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General Stochastic Dominance
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Strategies for Corn Producers

by

Larry Greenhall

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Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York, 14853

An Application of Ordinary and General Stochastic Dominance Criteria in Ordering Risky Marketing Strategies for Corn Producers

Larry Greenhall
Graduate Student
Cornell University
Department of Agricultural Economics

The widespread variability in farm prices during recent years has heightened the potential risks corn producers face. In an attempt to enlarge the farmer's control over the price he or she receives new and more complex marketing strategies have been developed. A skillfully implemented marketing strategy can augment the returns to a farmer's operation.[1]

Producers realize the potential gains from specific marketing techniques, but doubts arise about alternative strategies. Questions, such as which strategy generates the most net revenue and which is least risky, abound. Research has been conducted to answer such queries.

In the past mean-variance(E-V) analysis was the most common criterion used to rank risky marketing strategies for a particular producer. However, E-V analysis has several theoretical and empirical limitations. The purpose of this study is to contrast E-V analysis with a recently derived decision making technique called stochastic dominance. The oridnary and general forms of stochastic dominance will be discussed. The results of research in which corn marketing strategies were evaluated using stochastic dominance will be presented.

Mean-Variance Analysis

Mean-variance analysis or portfolio selection theory was formulated by Markowitz (1959). To use E-V either a quadratic utility function must be assumed or the probability distribution of the returns to the activity in question must be normal. If either assumption is validated, a quadratic program can be implemented to derive an efficient set of risky strategies that have minimum risk(variance) for given levels of expected return.

The applicability of the quadratic utility function has been denounced by Kenneth Arrow and John Hicks.[2] The quadratic function fails to meet the instinctive requirement of decreasing risk aversion with increasing wealth.

The assumption of a normal distribution of the returns of a risky marketing strategy is not realistic.[3] Corn prices and hence returns are not normally distributed or symmetric. The Farm Act of 1981 places a lower bound on the price of corn, reducing the probability of a low income event.

Ordinary Stochastic Dominance

In lieu of the restrictive characteristics of E-V analysis researchers developed an efficiency criterion which orders risky strategies given general restrictions on the decision makers preferences. Quirk and Saposnik(1962) and Fishburn(1964) were the first to elaborate and formalize the efficiency criterion labelled ordinary stochastic dominance.

The first formal efficiency criterion using ordinary stochastic dominance was first-degree stochastic dominance(FSD). The criterion rests on one of Bernoulli's more reasonable utility principles; more is preferred to less. This is nothing more than the assumption of a monotonically increasing utility function, wherein the first derivative is positive(i.e., $U^1(X)>0$).

To explain the stochastic dominance criteria, terminology needs to be introduced. Let f and g denote the probability distribution of returns (r_i) for two risky strategies, and let $F_1(R_i)$ and $G_1(R_i)$ be the respective cumulative distribution functions. Then

$$F_1(R) = \int_{r_1}^{r_2} f(r)dr \text{ for all } r.$$

Prospect f is said to dominate prospect g in the sense of FSD, if and only if $F_1(R) \leq G_1(R)$ for all possible R in the range of r_i with at least one strong inequality.

Second degree stochastic dominance(SSD) was formulated independently by Fishburn(1964), Hanoch and Levy(1969), and Hadar and Russell(1969). Second degree stochastic dominance eliminates dominated prospects from the FSD efficient set. The SSD criterion is based on the assumption that the decision maker is risk averse. This implies that the individual's utility function belongs to the class that exhibits positive but decreasing marginal utility(i.e., $U^1(X) >0$ and $U^{11}(X)<0$).

The SSD cumulative $F_2(R)$ for strategy f is defined as $F_2(R) = \int_{R_2}^{R_2} F_1(R)dR$ for all R. The distribution $F_2(R)$ is said to dominate $G_2(R)$, in the sense of SSD, if and only if $F_2(R) \leq G_2(R)$ for all possible R with at least one strong inequality.

Whitmore(1970) initiated the development of a further criterion called third-degree stochastic dominance(TSD). Third-degree stochastic dominance rests on the further assumption that the third derivative of the individual's utility function is everywhere positive.

(i.e., $U^{1}(X)>0, U^{11}(X)<0$, and $U^{111}(X)>0$). This assumption is a necessary, but not sufficient, condition to suggest that the individual displays decreasing absolute risk aversion as wealth increases.

The TSD cumulative function $F_3(R)$ is based on the area under the SSD cumulative function $F_2(R)$;

$$F_3(R) = \int_{R_1}^{R_2} F_2(R)dR \text{ for all } R$$

Risky prospect f dominates risky prospect g, in the sense of TSD, if and only if $F_3(R) \leq G_3(R)$ for all possible R with at least one strong inequality, and $F_3(M) \leq G_3(M)$, where M is the upper limit of the defined domain.

Hadar and Russel(1969) argue that the use of either FSD or SSD is superior to E-V analysis. The FSD and SSD conditions convey information which is more essential to the orderability of uncertain prospects than that obtained from the comparison of moments.[4]

Violations of the restrictions placed on an individual's utility function under FSD or SSD are a rare occurance. Most individuals have increasing utility and are risk averse.[5] The ordering conditions for TSD may be violated in more frequent cases.

The stochastic dominance criteria do not require elicitation of a decision maker's preferences. Only a specified set of conditions must be satisfied for the criteria to be effective.

The major reservations expressed concerning stochastic dominance is the lack of an optimizing algorithm. To assure the selection of the optimal portfolio of strategies a great number of prospect combinations must be tested.

General Stochastic Dominance

In 1977 Meyer developed an interesting extension of stochastic dominance criteria. Meyer's method, referred to as stochastic dominance with respect to a function(SD(k)), allows a researcher to perceive a decision maker's selection between a pair of risky prospects knowing only a lower and upper bound on his absolute measure of risk aversion.

Meyer incorporated Pratt's coefficient(r(x)) to deliniate the range of risk aversion. An optimal control program provides the procedure for determining the ordering between a particular pair of risky strategies for a given set of decision makers. Different groups of decision makers can be considered by varying the bounds of the absolute risk aversion coefficient($r_1(x)$,$r_2(x)$).

Comparison of Corn Marketing Strategies Using Stochastic Dominance Criteria

The stochastic dominance criteria of FSD, SSD, TSD, and SD(k) can be used by corn producers to order risky marketing strategies. To illustrate the value of these criteria corn marketing strategies will be ordered. Two sets of marketing strategies were analyzed. The first group included eleven prospects and was taken from Sogn, Vollmers, and Baatz (1981).[6] Returns to cash and hedging strategies were calculated for South Dakota farmers with the use of South Dakota cash prices and marketing costs. The strategies and their distributions of generated net returns are provided in Table I.

The second set of risky strategies evaluated was developed by Kenyon and Cooper(1980).[7] Kenyon and Cooper analyzed the performance of fifteen technical and fundamental pricing strategies instituted over the growing season for the 1970-1978 period. Returns were calculated for Virginia farmers using Virginia cash prices and marketing costs. The prospects and their distributions of generated net prices are provided in Table II.

The two sets of alternative marketing strategies were formulated into E-V, FSD, SSD, and TSD efficient sets. To facilitate the contrast of the four criteria, efficient frontiers were derived for the two groups of marketing strategies. The frontiers for the South Dakota and Virginia pricing strategies appear in figure 1 and 2, respectively.

The number of alternatives in each efficient set ordered from the marketing strategies are presented in Table III.

Table III

Number of Strategies in Each Efficient Set

Figure	Total Strategies	FSD	SSD	TSD	E-V
1	11	8	5	4	4
2	15	6	1		2

TABLE I

Corn Marketing Strategies and Their Net Returns from 1972-77
Analyzed by Sogn, Vollmers, and Baatz.

Strategy*	Distribution of Net Returns						Average Return	Variance
1	$1.03	1.87	3.27	2.27	2.40	1.64	$2.08	$ .4761
2	1.135	2.195	2.54	2.155	2.43	1.80	2.04	.2209
3	2.145	3.015	2.665	2.325	1.235	1.35	2.125	.4225
4	1.22	2.11	2.075	2.325	2.21	1.70	1.94	.1444
5	1.58	2.495	2.49	2.36	1.76	1.685	2.06	.1521
6	1.205	2.23	2.315	2.29	2.20	1.815	2.025	.1600
7	.93	1.445	2.485	2.11	2.55	2.175	1.95	.3364
8	1.055	1.445	2.79	2.18	2.57	2.43	2.075	.3844
9	.995	1.965	3.005	2.315	2.445	1.795	2.085	.3844
10	1.12	1.945	3.29	2.385	2.47	2.06	2.21	.4225
11	1.145	1.855	3.545	2.34	2.425	1.92	2.205	.5329

*Strategy	Description
1	Sell all crop at harvest, first week in Nov.
2	Short term storage, sell all last week in Jan.
3	Long term storage, sell all in mid-August.
4	Multiple sales at harvest and after storage, sell 1/3 of crop 1st week in Nov., 1/3 last week in Jan., 1/3 last week in June.
5	Multiple sales after extended storage, sell 1/3 of crop last week in April, 1/3 last week in June, 1/3 mid-August.
6	Multiple sales after short-term storage, sell 1/4 of crop last week in Jan. 1/4 mid-March, 1/4 last week in April, 1/4 last week in June.
7	Early forward selling, sell Dec. futures 1/3 last week in April, 1/3 last week in June, 1/3 1st week in Nov.; Then sell cash corn and close futures contracts.
8	Early forward selling with a roll ahead, same as strategy 7 except during the 1st week in Nov. buy back Dec. futures and sell a later contract.
9	Late forward selling, sell Dec. futures, 1/3 last week in June, 1/3 mid-August, 1/3 1st week in Nov.; Then sell cash corn and close contract.
10	Late forward selling with a roll ahead, same as strategy 9, except during the 1st week of Nov. buy back Dec. futures and sell a later contract.
11	Hedging the stored crop, all the first week in Nov.

TABLE II

Corn Marketing Strategies and Their Net Returns from 1973-78
Analyzed by Kenyon and Cooper

Strategy*	Distribution of Net Returns						Average Return	Variance
1	$2.38	3.08	2.83	2.42	1.81	2.03	$2.41	$ .1936
2	1.28	2.17	2.32	2.35	2.44	2.37	2.15	.16
3	1.28	2.17	2.32	2.35	2.44	2.48	2.17	.1681
4	1.44	2.13	2.32	2.32	2.38	2.49	2.18	.1225
5	1.67	2.00	2.34	2.47	2.20	2.49	2.19	.0841
6	1.98	2.67	2.43	2.46	1.93	2.15	2.27	.0729
7	2.08	2.71	2.52	2.48	1.85	2.23	2.31	.0841
8	2.08	2.71	2.49	2.46	1.81	2.23	2.30	.09
9	2.14	2.90	2.59	2.56	1.81	2.15	2.36	.1296
10	2.19	2.83	2.55	2.54	1.89	2.26	2.38	.09
11	2.21	2.88	2.55	2.52	1.89	2.26	2.38	.0961
12	2.03	2.69	2.80	2.51	1.88	2.09	2.33	.1225
13	2.57	2.78	2.67	2.15	2.32	2.28	2.46	.0529
14	2.57	2.78	2.75	2.15	1.94	2.05	2.37	.1156
15	2.67	2.82	2.73	2.29	2.19	2.34	2.51	.0576

*Strategy	Description
1	Cash sale at harvest.
2	Routine hedge.
3	Hedge if future price ≥ cash price plus basis.
4	Hedge if future price ≥ cash price plus basis and 4 day < 10 day moving average.
5	Same as strategy 4 but price after June 1st.
6	Hedge 1/4 each month when future price ≥ cash price plus basis.
7	Hedge 1/4 each month when futures price ≥ predicted futures price.
8	Same as strategy 7 but 1/4 of crop must be priced by months end (no carryover).
9	Hedge 1/4 each month when futures price ≥ predicted futures price plus the standard deviation of predicted price.
10	Hedge 1/4 each month if 4 day < 10 day moving average.
11	Same as strategy 10 but no carryover.
12	Price by scaling up asking price.
13	Use 4 day < 10 day moving average, place and lift starting April 15th.
14	Same as strategy 4 but place and lift starting April 15th.
15	Price using 4 day < 10 day moving average after June 1st.

FIGURE 1 F-V, FSD, SSD, and TSD Efficient Sets - Returns from Marketing Strategies (From Sogn, Vollmers, and Baatz (South Dakota, 1981))

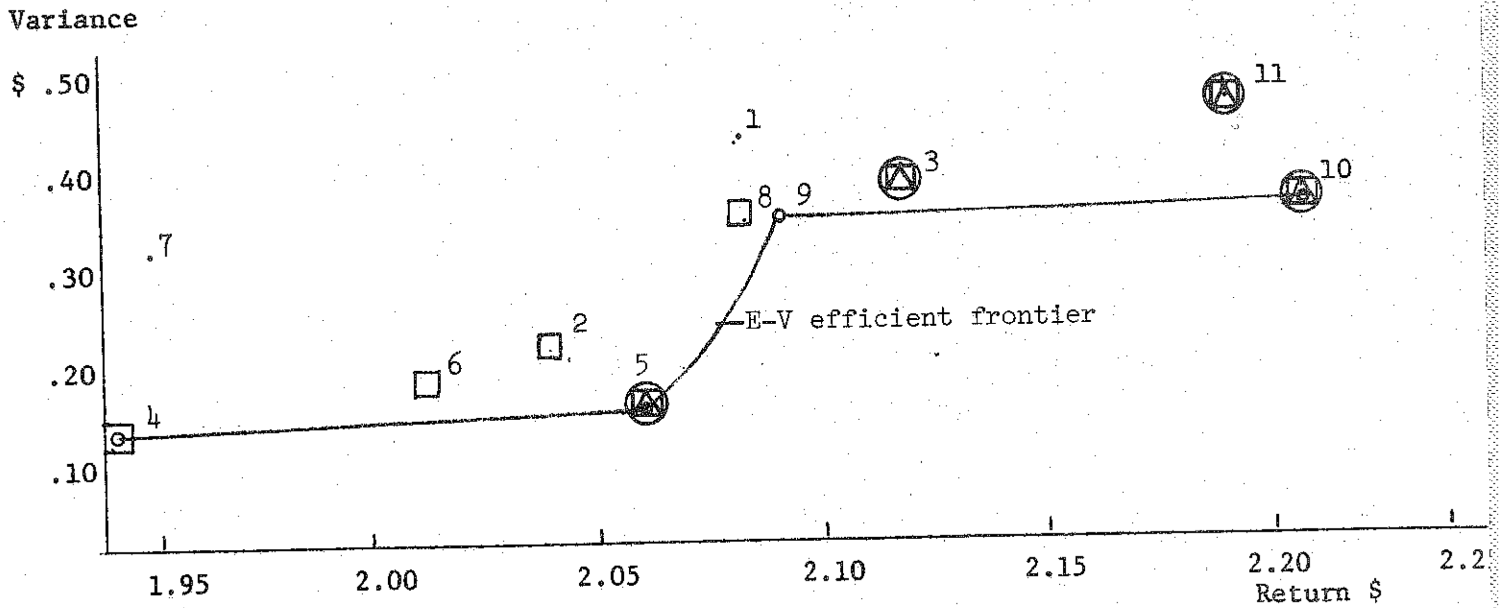
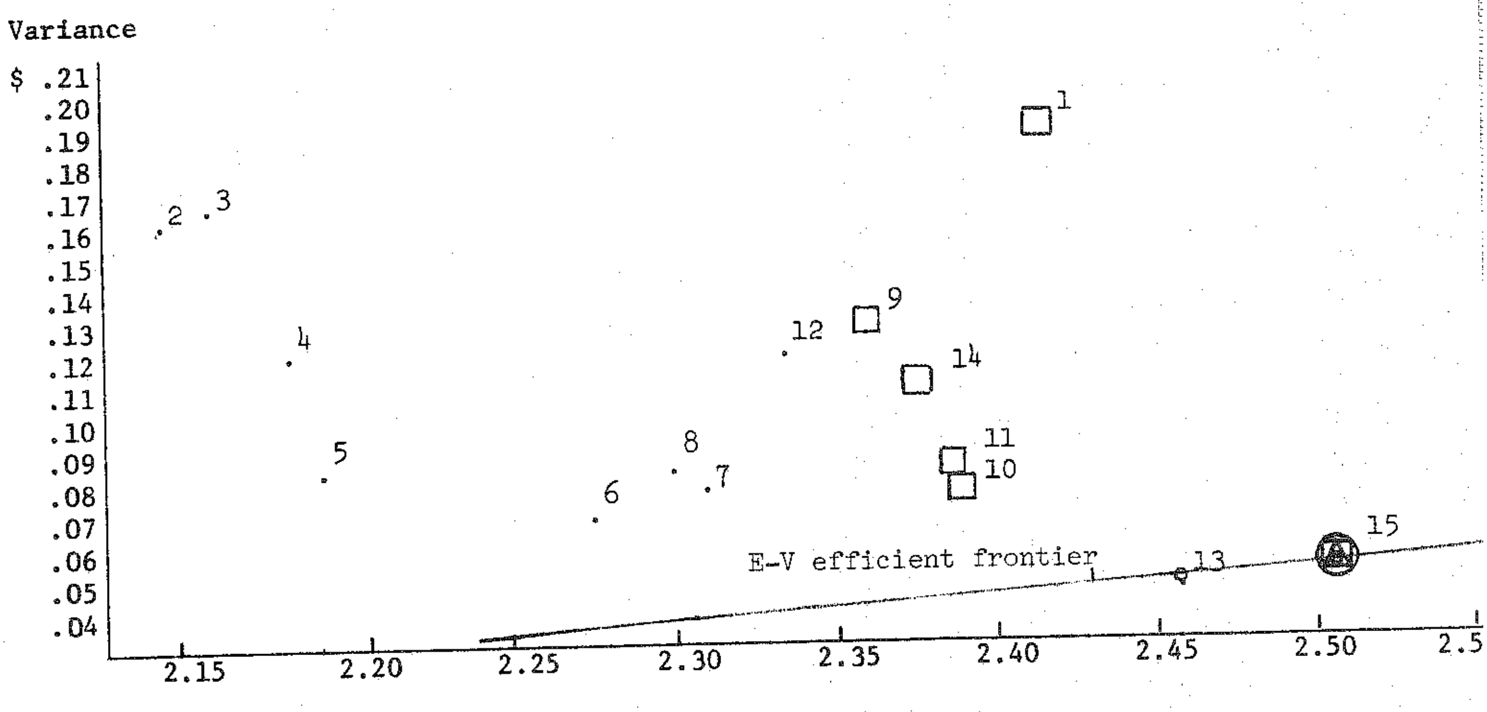


FIGURE 2 F-V, FSD, SSD, and TSD Efficient Sets - Returns from Marketing Strategies (From Kenyon and Cooper (Virginia, 1980))



KEY

o = E-V

□ = FSD

△ = SSD

○ = TSD

These results confirm several expectations concerning stochastic dominance and E-V analysis. First, the FSD criterion is relatively ineffective in reducing the original sample to a manageable set. Second, in both studies the E-V efficient set contained strategies that were eliminated by SSD. Under SSD, a South Dakota corn farmer would select strategy 6, 3, or 11 before selecting E-V efficient strategy 4 or 9. In Virginia strategy 15 is the optimal pricing technique under SSD, while both strategy 13 and 15 were E-V efficient. It is evident that the E-V criterion can err in ordering risky prospects for risk averse individuals. Finally, in some instances the E-V efficient set may be smaller than the SSD group but the SSD criterion must still be preferred. Second degree stochastic dominance eliminates a suitable number of risky strategies to facilitate evaluation and does not possess the limitations inherent to E-V analysis.

Meyer's SD(k) criterion can be used to order risky prospects for groups of decision makers defined by upper and lower bounds on their risk preference coefficient r(x). In this study four intervals of risk coefficients($r_1(x)$, $_2(x)$) were used to evaluate the two sets of corn marketing strategies. The intervals of risk coefficients($r_1(x)$,$r_2(x)$ were subjectively set at (-.1,0), (0,.05), (.05,1), and (1,2). A computer program was incorporated to make multiple comparisons of the probability distribution of returns from the strategies using SD(k) for each of the four intervals of risk coefficients (r(x),$r_2(x)$).[8] The results generated from the Sogn, Vollmers, and Baatz study and the Kenyon and Cooper paper are displayed in Tables A and B, respectively.

A decision maker whose risk preference coefficient falls between -.1 and 0 would display risk loving tendencies(i.e. $U^1(x)>0, U^{11}(x)>0$). A risk preference coefficient above zero would indicate a risk averse individual(i.e., $U^1(X)>0$, $U^{11}(X)<0$). The more positive the risk coefficient the stronger is the decision makers aversion toward risk.

The results of the multiple comparisons made using SD(k) under different levels of risk preference can be illustrated by scrutinizing Table A. For example, Table A.1. shows the dominating strategies chosen for a risk loving individual. Strategy 10 (sell December futures, 1/3 last week in June, 1/3 mid-August, and 1/3 first week in November;

TABLE A

Stochastic Dominance With Respect to a Function Comparisons of Corn Marketing Strategies Under Different Preferences Toward Risk. These Strategies were reported in Sogn, Vollmers, and Baatz (1981).

1.) $-1 \leq r(x) \leq 0$

strategy	1	2	3	4	5	6	7	8	9	10	11
1		-1	1	-1	-1	-1	-1	-1	1	1	1
2	1		1	-1	1	-1	-1	1	1	1	1
3	-1	-1		-1	-1	-1	-1	-1	-1	1	1
4	1	1	1		1	1	1	1	1	1	1
5	1	-1	1	-1		-1	-1	1	1	1	1
6	1	1	1	-1	1		-1	1	1	1	1
7	1	1	1	-1	1	1		1	1	1	1
8	1	-1	1	-1	-1	-1	-1		1	1	1
9	-1	-1	1	-1	-1	-1	-1	-1		1	1
10	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1
11	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	

2.) $0 \leq r(x) \leq .05$

strategy	1	2	3	4	5	6	7	8	9	10	11
1		-1	1	-1	-1	-1	-1	0	1	1	1
2	1		1	-1	1	-1	-1	1	1	1	1
3	-1	-1		-1	-1	-1	-1	-1	-1	1	1
4	1	1	1		1	1	1	1	1	1	1
5	1	-1	1	-1		-1	-1	1	1	1	1
6	1	1	1	-1	1		-1	1	1	1	1
7	1	1	1	-1	1	1		1	1	1	1
8	0	-1	1	-1	-1	-1	-1		1	1	1
9	-1	-1	1	-1	-1	-1	-1	-1		1	1
10	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1
11	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	

3.) $.05 \leq r(x) \leq 1$

strategy	1	2	3	4	5	6	7	8	9	10	11
1		0	1	0	0	0	-1	0	1	1	1
2	0		0	-1	1	0	-1	0	0	1	1
3	-1	0		-1	0	0	-1	-1	-1	1	1
4	0	1	1		1	1	0	1	1	1	1
5	0	-1	0	-1		-1	-1	0	0	1	0
6	0	0	0	-1	1		-1	0	0	1	1
7	1	1	1	0	1	1		1	1	1	1
8	0	0	1	-1	0	0	-1		0	1	1
9	-1	0	1	-1	0	0	-1	0		1	1
10	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1
11	-1	-1	-1	-1	0	-1	-1	-1	-1	1	

4.) $1 \leq r(x) \leq 2$

strategy	1	2	3	4	5	6	7	8	9	10	11
1		1	1	1	1	1	-1	0	1	1	1
2	-1		0	-1	1	1	-1	-1	-1	1	1
3	-1	0		0	1	1	-1	-1	-1	1	1
4	-1	1	0		1	1	-1	0	0	1	1
5	-1	-1	-1	-1		-1	-1	-1	-1	0	-1
6	-1	-1	-1	-1	1		-1	-1	-1	0	0
7	1	1	1	1	1	1		1	1	1	1
8	0	1	1	0	1	1	-1		0	1	1
9	-1	1	1	0	1	1	-1	0		1	1
10	-1	-1	-1	-1	0	0	-1	-1	-1		-1
11	-1	-1	-1	-1	1	0	-1	-1	-1	1	

KEY
0 indifferent between horizontal and verticle strategy
1 horizontal strategy dominates verticle strategy
-1 horizontal strategy does not dominate verticle strategy

TABLE B

Stochastic Dominance With Respect to a Function
Comparisons of Corn Marketing Strategies
Under Different Preferences Toward Risk.
These Strategies were reported in Kenyon and Cooper (1980).

1.) $-1 \leq r(x) \leq 0$

strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
2	1		-1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	-1		1	1	1	1	1	1	1	1	1	1	1	1
4	1	-1	-1		1	1	1	1	1	1	1	1	1	1	1
5	1	-1	-1	-1		1	1	1	1	1	1	1	1	1	1
6	1	-1	-1	-1	-1		1	1	1	1	1	1	1	1	1
7	1	-1	-1	-1	-1	-1		-1	1	1	1	1	1	1	1
8	1	-1	-1	-1	-1	-1	1		1	1	1	1	1	1	1
9	1	-1	-1	-1	-1	-1	-1	-1		1	1	-1	1	1	1
10	1	-1	-1	-1	-1	-1	-1	-1	-1		1	-1	1	-1	1
11	1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1	-1	1
12	1	-1	-1	-1	-1	-1	-1	-1	1	1	1		1	1	1
13	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1
14	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1		1
15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

2.) $0 \leq r(x) \leq .09$

strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
2	1		1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	-1		1	1	1	1	1	1	1	1	1	1	1	1
4	1	-1	-1		1	1	1	1	1	1	1	1	1	1	1
5	1	-1	-1	-1		1	1	1	1	1	1	1	1	1	1
6	1	-1	-1	-1	-1		1	1	1	1	1	1	1	1	1
7	1	-1	-1	-1	-1	-1		-1	1	1	1	1	1	1	1
8	1	-1	-1	-1	-1	-1	1		1	1	1	1	1	1	1
9	1	-1	-1	-1	-1	-1	-1	-1		1	1	-1	1	1	1
10	1	-1	-1	-1	-1	-1	-1	-1	-1		1	-1	1	-1	1
11	1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1	-1	1
12	1	-1	-1	-1	-1	-1	-1	-1	1	1	1		1	1	1
13	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1
14	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1		1
15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

3.) $.05 \leq r(x) \leq 1$

strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		-1	-1	-1	-1	-1	-1	-1	-1	0	0	-1	1	-1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	-1		1	1	1	1	1	1	1	1	1	1	1	1
4	1	-1	-1		1	1	1	1	1	1	1	1	1	1	1
5	1	-1	-1	-1		1	1	1	1	1	1	1	1	1	1
6	1	-1	-1	-1	-1		1	1	1	1	1	1	1	1	1
7	1	-1	-1	-1	-1	-1		-1	1	1	1	1	1	1	1
8	1	-1	-1	-1	-1	-1	1		1	1	1	1	1	1	1
9	1	-1	-1	-1	-1	-1	-1	-1		1	1	-1	1	1	1
10	0	-1	-1	-1	-1	-1	-1	-1	-1		1	-1	1	-1	1
11	0	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1	-1	1
12	1	-1	-1	-1	-1	-1	-1	-1	1	1	1		1	1	1
13	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1
14	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1		1
15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

4.) $1 \leq r(x) \leq 2$

strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1	0	1
2	1		1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	-1		1	1	1	1	1	1	1	1	1	1	1	1
4	1	-1	-1		1	1	1	1	1	1	1	1	1	1	1
5	1	-1	-1	-1		1	1	1	1	1	1	1	1	1	1
6	1	-1	-1	-1	-1		1	1	1	1	1	1	1	1	1
7	1	-1	-1	-1	-1	-1		-1	1	1	1	0	1	1	1
8	1	-1	-1	-1	-1	-1	-1		1	1	1	1	1	1	1
9	1	-1	-1	-1	-1	-1	-1	-1		1	1	-1	1	1	1
10	-1	-1	-1	-1	-1	-1	-1	-1	-1		1	-1	1	-1	1
11	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1	-1	1
12	1	-1	-1	-1	-1	-1	0	-1	1	1	1		1	1	1
13	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	1
14	0	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1		1
15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

Key
0 indifferent between horizontal and verticle strategy
1 horizontal strategy dominates verticle strategy
-1 horizontal strategy does not dominate verticle strategy

then buy back December futures and sell a later contract) is the favored prospect for South Dakota corn producers displaying a risk coefficient less than 1. Individuals with a level of risk aversion between 1 and 2 (Table A.4.) would be indifferent between strategy 10 and strategy 5(after extended storage, sell 1/3 of crop last week in April, 1/3 last week in June, and 1/3 in mid-August). As the group of decision makers becomes more risk averse, a shift occurs from a preference of high returns - high variance (strategy 10) to a strategy with lower returns - lower variance (strategy 5). In the Kenyon and Cooper set of Virginia pricing techniques strategy 15 (place and lift hedges using a 4 day<10 day moving average after June 1st) is preferred throughout the tested risk aversion intervals.

The SD(k) criterion appears to be a more flexible and stronger test of dominance than SSD and E-V. The ability to shift the risk coefficient interval to any level and size enables a decision maker to accurately select an efficient set of risky strategies. As more research is performed using SD(k) its value and acknowledgement as a decision making tool will expand.

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*The author is currently a candidate for the M.S. degree at Cornell University. He is an agricultural finance major with a minor in marketing. In 1981 he received a B.S. degree in agricultural economics from Cook College/Rutgers University. His interests are in commodity futures, hedging programs, and grain merchandising.

Footnotes

[1]A. Sogn, A. C. Vollmers, and F. Baatz, "Alternative Marketing Strategies for Corn and Soybeans," (Brookings, S. Dakota, S. Dakota State University, Agr. Exp. Station, 1981), pp. 3.

[2]S. C. Tsiang, "The Rationale of the Mean-Standard Deviation Analysis, Skewness Preference, and the Demand for Money," The American Economic Review, LXII, no. 3 (June, 1972), p. 354.

[3]R. Kramer and R. Pope, "Participation in Farm Commodity Programs: A Stochastic Dominance Analysis," American Journal of Agricultural Economics, 63(1981), p. 120.

[4]J. Hadar and W. R. Russell, "Rules for Ordering Uncertain Prospects," The American Economic Review, LIX no. 1 (March, 1969), p.25.

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[6]A. Sogn, A. C. Vollmers, and F. Baatz, pp. 1-23.

[7]D. Kenyon and C. Cooper, "Fundamental and Technical Pre-Harvest Corn Pricing Strategies for Virginia Farmers," (Blacksburg, Virginia, Virginia Polytechnic and State University, Research Division Bulletin 57, August, 1980) pp. 1-45.

[8]R. P. King and L. J. Robison, "Implementation of the Interval Approach to the Measurement of Decision Maker Preference," (East Lansing, Mich., Agr. Econ. Report 418, Dept. of Agr. Econ. Michigan State University, 1981), p. 26.

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