9	33.1	52.8	75.4	36.2	42.3	38.8	22.4	67.3	58.5	23.8	71.0	80.3	41.5	75.1	90.8			
TETNAPR	34.0	24.0	51.4	40.4	22.1	35.3	57.6	48.0	59.8	60.3	31.9	45.9	43.2	17.4	30.0	42.2	19.8	57.6	75.0	28.5	52.9	83.2			
TETNEAPR	36.4	44.0	55.2	34.1	45.4	54.2	62.3	35.2	45.1	66.2	47.8	56.9	20.3	20.4	46.8	36.2	26.2	47.0	69.0	47.9	53.9	79.6			
TETSAPR	61.4	77.7	58.3	109.0	39.1	95.3	91.6	20.6	40.4	89.1	85.7	80.2	83.3	28.8	118.7	99.2	86.5	70.4	76.6	32.8	96.7	117.3			
TETCMAY	73.8	79.3	101.3	102.7	50.7	89.5	93.7	97.4	90.1	102.5	78.7	85.2	97.7	77.6	94.3	86.3	84.5	106.1	102.4	105.8	87.4	104.4			
TETNMAY	88.6	96.5	85.1	90.5	56.9	74.6	96.1	88.4	85.3	97.9	86.4	86.3	70.6	45.0	88.0	79.3	84.5	90.7	89.4	89.8	80.9	89.8			
TETNEMAY	83.4	91.7	86.2	68.6	57.3	85.4	96.1	75.8	90.9	98.3	88.8	81.4	62.6	70.9	100.8	78.2	86.3	82.1	90.5	83.7	73.9	92.4			
TETSMAY	103.9	102.2	95.6	108.4	78.7	99.7	94.9	89.2	74.2	95.5	96.7	100.0	108.9	91.9	112.2	87.6	91.8	101.8	106.6	86.7	93.7	105.2			
TETCJUN	87.7	84.0	83.5	87.3	90.6	88.5	83.0	103.7	101.8	103.3	96.5	95.3	88.9	86.2	98.8	85.4	103.2	98.3	94.4	103.8	91.1	89.2			
TETNJUN	77.6	76.1	76.0	83.1	89.2	74.4	74.7	87.1	86.1	87.0	84.9	79.6	63.0	65.2	90.7	76.2	90.2	83.8	73.1	91.2	74.3	70.7			
TETNEJUN	71.3	77.5	77.5	84.3	89.5	82.9	77.1	86.7	88.3	86.7	90.8	78.6	78.4	78.6	94.1	73.0	93.4	90.2	95.3	86.1	81.6	82.3			
TETSJUN	92.3	87.3	99.5	94.7	96.5	90.9	99.2	100.7	97.5	105.7	104.9	102.1	107.8	94.3	108.7	94.5	97.6	100.2	95.9	90.0	91.0	90.4			
TETCJLY	103.7	100.4	83.1	93.6	103.7	97.4	90.5	87.5	103.3	101.5	96.7	96.6	85.8	104.5	108.0	87.2	93.0	92.4	79.6	104.4	99.6	89.6			
TETNJLY	94.4	81.5	72.1	78.2	90.0	82.9	80.8	81.9	80.4	84.0	84.8	75.3	74.4	80.0	84.9	76.0	76.4	79.2	74.2	75.8	77.6	76.3			
TETNEJLY	98.9	86.4	76.9	92.6	101.6	92.8	92.2	86.6	84.1	95.1	88.9	83.2	80.1	91.9	98.2	82.7	86.4	88.1	86.8	89.1	84.6	89.0			
TETSJLY	93.6	94.5	103.3	94.4	102.3	99.7	107.1	105.4	106.5	94.7	102.0	108.7	95.7	106.3	102.2	101.4	98.3	88.0	105.3	114.5	115.9	106.6			
TETCAUG	93.7	100.0	87.8	80.8	84.7	88.2	87.4	96.2	93.4	86.8	98.2	97.3	84.5	90.8	86.0	87.5	82.0	91.5	87.3	102.7	94.2	97.0			
TETNAUG	70.3	78.2	75.6	69.2	77.1	75.2	70.5	86.8	84.8	71.5	83.2	91.7	70.9	83.8	73.3	68.2	66.0	74.8	70.1	91.2	65.6	78.0			
TETNEAUG	82.2	88.2	85.1	77.8	86.5	78.1	79.5	88.6	97.2	82.6	86.6	90.0	77.5	86.7	87.8	82.5	84.8	86.8	88.2	102.0	83.6	92.4			
TETSAUG	104.8	95.7	101.2	95.5	95.3	107.0	104.2	100.2	93.0	103.3	101.7	110.3	98.9	99.3	105.8	98.5	96.7	102.1	97.7	104.3	108.2	102.1			
TETCSEP	83.3	76.6	81.0	70.6	79.9	81.0	78.5	92.1	81.1	89.1	85.1	80.9	80.1	87.5	83.7	83.7	75.8	69.7	76.5	79.0	84.8	73.9			
TETNSEP	70.1	66.4	77.8	63.8	73.1	73.4	74.9	83.1	73.3	79.6	73.1	73.4	74.4	73.0	75.6	73.1	74.0	69.1	75.7	77.8	67.6	64.1			
TETNESEP	83.7	70.4	90.4	69.6	86.1	86.4	81.7	96.8	84.0	92.5	86.2	80.6	85.4	82.9	89.5	80.3	92.6	75.4	84.4	82.2	86.8	79.9			
TETSSEP	89.5	98.7	90.8	92.4	90.7	92.8	89.6	91.3	97.5	85.6	97.8	94.3	87.6	102.3	95.6	95.0	83.7	88.1	80.2	81.4	98.0	91.6			
TETCOCT	113.3	83.7	86.8	95.0	74.1	89.3	87.2	86.1	100.1	79.9	94.8	86.8	92.2	77.5	99.3	108.7	85.8	88.0	98.4	87.8	79.3	79.5			
TETNOCT	88.6	71.2	72.8	82.4	71.6	72.0	78.1	76.8	86.9	71.6	75.7	78.6	78.6	68.7	85.0	89.1	81.1	80.3	84.6	82.3	65.8	73.8			
TETNEOCT	106.1	92.6	89.2	102.1	87.6	95.9	100.5	96.7	110.4	78.6	98.3	94.0	97.3	91.4	109.3	111.2	101.6	99.8	107.8	101.9	93.1	90.4			
TETSOCT	90.9	81.9	91.3	94.4	80.6	91.0	83.1	83.6	97.0	84.1	83.5	90.7	88.8	79.1	85.6	96.3	84.1	83.3	89.4	81.6	76.6	80.2			
TETCNOV	68.8	99.4	78.4	101.6	92.0	99.7	93.3	97.6	83.4	88.1	103.5	98.8	101.7	96.1	98.0	106.9	97.4	94.7	96.3	99.4	98.7	96.9			
TETNNOV	68.1	75.4	60.8	76.0	66.6	76.0	68.8	71.8	67.9	66.7	73.3	76.2	74.8	69.5	70.3	78.0	69.0	74.0	74.0	75.3	71.6	73.0			
TETNENOV	50.8	78.3	81.1	83.4	83.0	83.7	80.9	85.5	79.5	80.8	86.2	86.8	80.4	74.7	68.5	81.8	85.5	76.2	79.2	79.6	82.3	77.8			
TETSNOV	84.6	78.4	75.0	87.3	82.5	93.5	77.7	85.4	85.8	73.8	89.2	91.2	96.4	83.5	89.0	89.8	74.1	85.1	86.9	79.2	81.9	82.8			
TETCDEC	27.3	72.1	83.7	66.8	89.6	56.6	76.3	70.6	85.6	63.2	63.3	68.1	52.0	59.9	45.6	67.3	65.9	82.7	54.7	73.6	72.1	59.4			
TETNDEC	32.8	54.4	57.1	45.6	60.9	49.3	62.2	53.4	58.6	53.8	47.1	57.9	45.0	45.2	33.1	55.3	59.5	59.3	45.8	58.8	53.6	43.9			
TETNEDEC	18.5	39.9	50.7	35.8	41.9	39.8	40.5	46.3	41.5	43.0	40.2	43.5	34.6	34.1	25.7	36.2	47.4	41.2	32.8	34.7	43.7	36.7			
TETSDEC	108.9	97.3	107.1	107.0	97.6	94.0	103.2	115.4	101.4	107.5	118.4	111.2	106.0	105.0	96.9	119.6	104.3	94.5	83.8	73.3	75.7	88.6			

Appendix 4

Table A-4. Data for REMEW-VIET

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VYS_RRD							38.4	30.3	22.2	40.3	38.4	36.3	17.9	40.5	47.3	49.7	47.1	56.3	56.3	55.3	56.9	59.7	57.9	59.9	
VYS_NE							27.9	25.0	18.6	27.9	28.6	25.5	11.1	28.1	30.8	31.2	29.6	35.6	36.8	35.9	39.4	45.6	44.7	46.5	
VYS_NW							26.0	23.9	18.2	26.4	26.9	26.0	22.6	27.1	30.4	35.6	35.0	39.2	41.0	37.8	41.6	47.4	47.7	49.4	
VYS_NCC							25.3	30.5	22.7	27.8	29.4	28.6	24.4	30.1	31.5	31.8	36.5	38.7	43.2	41.5	45.1	49.1	49.5	53.2	
VYS_SCC							34.4	29.8	33.2	37.9	30.2	34.7	35.6	26.1	21.3	35.9	35.2	39.6	42.5	40.1	43.8	43.6	44.9	50.7	
VYS_CH							37.4	36.3	38.1	37.1	40.2	39.3	45.2	40.0	44.7	47.3	38.5	42.1	47.7	36.8	46.4	49.8	49.6	42.8	
VYS_SE							31.4	31.2	31.0	29.9	31.9	33.8	31.5	33.1	33.3	34.8	35.2	39.3	37.8	35.8	39.0	39.5	39.4	41.5	
VYS_MRD							43.0	43.9	45.2	44.0	47.5	48.3	47.6	50.1	42.5	50.6	51.6	51.9	53.3	53.0	50.1	52.6	50.4	57.0	
VYM_RRD							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VYM_NE							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VYM_NW							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VYM_NCC							20.0	23.2	19.2	23.5	25.1	21.1	26.6	28.5	19.3	30.7	30.8	30.1	36.2	29.1	40.6	39.2	40.2	41.5	
VYM_SCC							39.3	39.0	34.3	39.0	41.1	37.2	38.9	37.8	39.5	40.9	40.9	42.1	43.2	42.2	45.1	45.5	46.7	43.2	
VYM_CH							0	0	0	0	0	0	0	0	0	0	0	0	22.1	25.8	20.4	28.8	27.7	24.4	
VYM_SE							28.4	31.8	31.3	31.2	33.6	28.4	32.0	31.9	32.3	33.4	33.3	33.2	31.6	32.3	31.5	34.9	34.3	33.8	
VYM_MRD							34.6	33.4	28.6	35.1	36.4	35.3	34.6	34.2	38.0	36.0	37.9	34.6	34.8	35.3	37.1	37.2	37.2	39.4	
VYW_RRD							21.9	26.9	34.9	26.9	33.5	33.2	40.8	39.5	46.5	30.7	41.7	37.8	41.1	47.3	52.4	50.9	48.9	51.9	
VYW_NE							20.5	22.6	25.3	21.7	25.4	22.2	25.0	24.9	28.7	26.9	28.0	29.0	30.9	33.2	36.1	36.2	37.7	38.3	
VYW_NW							15.8	17.0	17.7	17.7	19.5	15.2	18.4	17.1	21.0	19.8	21.7	19.5	21.9	22.6	24.6	24.5	26.9	26.8	
VYW_NCC							17.4	17.8	21.5	14.9	15.2	20.2	22.8	18.8	25.3	21.8	24.8	17.3	25.8	26.2	28.8	28.7	32.4	33.8	
VYW_SCC							26.1	23.5	24.8	18.8	26.9	26.4	29.7	27.7	23.2	27.5	25.4	27.1	24.6	28.9	29.0	30.5	32.2	31.4	
VYW_CH							18.8	18.8	18.2	18.6	21.3	20.2	21.4	21.0	19.9	20.1	21.4	23.1	23.0	22.4	25.7	28.0	30.5	28.7	
VYW_SE							24.5	25.3	24.4	25.1	25.5	25.3	26.4	20.9	24.6	24.5	24.8	23.7	27.5	28.4	26.6	26.9	29.8	31.2	
VYW_MRD							23.7	23.6	21.6	25.2	28.3	28.7	29.9	28.1	28.7	32.2	28.9	33.3	26.7	29.8	30.9	31.2	33.9	34.2	
VAPS_RRD							556.9	557.2	555.4	557.6	563.9	568.2	571.1	579.3	579.7	584.9	588.3	585.1	593.3	593.2	591.4	599.7	599.1	594.3	
VAPS_NE							167.5	168.3	166.7	166.6	170.2	171.8	176.7	176.2	177.1	178.0	182.3	180.5	191.0	193.2	186.8	202.2	210.2	214.2	
VAPS_NW							26.3	26.6	27.1	27.1	26.7	26.8	28.0	27.4	26.1	27.4	27.8	27.3	28.5	27.4	26.6	29.9	31.5	32.7	
VAPS_NCC							316.4	315.0	314.1	312.1	313.4	312.2	314.9	315.1	314.8	317.2	319.3	320.3	325.8	326.7	316.4	330.6	335.6	336.4	
VAPS_SCC							167.5	166.7	163.2	163.6	163.7	161.9	162.5	164.8	165.0	164.8	164.3	165.4	167.1	166.9	167.7	168.1	172.1	173.1	
VAPS_CH							23.6	24.6	24.5	25.2	25.9	25.6	26.9	27.2	28.6	30.0	30.1	30.9	35.1	36.6	40.8	44.8	50.4	55.1	
VAPS_SE							46.3	50.5	53.9	52.7	57.0	54.7	60.1	62.2	65.4	68.8	73.5	79.4	87.9	90.3	110.7	117.3	120.4	113.5	
VAPS_MRD							461.1	519.6	535.1	577.1	671.5	752.4	820.4	926.8	966.9	1010.3	1035.7	1152.2	1254.0	1349.0	1448.5	1520.6	1537.6	1513.8	
VAPM_RRD							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VAPM_NE							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VAPM_NW							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VAPM_NCC							89.3	95.5	110.3	101.5	101.7	120.7	119.7	124.7	120.7	126.9	127.2	130.1	136.9	133.9	140.9	146.9	153.7	155.9	
VAPM_SCC							111.1	111.8	108.0	111.5	114.0	110.7	116.2	117.2	119.6	113.5	116.5	123.6	120.0	113.5	121.0	115.2	107.5	98.0	
VAPM_CH							0	0	0	0	0	0	0	0	0	0	0	0	8.6	5.2	5.6	5.9	5.2	5.4	
VAPM_SE							74.8	80.4	68.9	79.9	81.5	76.5	88.0	86.5	90.6	94.2	101.1	111.0	109.5	112.0	134.0	143.2	132.9	133.4	
VAPM_MRD							581.1	626.9	604.8	700.9	843.3	907.8	1058.2	1120.2	1218.2	1251.1	1397.6	1619.5	1510.2	1776.0	1939.7	1881.6	1811.5	1883.4	

Table A-4. Data for REMEW-VIET (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VAPW_RRD							593.9	571.3	587.4	595.3	597.5	589.8	596.1	596.4	605.3	589.4	604.7	585.3	603.7	609.9	611.4	612.9	603.4	602.4	
VAPW_NE							345.1	331.3	341.6	349.4	352.2	347.4	345.9	340.8	345.1	338.3	340.0	339.0	340.5	345.6	348.4	348.1	347.8	348.3	
VAPW_NW							117.8	115.4	109.7	114.0	115.3	117.5	116.6	115.0	112.0	108.6	106.7	107.0	104.4	101.2	106.3	106.9	108.1	108.1	
VAPW_NCC							302.5	275.5	252.6	255.8	255.6	244.1	240.6	247.2	238.6	236.2	235.7	233.9	229.3	216.9	220.6	217.5	211.9	208.1	
VAPW_SCC							143.3	140.8	140.1	135.0	137.1	142.0	147.5	153.9	149.5	151.4	141.7	144.2	142.6	144.2	146.1	139.2	134.4	128.4	
VAPW_CH							134.0	131.4	124.6	134.1	134.9	139.7	143.1	152.2	158.0	151.9	143.1	125.2	126.3	122.9	119.6	126.1	125.2	125.6	
VAPW_SE							251.0	249.3	248.3	245.8	255.8	253.1	241.9	264.5	270.2	278.8	272.7	272.9	268.6	262.5	274.1	266.0	251.3	238.7	
VAPW_MRD							1208.7	1144.9	1066.7	1035.8	930.0	919.9	928.4	877.7	808.0	776.5	757.3	671.0	716.4	635.6	597.0	543.6	442.9	416.6	
EYS_RRD							27.9	29.9	31.9	33.9	36.0	38.0	40.0	42.0	44.0	46.0	48.1	50.1	52.1	54.1	56.1	58.2	60.2	62.2	
EYS_NE							19.7	21.1	22.5	23.9	25.3	26.7	28.1	29.5	30.9	32.3	33.7	35.1	36.5	37.9	39.3	40.7	42.1	43.5	
EYS_NW							19.3	20.9	22.6	24.3	25.9	27.6	29.3	31.0	32.6	34.3	36.0	37.6	39.3	41.0	42.6	44.3	46.0	47.6	
EYS_NCC							21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0	34.7	36.3	38.0	39.6	41.3	42.9	44.5	46.2	47.8	49.5	
EYS_SCC							28.7	29.6	30.5	31.5	32.4	33.4	34.3	35.2	36.2	37.1	38.0	39.0	39.9	40.9	41.8	42.7	43.7	44.6	
EYS_CH							37.3	37.9	38.4	39.0	39.6	40.2	40.7	41.3	41.9	42.5	43.0	43.6	44.2	44.8	45.3	45.9	46.5	47.1	
EYS_SE							29.6	30.2	30.8	31.5	32.1	32.7	33.4	34.0	34.6	35.3	35.9	36.6	37.2	37.8	38.5	39.1	39.7	40.4	
EYS_MRD							43.6	44.3	44.9	45.5	46.2	46.8	47.4	48.1	48.7	49.4	50.0	50.6	51.3	51.9	52.5	53.2	53.8	54.4	
EYD_RRD							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
EYD_NE							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
EYD_NW							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
EYD_NCC							18.2	19.5	20.8	22.1	23.4	24.7	25.9	27.2	28.5	29.8	31.1	32.4	33.7	34.9	36.2	37.5	38.8	40.1	
EYD_SCC							36.7	37.2	37.7	38.2	38.7	39.2	39.7	40.2	40.6	41.1	41.6	42.1	42.6	43.1	43.6	44.1	44.5	45.0	
EYD_CH							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.8	32.5	33.3	34.0	34.7	35.5	
EYD_SE							30.4	30.6	30.8	31.0	31.2	31.4	31.7	31.9	32.1	32.3	32.5	32.7	32.9	33.1	33.3	33.5	33.7	33.9	
EYD_MRD							33.2	33.5	33.7	34.0	34.3	34.6	34.8	35.1	35.4	35.7	36.0	36.2	36.5	36.8	37.1	37.3	37.6	37.9	
EYW_RRD							26.3	27.8	29.3	30.8	32.4	33.9	35.4	37.0	38.5	40.0	41.6	43.1	44.6	46.2	47.7	49.2	50.8	52.3	
EYW_NE							19.8	20.8	21.9	22.9	23.9	24.9	25.9	26.9	28.0	29.0	30.0	31.0	32.0	33.1	34.1	35.1	36.1	37.1	
EYW_NW							15.2	15.8	16.5	17.1	17.7	18.3	18.9	19.5	20.1	20.7	21.3	22.0	22.6	23.2	23.8	24.4	25.0	25.6	
EYW_NCC							15.3	16.2	17.1	18.0	18.9	19.8	20.7	21.6	22.5	23.4	24.3	25.2	26.1	27.0	27.9	28.8	29.7	30.6	
EYW_SCC							23.4	23.8	24.2	24.6	25.0	25.4	25.8	26.3	26.7	27.1	27.5	27.9	28.3	28.7	29.1	29.5	29.9	30.4	
EYW_CH							17.1	17.7	18.3	18.9	19.5	20.2	20.8	21.4	22.0	22.6	23.2	23.8	24.4	25.0	25.6	26.2	26.8	27.4	
EYW_SE							23.5	23.8	24.0	24.3	24.6	24.9	25.2	25.4	25.7	26.0	26.3	26.6	26.8	27.1	27.4	27.7	27.9	28.2	
EYW_MRD							24.1	24.6	25.2	25.7	26.3	26.9	27.4	28.0	28.5	29.1	29.7	30.2	30.8	31.3	31.9	32.5	33.0	33.6	
VQS_RRD							2138.5	1688.3	1233.0	2247.1	2165.4	2062.6	1022.3	2346.2	2742.0	2907.0	2770.9	3294.1	3340.3	3280.4	3365.1	3580.2	3468.8	3559.9	
VQS_NE							467.3	420.8	310.1	464.8	486.8	438.1	196.1	495.1	545.5	555.4	539.6	642.6	702.9	693.6	736.0	922.0	939.6	996.0	
VQS_NW							68.4	63.6	49.3	71.5	71.8	69.7	63.3	74.3	79.3	97.5	97.3	107.0	116.9	103.6	110.7	141.7	150.3	161.5	
VQS_NCC							800.5	960.8	713.0	867.6	921.4	892.9	768.4	948.5	991.6	1008.7	1165.4	1239.6	1407.5	1355.8	1427.0	1623.2	1661.2	1789.6	
VQS_SCC							576.2	496.8	541.8	620.0	494.4	561.8	578.5	430.1	351.5	591.6	578.3	655.0	710.2	669.3	734.5	732.9	772.7	877.6	
VQS_CH							88.3	89.3	93.3	93.5	104.1	100.6	121.6	108.8	127.8	141.9	115.9	130.1	167.4	134.7	189.3	223.1	250.0	235.8	
VQS_SE							145.4	157.6	167.1	157.6	181.8	184.9	189.3	205.9	217.8	239.4	258.7	312.0	332.3	323.3	431.7	463.3	474.4	471.0	
VQS_MRD							1982.7	2281.0	2418.7	2539.2	3189.6	3634.1	3905.1	4643.3	4109.3	5112.1	5344.2	5979.9	6683.8	7149.7	7257.0	7998.4	7749.5	8628.7	

Table A-4. Data for REMEW-VIET (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VQM_RRD							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
VQM_NE							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
VQM_NW							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
VQM_NCC							178.6	221.6	211.8	238.5	255.3	254.7	318.4	355.4	233.0	389.6	391.8	391.6	495.6	389.6	572.1	575.8	617.9	647.0	
VQM_SCC							436.6	436.0	370.4	434.9	468.5	411.8	452.0	443.0	472.4	464.2	476.5	520.4	518.4	479.0	545.7	524.2	502.0	423.4	
VQM_CH							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	13.4	11.4	17.0	14.4	13.2	
VQM_SE							212.4	255.7	215.7	249.3	273.8	217.3	281.6	275.9	292.6	314.6	336.7	368.5	346.0	361.8	422.1	499.8	455.8	450.9	
VQM_MRD							2010.6	2093.8	1729.7	2460.2	3069.6	3204.5	3661.4	3831.1	4629.2	4504.0	5296.9	5603.5	5255.5	6269.3	7196.3	6999.6	6738.8	7420.6	
VQW_RRD							1300.6	1536.8	2050.0	1601.4	2001.6	1958.1	2432.1	2355.8	2814.6	1809.5	2521.6	2212.4	2481.2	2884.8	3203.7	3119.7	2950.6	3126.5	
VQW_NE							707.5	748.7	864.2	758.2	894.6	771.2	864.8	848.6	990.4	910.0	952.0	983.1	1052.1	1147.4	1257.7	1260.1	1311.2	1334.0	
VQW_NW							186.1	196.2	194.2	201.8	224.8	178.6	214.5	196.7	235.2	215.0	231.5	208.7	228.6	228.7	261.5	261.9	290.8	289.7	
VQW_NCC							526.4	490.4	543.1	381.1	388.5	493.1	548.6	464.7	603.7	514.9	584.5	404.6	591.6	568.3	635.3	624.2	686.6	703.4	
VQW_SCC							374.0	330.9	347.4	253.8	368.8	374.9	438.1	426.3	346.8	416.4	359.9	390.8	350.8	416.7	423.7	424.6	432.8	403.2	
VQW_CH							251.9	247.0	226.8	249.4	287.3	282.2	306.2	319.6	314.4	305.3	306.2	289.2	290.5	275.3	307.4	353.1	381.9	360.5	
VQW_SE							615.0	630.7	605.9	617.0	652.3	640.3	638.6	552.8	664.7	683.1	676.3	646.8	738.7	745.5	729.1	715.5	748.9	744.7	
VQW_MRD							2864.6	2702.0	2304.1	2610.2	2631.9	2640.1	2775.9	2466.3	2319.0	2500.3	2188.6	2234.4	1912.8	1894.1	1844.7	1696.0	1501.4	1424.8	
VQT_RRD							3439.1	3225.1	3283.0	3848.5	4167.0	4020.7	3454.4	4701.9	5556.6	4716.4	5292.5	5506.5	5821.5	6165.2	6568.8	6699.9	6419.4	6686.3	
VQT_NE							1174.8	1169.5	1174.3	1223.0	1381.4	1209.3	1060.9	1343.7	1535.9	1465.4	1491.6	1625.7	1755.0	1841.0	1993.7	2182.2	2250.8	2330.0	
VQT_NW							254.5	259.8	243.5	273.3	296.7	248.3	277.8	270.9	314.5	312.6	328.8	315.7	345.5	332.3	372.2	403.6	441.0	451.2	
VQT_NCC							1505.4	1672.7	1467.9	1487.3	1565.2	1640.7	1635.3	1768.6	1828.2	1913.2	2141.8	2035.8	2494.6	2313.7	2634.3	2823.3	2965.7	3140.0	
VQT_SCC							1386.8	1263.7	1259.7	1308.7	1331.7	1348.5	1468.6	1299.4	1170.7	1472.2	1414.7	1566.1	1579.4	1565.0	1703.9	1681.6	1707.5	1704.2	
VQT_CH							340.2	336.3	320.1	342.9	391.5	382.8	427.8	428.4	442.3	447.2	422.1	419.3	476.9	423.4	508.1	593.2	646.2	609.5	
VQT_SE							972.8	1044.0	988.6	1023.8	1108.0	1042.5	1109.5	1034.6	1175.1	1237.1	1271.7	1327.3	1416.9	1430.5	1582.9	1678.6	1679.1	1666.7	
VQT_MRD							6858.0	7076.9	6452.5	7609.6	8891.1	9478.7	10342.4	10940.7	11057.4	12116.4	12829.7	13817.8	13852.1	15313.1	16298.0	16693.9	15989.7	17474.0	
VQS							6267.3	6158.1	5526.3	7061.5	7615.3	7944.6	6844.5	9252.1	9164.8	10653.6	10870.4	12360.3	13461.1	13710.3	14251.2	15684.9	15466.5	16720.2	
VQM							2838.3	3007.1	2527.6	3382.8	4067.3	4088.3	4713.4	4905.4	5627.2	5672.4	6501.8	6883.9	6634.5	7513.1	8747.6	8616.3	8328.9	8955.0	
VQW							6826.1	6882.7	7135.7	6672.9	7449.9	7338.6	8218.8	7630.8	8288.9	7354.5	7820.7	7370.0	7646.3	8160.8	8663.2	8455.1	8304.1	8386.7	
VQ_000MT							15931.6	16047.9	15189.6	17117.2	19132.5	19371.5	19776.7	21788.3	23080.8	23680.5	25192.9	26614.3	27742.0	29384.2	31662.0	32756.4	32099.5	34061.9	
VQME000MT							10626.4	10703.9	10131.4	11417.2	12761.4	12920.8	13191.1	14532.8	15394.9	15794.9	16803.7	17751.7	18503.9	19599.3	21118.5	21848.5	21410.4	22719.3	
VSTCME1	564.0	-140.3	-423.7	276.6	-276.6	0.0	0.0	0.0	-309.0	628.7	0.0	-628.7	0.0	-244.7	351.5	343.3	784.7	98.1	-161.7	404.2	707.4	2223.3	1718.0	3486.6	
VEXPME	4.9	32.7	8.8	16.7	87.3	81.4	58.3	129.5	118.1	89.5	1392.9	1593.0	1013.3	1908.6	1689.1	1945.1	1950.0	2945.6	3612.7	3769.6	4556.1	3513.9	3760.5	3275.4	
VIMPME	245.2	197.6	11.8	193.2	41.2	315.8	329.7	473.3	316.3	195.7	54.1	1.9	6.1	1.7	0.7	0.0	10.8	0.0	0.0	1.3	5.3	0.0	2.6	40.4	
VQD							10897.8	11047.7	10638.7	10894.6	11422.6	11958.4	12183.9	12870.6	13355.1	13506.5	14079.8	14708.0	15052.9	15426.8	15860.3	16111.3	15934.5	15997.7	
VQC							182.02	180.79	170.35	170.96	176.68	181.14	181.19	188.03	191.76	190.70	195.56	201.05	202.58	204.45	207.06	207.53	202.51	200.66	
VFP	1360	1430	1940	2230	1700	1900	2200	6000	3700	3800	1700	2100	2100	1500	1400	1500									
VDFP											497	438	501	446	425	390	441	396	370	423	360	335			
VDRP											771	673	687	631	607	559	628	665	587	676	652	595			
VPOP			54.93	56.17	57.37	58.65	59.87	61.11	62.45	63.73	64.65	66.02	67.24	68.45	69.64	70.82	72.00	73.16	74.31	75.46	76.60	77.64	78.69	79.73	80.90
VGDP								599	2870	15420	28093	41955	76707	110532	140258	178534	228892	272036	313623	361016	399942	441646	481298	535762	605586
VNEXGI	2.18	2.18	2.18	2.18	3.07	10.12	70.23	71.42	80.00	584.77	4222.6	4966.3	9068.7	11149.4	10615.8	10952.9	11094.7	11005.5	11695.8	13260.7	13940.6	14164.1	14794.4	15269.0	15510.6

Table A-4. Data for REMEW-VIET (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VNCPIGI	0.100	0.105	0.118	0.141	0.188	0.316	0.667	2.300	10.800	51.100	100.00	136.40	249.20	343.10	372.00	406.60	475.72	502.72	518.86	556.56	579.47	569.56	567.10	588.82	607.16
VNGDPD	0.116	0.130	0.149	0.173	0.225	0.312	0.501	2.493	11.532	58.931	100.00	142.10	245.18	325.18	381.81	446.54	522.63	568.07	605.56	659.07	696.87	720.63	739.95	764.49	805.16
VNGDPRGI								6.989	7.243	7.676	8.036	8.446	8.949	9.723	10.508	11.437	12.525	13.701	14.904	15.770	16.530	17.523	18.454	19.321	20.236
VWP									182.8	249.3	253.2	202.0	223.8	217.2	192.1	219.1	290.6	275.6	246.6	250.2	210.2	167.0	149.0	170.7	178.0
VRPPD			0.48	0.82	0.77	1.84	2.12	28.80	82.15	431.2	327.3	549.7	1291	1094	1169	1352	1957	2031	1866	2109	2250	1853	1737	2002	
VRPME			0.74	1.05	1.28	3.1	4.01	54.47	155.4	815.5	619.1	947.6	2028	1742	1865	2195	3019	3074	2968	3491	3576	3010	3036	3307	
VETRRDJAN			27.3	30.1	38.4	30.5	28.8	21.0	29.3	22.0	31.5	22.9	19.5	43.6	27.4	12.9	38.4	22.2	29.4	29.3	37.1	38.9			
VETNEJAN			31.2	33.1	39.9	35.1	23.5	22.8	28.4	23.7	26.2	18.5	22.0	40.0	31.9	14.3	41.1	17.8	32.2	31.9	36.7	45.3			
VETNWJAN			25.9	37.9	47.3	43.1	31.4	24.7	33.8	25.0	32.3	18.9	24.8	45.8	39.9	15.8	58.5	27.8	39.5	31.8	45.5	56.9			
VETNCCJAN			48.7	50.5	66.4	62.7	45.0	31.7	50.0	36.9	50.3	42.0	37.4	58.8	54.6	30.6	68.0	38.8	41.8	42.5	63.0	67.2			
VETSCCJAN			84.1	85.4	86.3	78.9	78.6	73.5	79.0	79.8	77.8	89.4	86.9	76.8	82.6	81.2	83.5	76.5	85.6	92.1	82.8	87.4			
VETCHJAN			81.4	76.4	85.3	79.2	73.4	67.3	75.4	68.8	76.4	78.0	77.4	64.7	87.3	79.0	76.0	75.9	74.0	75.2	84.5	73.5			
VETSEJAN			69.5	76.4	78.3	77.8	74.3	71.3	61.7	72.4	75.5	65.1	68.8	54.7	79.9	61.1	67.3	73.5	69.6	76.3	75.1	82.9			
VETMRDJAN			83.4	60.8	70.4	92.6	62.8	87.2	82.0	69.2	59.5	55.8	59.0	86.0	40.9	76.9	43.0	68.3	86.0	87.3	86.2	61.3			
VETRRDFEB			21.3	29.3	36.3	23.3	33.1	19.5	23.9	29.0	22.2	38.4	15.0	38.8	34.7	17.2	31.5	19.3	27.9	29.8	18.1	32.1			
VETNEFEB			24.8	30.6	38.0	24.9	32.0	16.8	23.7	31.0	22.9	32.7	15.8	38.3	40.5	22.2	33.9	17.4	26.0	25.3	18.2	37.8			
VETNWFEB			25.3	37.6	44.5	28.5	35.1	17.5	24.7	35.2	22.0	37.6	15.6	52.4	49.8	25.3	43.0	19.9	35.4	31.7	21.7	46.1			
VETNCCFEB			35.3	37.5	63.4	42.5	53.4	27.1	32.7	39.0	35.6	50.7	19.2	59.3	46.4	30.9	42.2	29.7	39.6	43.9	42.2	37.8			
VETSCCFEB			67.8	56.9	84.3	73.4	76.0	62.5	46.5	64.7	77.5	70.1	56.0	81.4	74.8	70.5	64.1	60.6	59.6	69.1	94.0	70.6			
VETCHFEB			55.5	42.1	65.3	57.4	57.8	45.3	37.4	43.1	56.2	45.1	38.6	51.9	59.8	48.4	41.8	45.2	42.0	50.4	64.3	46.9			
VETSEFEB			42.5	40.3	45.8	51.5	41.5	43.2	33.2	40.9	41.1	35.9	36.7	30.3	46.4	36.9	36.2	42.7	38.0	36.0	45.6	46.4			
VETMRDFEB			54.3	54.4	53.5	65.4	59.9	52.2	49.0	55.5	63.2	52.1	55.3	49.3	74.8	56.9	58.6	63.2	55.2	57.3	65.9	74.0			
VETRRDMAR			40.2	38.6	51.3	37.0	41.9	22.7	34.1	34.4	48.7	56.2	30.4	36.5	43.2	47.3	39.6	31.9	54.4	50.7	32.4	45.0			
VETNEMAR			40.3	39.8	54.7	31.7	39.8	18.8	26.0	30.3	53.0	55.7	27.6	38.5	39.9	44.5	38.9	26.7	53.1	45.5	20.0	44.1			
VETNWMAR			42.2	39.0	52.6	32.3	47.4	16.9	37.2	34.0	52.4	72.4	28.2	51.0	43.3	43.0	36.9	27.1	62.6	61.4	23.8	43.6			
VETNCCMAR			42.8	50.2	74.8	65.0	72.4	26.7	50.1	45.4	57.0	81.4	36.3	55.2	45.5	64.8	50.2	39.4	76.9	72.1	52.2	53.2			
VETSCCMAR			42.3	41.5	53.7	51.9	64.5	39.8	42.4	51.0	48.4	62.8	42.8	53.9	44.7	59.4	48.0	47.5	73.8	58.2	52.3	51.1			
VETCHMAR			35.8	34.5	39.6	38.5	44.2	31.3	35.0	37.4	38.8	42.0	34.1	34.1	38.8	36.8	44.7	43.2	51.3	43.6	40.4	34.6			
VETSEMAR			34.1	28.9	28.9	36.0	31.7	25.6	26.4	29.8	28.2	36.4	26.9	21.6	36.6	35.2	30.0	26.7	39.1	29.4	31.3	30.4			
VETMRDMAR			47.5	41.6	34.2	52.6	60.6	34.0	34.5	40.7	43.1	54.3	38.5	25.4	71.7	46.4	46.1	42.2	61.1	42.9	52.3	48.6			
VETRRDAPR			82.7	70.6	92.7	72.4	84.2	76.2	52.1	63.5	78.0	85.3	55.6	60.7	76.5	60.5	64.2	53.7	79.3	74.8	64.3	73.7			
VETNEAPR			82.7	72.4	85.8	58.6	82.4	72.7	41.7	49.6	70.1	83.8	54.0	60.6	72.5	54.2	55.4	42.6	79.4	81.4	55.9	68.9			
VETNWAPR			82.6	67.1	74.4	67.0	91.9	82.9	50.1	42.8	60.8	95.3	44.2	54.6	66.0	52.1	39.6	58.3	93.1	75.4	60.4	72.5			
VETNCCAPR			88.2	47.7	82.5	78.2	93.1	73.8	55.8	60.0	79.4	88.0	32.3	42.0	61.2	54.8	52.6	57.0	94.9	61.5	74.5	91.4			
VETSCCAPR			54.2	34.0	49.1	46.8	54.6	50.3	47.5	56.4	62.8	52.8	35.7	42.5	56.6	43.9	52.4	40.0	78.1	42.8	47.3	52.6			
VETCHAPR			48.3	27.4	43.8	44.3	49.5	39.2	36.6	44.3	45.7	43.3	36.6	36.4	48.9	39.6	40.2	39.7	61.1	38.2	43.1	42.3			
VETSEAPR			35.5	35.3	26.5	34.1	34.3	27.4	29.2	37.5	27.1	35.4	31.2	26.7	36.2	25.7	27.8	26.9	37.1	27.0	32.0	45.0			
VETMRDAPR			40.7	56.5	26.1	55.6	51.9	30.7	34.8	50.7	41.2	51.6	36.4	28.9	51.1	49.7	33.3	40.5	45.6	25.7	46.7	64.5			
VETRRDMAY			106.7	119.8	110.2	110.2	116.0	115.4	125.1	115.9	118.6	116.7	59.3	86.4	115.9	107.2	97.8	110.6	134.8	105.5	87.3	114.9			
VETNEMAY			105.4	116.9	101.8	105.8	119.1	114.0	110.6	102.3	108.6	113.0	63.1	99.3	113.4	102.9	87.2	114.6	130.3	100.7	76.5	105.1			

Table A-4. Data for REMEW-VIET (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VETNWMAY			104.9	108.2	95.1	104.3	110.5	116.7	118.2	98.7	106.2	111.0	85.8	90.0	112.1	112.1	87.3	112.2	128.5	92.4	89.2	102.2			
VETNCCMAY			102.5	86.3	91.8	101.8	123.3	110.7	125.7	116.4	108.5	99.4	64.9	84.6	117.4	94.6	104.8	95.1	132.0	103.1	86.6	115.5			
VETSCCMAY			77.4	68.5	81.4	77.5	85.9	82.1	89.1	98.5	81.0	73.9	80.6	72.3	91.7	71.3	86.0	68.5	86.7	88.1	73.2	92.0			
VETCHMAY			81.4	63.7	85.6	73.1	82.0	81.6	101.4	99.3	91.3	82.8	93.0	75.7	81.5	74.1	91.7	64.8	80.0	95.3	78.3	97.3			
VETSEMAY			83.6	87.1	77.7	79.6	93.5	87.6	79.5	85.1	82.1	79.5	90.1	70.2	79.5	77.3	89.8	90.2	86.6	109.7	81.0	94.3			
VETMRDMAY			86.5	83.4	70.8	83.7	83.2	88.5	78.5	91.3	83.0	88.3	86.9	75.9	81.8	76.0	98.1	93.2	69.7	110.5	80.9	83.0			
VETRRDJUN			116.0	99.8	101.6	108.3	99.8	108.5	105.8	98.9	112.7	104.1	93.9	104.7	115.8	102.2	106.6	105.3	106.5	106.3	101.2	98.8			
VETNEJUN			119.0	101.1	104.1	108.5	103.9	109.6	105.5	104.0	115.2	110.6	97.2	107.6	119.5	107.3	111.1	112.6	106.9	109.1	112.5	103.4			
VETNWJUN			113.7	99.4	106.8	110.0	98.8	113.3	99.9	102.9	110.2	102.0	96.9	101.6	115.5	98.0	103.7	105.5	101.0	107.1	109.6	98.4			
VETNCCJUN			100.4	95.3	101.7	105.7	96.8	114.4	108.1	110.4	112.6	102.0	93.1	99.9	113.7	91.5	107.0	106.4	114.1	106.9	108.8	107.1			
VETSCCJUN			87.5	89.9	88.0	94.9	86.8	107.9	99.3	98.0	100.9	93.2	87.3	91.5	107.9	86.8	111.7	101.2	104.5	100.8	107.7	98.2			
VETCHJUN			85.0	95.7	97.6	93.7	85.3	109.1	100.8	98.3	97.7	90.3	84.9	94.2	115.1	86.8	109.3	105.0	105.8	102.9	103.1	96.3			
VETSEJUN			90.7	91.0	104.2	94.5	94.2	107.6	102.0	106.7	101.2	90.8	95.5	98.5	112.8	92.3	111.4	105.6	111.1	113.9	105.5	98.2			
VETMRDJUN			92.4	87.1	102.3	95.0	95.3	103.6	99.2	106.1	99.9	93.8	99.1	102.1	108.2	95.9	112.5	104.6	110.1	111.2	102.9	96.7			
VETRRDJLY			108.8	115.0	107.9	117.8	110.2	105.8	111.4	111.7	131.8	115.6	115.4	112.3	118.1	105.0	117.4	106.1	111.5	117.6	110.6	119.0			
VETNEJLY			110.7	120.0	120.4	118.1	120.1	108.5	120.1	110.2	135.4	117.8	117.9	116.1	113.3	109.0	122.1	108.0	113.6	114.8	116.4	123.1			
VETNWJLY			104.4	112.8	114.9	111.6	110.5	99.1	106.4	112.1	122.5	104.4	104.4	105.6	109.3	103.9	107.7	98.1	105.1	105.4	105.7	114.6			
VETNCCJLY			100.3	119.9	123.1	117.6	117.4	109.3	109.1	121.8	119.7	106.3	107.3	102.9	116.9	97.2	105.8	106.0	109.2	109.9	108.3	116.7			
VETSCCJLY			100.9	120.0	114.9	107.3	115.5	108.2	94.1	111.0	103.2	119.1	97.2	105.9	118.8	87.0	102.7	103.2	105.7	97.2	109.3	113.8			
VETCHJLY			93.2	111.2	110.5	101.5	105.9	101.9	98.5	106.5	93.4	114.7	87.7	101.9	111.5	80.0	97.8	99.1	101.0	102.8	100.4	104.8			
VETSEJLY			99.0	104.5	105.4	98.9	98.8	100.6	100.4	102.3	91.6	101.7	89.2	99.1	102.0	86.8	99.3	94.8	96.6	107.2	99.0	103.7			
VETMRDJLY			102.0	95.1	100.1	95.5	97.6	99.2	101.6	101.1	95.9	102.5	96.0	102.0	99.7	91.3	104.8	100.1	93.8	110.1	99.7	102.4			
VETRRDAUG			116.6	100.1	109.0	104.9	97.9	117.7	109.1	97.0	122.2	125.0	115.5	132.9	107.3	108.3	98.7	106.6	110.3	137.2	99.4	123.0			
VETNEAUG			118.5	101.9	111.9	110.4	103.6	123.7	107.4	96.6	124.5	122.8	116.9	139.0	110.8	111.9	102.7	108.7	110.4	137.5	98.8	128.0			
VETNWAUG			108.8	99.7	105.6	103.4	93.5	114.3	104.4	90.2	111.0	122.9	105.8	125.6	98.2	101.3	94.8	100.9	100.5	123.4	90.0	119.2			
VETNCCAUG			107.9	103.1	102.7	91.5	92.4	110.9	112.2	92.5	105.0	115.4	99.5	117.3	102.4	97.5	92.5	98.5	107.2	130.4	99.4	115.5			
VETSCCAUG			112.4	117.8	100.8	91.5	103.8	98.9	113.1	118.8	99.6	107.5	101.7	105.3	104.7	104.1	98.9	103.5	114.6	118.3	110.8	115.7			
VETCHAUG			105.7	119.0	94.5	86.0	104.5	97.7	115.1	110.1	94.2	105.6	100.1	101.5	100.3	102.9	95.5	104.0	108.2	112.0	108.6	111.3			
VETSEAUG			105.2	113.6	93.3	93.5	107.4	97.3	108.5	106.7	95.8	98.7	101.7	100.9	99.1	95.8	98.5	101.7	104.9	109.0	109.3	110.9			
VETMRDAUG			103.8	101.1	93.4	92.9	105.1	95.4	104.3	106.1	98.1	100.2	103.7	99.1	98.7	95.2	102.5	97.3	99.5	103.4	104.1	106.7			
VETRRDSEP			116.4	90.7	109.1	100.5	98.8	113.8	106.9	108.4	110.0	104.0	116.3	113.2	111.2	102.0	112.8	111.1	103.3	119.5	114.8	109.5			
VETNESEP			114.8	90.9	109.4	101.3	101.2	115.6	103.8	110.2	115.3	102.1	118.1	110.2	112.4	101.6	114.2	116.4	102.8	119.1	114.7	111.0			
VETNWSEP			115.4	91.2	107.3	100.8	97.5	108.3	103.6	100.1	107.4	106.9	107.6	107.2	104.0	97.0	106.1	109.2	102.7	120.5	108.4	105.4			
VETNCCSEP			110.3	91.1	111.4	101.6	93.1	113.1	104.0	104.2	108.5	104.6	111.6	106.2	103.4	95.3	102.2	96.8	104.5	110.5	107.9	106.2			
VETSCCSEP			104.3	94.7	107.4	101.6	85.6	108.7	96.4	97.4	102.7	95.8	98.4	101.0	91.1	95.0	78.7	86.2	96.8	99.9	107.8	101.2			
VETCHSEP			100.7	90.8	102.4	96.4	84.2	105.0	94.2	98.5	99.4	93.9	92.4	103.6	92.3	98.5	79.7	87.0	92.5	98.4	106.8	100.4			
VETSESEP			98.5	96.1	100.4	94.9	91.9	99.5	97.2	102.3	99.7	98.3	93.8	107.4	96.6	97.7	91.6	98.4	92.6	100.5	108.3	100.8			
VETMRDSEP			95.1	93.1	96.5	88.7	91.2	93.8	94.3	98.6	96.2	96.1	93.1	103.5	92.3	93.7	92.8	96.8	86.6	92.5	103.2	93.1			
VETRRDOCT			77.7	85.5	78.4	80.6	91.4	74.9	85.7	72.0	92.6	85.3	85.8	72.4	86.8	89.9	98.9	90.2	87.6	86.7	90.2	84.1			
VETNEOCT			76.6	87.8	79.3	80.8	97.2	81.4	90.1	78.3	92.9	91.5	82.3	81.3	90.2	94.7	98.3	103.1	94.0	81.5	92.2	87.5			

Table A-4. Data for REMEW-VIET (continued)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
VETNWOCT			81.9	93.3	84.8	86.1	99.5	85.7	96.6	79.9	89.5	87.3	92.4	85.5	88.1	100.1	99.0	97.7	98.6	95.9	93.9	92.3			
VETNCCOCT			91.7	102.0	91.8	96.5	106.3	90.4	106.3	82.6	99.8	93.3	105.0	89.1	94.0	103.1	104.0	101.2	106.3	103.1	96.1	92.6			
VETSCCOCT			96.2	112.8	86.8	95.8	102.0	93.9	111.5	79.3	89.4	89.8	99.1	87.5	86.6	94.7	92.1	94.3	109.2	105.7	96.1	84.1			
VETCHOCT			92.4	108.6	84.3	94.2	99.9	94.3	108.6	76.3	89.1	87.0	96.4	89.6	88.4	96.6	94.6	95.9	110.3	102.0	95.2	82.1			
VETSEOCT			92.8	103.0	84.7	94.0	96.1	93.5	104.3	85.7	89.6	88.7	95.6	90.7	88.7	98.1	101.2	102.1	111.0	99.0	96.9	83.6			
VETMRDOCT			89.9	97.6	86.0	91.3	92.4	89.8	100.4	88.0	89.4	91.6	95.2	89.3	89.0	94.9	100.7	101.4	105.8	95.9	95.9	81.1			
VETRRDNOV			47.6	57.2	69.1	61.2	49.3	57.6	47.6	62.2	65.6	61.0	59.7	42.4	46.7	59.5	62.3	50.9	45.0	39.1	58.5	54.2			
VETNENOV			49.4	57.9	69.6	67.2	57.4	62.4	51.1	66.1	64.3	65.2	60.2	54.7	56.1	66.5	64.5	62.7	49.8	35.4	64.8	67.1			
VETNWNOV			60.3	67.9	73.8	74.3	64.2	67.0	62.8	69.7	74.7	73.1	68.6	61.0	47.5	76.1	68.5	70.3	61.2	50.4	72.5	72.1			
VETNCCNOV			77.5	83.8	88.3	89.1	69.0	81.0	74.7	83.4	88.9	84.8	76.0	54.6	56.8	86.0	79.8	76.1	69.4	69.7	76.6	75.5			
VETSCCNOV			83.6	100.4	88.6	94.1	80.1	84.7	83.9	81.5	99.1	89.0	93.9	82.8	91.2	92.1	75.4	81.7	96.2	92.4	73.5	87.1			
VETCHNOV			83.7	103.8	88.3	98.0	79.6	87.8	82.7	85.6	100.8	91.6	100.9	89.4	98.8	100.1	81.0	86.2	99.4	97.1	77.0	92.8			
VETSENOV			83.7	104.8	91.4	102.0	83.3	92.0	87.9	94.0	106.2	97.2	107.8	96.3	102.2	107.8	93.6	96.3	100.3	101.1	85.6	99.4			
VETMRDNOV			78.7	97.5	92.9	98.7	79.7	87.9	90.6	92.0	98.9	96.6	106.9	93.1	92.6	103.4	92.7	96.2	95.6	99.3	85.1	98.3			
VETRRDDEC			41.9	47.6	41.9	34.6	35.7	40.1	41.6	34.3	37.3	44.7	41.5	41.7	27.6	47.7	41.9	31.9	28.1	29.7	47.8	31.4			
VETNEDEC			49.4	49.7	47.3	31.9	42.3	42.9	49.6	31.2	30.1	50.8	42.7	49.2	32.1	48.1	44.2	39.5	30.2	32.2	52.3	36.0			
VETNWDEC			52.4	57.0	57.9	43.4	47.1	52.0	48.0	36.6	33.5	48.2	51.9	52.0	23.3	60.4	56.5	52.9	29.7	36.8	56.0	32.6			
VETNCCDEC			57.9	69.8	64.2	60.7	44.3	67.3	51.6	48.6	54.9	63.5	58.0	53.3	33.7	70.4	62.8	49.5	42.5	47.1	66.6	42.0			
VETSCCDEC			67.6	86.5	72.9	72.7	73.7	82.0	69.2	68.4	87.4	76.6	78.1	74.4	65.0	77.6	67.5	68.5	80.5	71.9	69.0	78.7			
VETCHDEC			79.3	97.2	82.2	82.6	81.7	94.1	81.6	82.1	101.2	91.1	88.6	84.0	78.1	91.9	77.4	78.6	93.4	88.4	79.2	92.6			
VETSEDEC			96.0	97.6	90.5	89.6	88.9	97.3	93.3	96.7	101.2	94.3	82.4	88.3	87.4	92.6	92.5	84.9	100.7	97.1	85.8	99.3			
VETMRDDEC			99.5	101.2	96.1	92.2	89.9	97.9	91.0	99.2	100.6	98.5	91.1	90.5	88.5	95.3	99.2	83.9	101.8	95.6	81.9	96.3			

JIRCAS Working Report No.68 2010

Development of Supply and Demand Models of Rice in Lower Mekong River Basin Countries: REMEW-Mekong

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Published by
Japan International Research Center for Agricultural Sciences

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Tel. +81-29-838-6340 (Publications and Documentation Section)
Fax. +81-29-838-6656
http://www.jircas.affrc.go.jp/

JIRCAS Working Report No. 68
平成 22 年 3 月 19 日発行
発行者：独立行政法人　国際農林水産業研究センター
理事長　飯山　賢治
〒305-8686　茨城県つくば市大わし 1-1
TEL　029 (838) 6340（情報資料科）
FAX　029 (838) 6656
印　刷：朝日印刷株式会社つくば支社
〒305-0046　茨城県つくば市東2-11-15
TEL　029（851）1188
FAX　029（856）5009

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