

CHAPTER V

RISKS AND TREND ANALYSIS

This chapter will explore risks and analyze trends of yield, prices, costs, incomes, and gross margin in the future. Coefficients of variation will be used indicators of risks. Simple regression will be used for trend analysis of rice price, yields, income, and gross margin.

5.1 Risk and coefficient of variation

To understand risks in rice production variations in yields, prices cost, income, and gross margin of different rice varieties were explored. Rice prices, yields, costs, income, and gross margin over the past 6 years were examined and their estimates of coefficients of variation for different rice varieties, namely RD15, KDML105, and RD6.

Price of rice, both market price and government support price, are shown for the years 2000/2001 - 2005/2006 in Table 5.1. Coefficient of variation (CV) of rice price is also shown. It is shown that under government support price program, risks price are lower than under market prices for RD15 and KDML105. Using market prices, the rice which the highest price risk is KDML105 (CV=19.36%) although price risk of RD15 is also as high as KDML105 (CV=19.17%). Under market price, RD6 has the lowest coefficient of variation (CV=10.08%). Under government support price, rice with highest price risk is also KDML105 (CV=18.59%), while RD15 has second highest price risk (CV=15%), and RD6 has the lowest price risk (CV=12.31%).

Table 5.4 shows rice yield risk. RD15 has the highest yield risk with CV = 11.38 %, while RD6 is the lowest yield risk (CV = 7.37 %). KDML105 has also a low yield risk with CV = 7.73 %.

Cost of rice, both rainfed area and irrigated area are displayed for the year 2000/2001 – 2005/2006 in Table 5.3. Coefficient of variation (CV) of rice cost is also shown. It is shown that in rainfed area, cost risks are lower than in irrigated. RD15 cost risk is the highest in both rainfed area and irrigated area with coefficient of variation of CV = 22.26 and 30.67 % respectively. RD6 has the lowest cost risk with CV = 12.10 % in rainfed area, and in irrigated area CV = 14.93 %. KDML105 coefficient of variation in rainfed area is 20.77 %, and in irrigated area 21.42 %.

Considering gross margin under market price, rice with the highest gross margin risk is RD6 with coefficient of variation of CV = 33.84 % in rainfed area, and in irrigated area 30.38 %. RD15 coefficient of variation is 25.14 % in rainfed area, and in irrigated area 22.05 %. KDML105 has the lowest gross margin risk in rainfed area and in irrigated area with coefficient of variation of CV=18.90 and 15.85% respectively. Under government support price program, RD15 is the highest gross margin risk with coefficient of variation of CV = 28.31 % in rainfed area, and in irrigated area 24.38 %. KDML105 is the lowest gross margin risk irrigated with coefficient of variation 22.39 % and in rainfed area of 26.17%. RD6 has coefficient variation of 23.24 and 23.34% in rainfed area and irrigated area respectively (Table 5.4). In term of gross margin, RD6 has higher risk under market price than under government support price while RD15 have lower risk under market price than under government support price.

Table 5.1 Price and coefficient of variation of rice price

Year	Market price			Government support price		
	RD15	KDML105	RD6	RD15	KDML105	RD6
2000/01	8.460	8.460	5.202	5.014	6.495	5.748
2001/02	5.685	5.685	5.254	4.766	6.900	5.775
2002/03	5.727	5.728	5.927	5.064	6.667	5.775
2003/04	8.137	8.096	5.492	5.064	6.900	5.775
2004/05	8.692	8.765	5.898	6.400	8.900	7.100
2005/06	8.653	8.714	6.759	6.700	9.900	7.400
SD	1.449	1.466	0.580	0.825	1.418	0.771
\bar{X}	7.559	7.575	5.755	5.501	7.627	6.262
CV(%)	19.17	19.36	10.08	15.00	18.59	12.31

Source: Calculation

Table 5.2 Yield and coefficient of variation of rice yield

Year	Yield		
	RD15	KDML105	RD6
2000/01	644.33	545.22	542.00
2001/02	541.58	554.70	616.87
2002/03	489.63	495.14	533.60
2003/04	470.08	502.35	499.94
2004/05	521.00	445.00	530.00
2005/06	539.48	509.61	522.98
SD	60.800	39.325	39.859
\bar{X}	534.35	508.67	540.90
CV(%)	11.38	7.73	7.37

Source: Calculation

Table 5.3 Cost and coefficient of variation of rice cost

Year	Cost					
	RD15		KDML105		RD6	
	baht/rai					
	Rainfed area	Irrigated area	Rainfed area	Irrigated area	Rainfed area	Irrigated area
2000/01	1,547	1,271	1,392	1,521	1,980	2,022
2001/02	1,656	1,378	1,797	1,963	1,669	1,704
2002/03	1,136	945	1,523	1,521	1,556	1,589
2003/04	1,722	1,432	2,156	2,153	1,960	2,001
2004/05	1,867	1,533	2,235	2,442	2,078	2,122
2005/06	2,280	2,308	2,343	2,561	2,359	2,408
SD	1,708.47	1,486.76	1,907.56	1,963.92	1,848.69	1,974.17
\bar{X}	380.22	455.97	396.2	420.77	223.75	294.83
CV(%)	22.26	30.67	20.77	21.42	12.10	14.93

Source: Calculation

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Table 5.4 Gross margin and coefficient of variation for each rice variety, 2000/01 – 2005/06

Unit: baht

Item	Land type	Rice variety	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	\bar{X}	SD	CV (%)
Under market price	Rainfed area	RD15	1,356	1,196	1,462	1,822	2,329	2,045	1,695	426.05	25.14
		KDML105	1,447	1,094	1,077	1,573	1,340	1,728	1,376	260.09	18.90
		RD6	769	1,491	1,528	717	970	1,088	1,094	349.10	31.91
	Irrigated area	RD15	1,417	1,263	1,460	1,849	2,351	2,013	1,716	380.51	22.05
		KDML105	1,475	1,088	1,223	1,782	1,331	1,736	1,502	233.98	15.58
		RD6	848	1,595	1,631	794	1,060	1,190	1,186	360.31	30.38
Under government support price	Rainfed area	RD15	1,845	1,053	1,466	777	1,633	1,515	1,374	389.13	28.31
		KDML105	1,877	1,736	1,524	1,044	1,421	2,314	1,653	394.83	23.89
		RD6	1,261	2,037	1,650	1,044	1,838	1,668	1,583	368.01	23.24
	Irrigated area	RD15	2,264	1,446	1,767	1,172	2,114	1,459	1,695	413.18	24.38
		KDML105	1,886	1,719	1,655	1,182	1,369	2,293	1,747	391.15	22.39
		RD6	1,278	2,068	1,675	1,056	1,864	1,691	1,605	374.73	23.34

Source: Calculation

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From the above analysis, it appears that the rice variety with the highest yield risk, measured by coefficient of variation, is RD15 while the lowest yield risk is RD6. In term of price risks under market price and under government support price, the rice variety with the highest price risk is KDML105 while RD6 has the lowest price risk. In rainfed area and in irrigated area, the rice variety with the highest cost risk is RD15 while RD6 has the lowest cost risk. Considering gross margin under market price in both rainfed area and in irrigated area, the rice variety with the highest gross margin risk is RD6 while KDML105 has the lowest gross margin risk. Under government support price program, RD15 has the highest gross margin risk while KDML105 has the lowest gross margin risk. Since KDML105 has low yield risk and cost risk and the government gives priority to KDML105 rice, KDML105 has the low gross margin risk.

5.2 Trend Analysis

Simple regression was used for trend analysis. Table 5.5 shows regression result of market price as dependent variable. Year is independent variable the period 1994/95 to 2007/08. Market price shows an increasing trend with a coefficient of 0.22 against trend variable. At the significant level of 95%, market price of KDML105 will increase 0.222 baht/kg/year (R square = 33.9%). RD15 price also shows an increasing trend with $R^2 = 33.7\%$. RD6 market price also has an increasing trend with coefficient of 0.164 against trend variable at the significant level of 95%.

Table 5.5 Simple regression result using market price as dependent variable

Rice variety	Constant	Coefficient	R ²
RD15	-432.89**	0.220**	0.337
KDML105	-436.42**	0.222**	0.339
RD6	-323.01*	0.164**	0.285

(Baht/kg)

** Significant at 5%

* Significant at 10%

Source: Calculation

Under government support price, simple regression result is displayed in Table 5.6. Independent variable is year 2000/01 to 2007/08. The regression results show that the price increases with time with a higher R^2 . KDML105 price increases 0.426 baht/kg/year ($R^2 = 88.1\%$). RD15 price increases 0.452 baht/kg/year ($R^2 = 69.7\%$), and RD6 price increases 0.315 baht/kg/year ($R^2 = 85.2\%$). KDML105 price trends to increase at the fastest rate under government support price program.

Table 5.6 Simple regression result using support price as dependent variable

Rice variety	Constant	Coefficient	R^2
RD15	-848.28***	0.426***	0.881
KDML105	-896.83***	0.452***	0.697
RD6	-696.72***	0.351***	0.852

(Baht/kg)

*** Significant at 1%

Source: Calculation

In term of yields, the increase of yield through time is not demonstrated from the regression results (Table 5.7).

Table 5.7 Simple regression result using rice yield as dependent variable

Rice variety	Constant	Coefficient	R^2
RD15	-3409NS	1.964NS	0.042
KDML105	-5505NS	2.99NS	0.075
RD6	-9529NS	5.02NS	0.253

(Kg/rai)

NS = not significant

Note=Independent variable is year 1991/92 to 2005/06.

Source: Calculation

In term of trend analysis, under market price and government support price, KDML105 tends to be the highest rate of increase but RD6 tends to be the lowest rate of increase. As for rice yield, there seem to be no demonstrated increase through time from the regression results.

A summary of risk situation as presented by estimates of CV can be seen in table 5.8. Here risk can be categorized in to high, medium and low group. The medium market price risk group consists of RD15 and KDML105 while the low market price risk is RD6. Under government support price, the medium risk is also RD15 and KDML105. RD6 with government support price has low price risk. Classification by level of yield risk produces low yield risk in RD15, KDML105 and RD6. In term of cost risk, RD15, KDML105 and RD6 have medium cost risk in rainfed area while in irrigated area RD15 has high cost risk, KDML105 has medium cost risk, and RD6 has low cost risk. Considering gross margin risk under market price in rainfed area, rice with the high gross margin risks are RD15 and RD6, and the rice variety with medium gross margin risk is KDML105. In irrigated area, rice with the high gross margin risk is RD6, and the rice variety with medium gross margin risks are RD15 and KDML105. Under government support price, RD15 has high gross margin risk in rainfed area and medium in irrigated area while KDML105 and RD6 have medium gross margin risk in both rainfed area and irrigated area.

Table 5.8 Classification of level of price, yield, cost and gross margin risk in each rice variety

Risk item	RD15	KDML105	RD6
Price risk			
- Market price	Medium 19.17	Medium 19.36	Low 10.08
- Government support price	Medium 15.00	Medium 18.59	Low 12.31
Yield risk			
	Low 11.38	Low 7.73	Low 7.37
Cost risk			
- Rainfed area	Medium 22.26	Medium 20.77	Medium 12.10
- Irrigated area	High 30.67	Medium 21.42	Low 14.93
Gross margin risk			
- Rainfed area			
- Market price	High 25.14	Medium 18.90	High 31.91
- Government support price	High 28.31	Medium 23.89	Medium 23.24
- Irrigated area			
- Market price	Medium 22.05	Medium 15.58	High 30.38
- Government support price	Medium 24.38	Medium 22.39	Medium 23.34

Source: Calculation

Note: Low = $CV < 15\%$

Medium = $15\% \leq CV \leq 25\%$

High = $CV > 25\%$