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**STOCK INVESTMENT AS A VALUE ADDED ALTERNATIVE**

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## STOCK INVESTMENT AS A VALUE ADDED ALTERNATIVE

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The term value added has become a commonly used expression in the agribusiness industry, where methods are routinely sought that add value to traditional farm products. One definition of value is that of added expected return and/or reduced risk. Results of this study suggest that investing in public stock is a reasonable alternative to traditional value added approaches.

### Introduction

*Value added* is a popular phrase in today's agricultural industry. The term value added is generally used to describe activities targeted at producers' obtaining a larger portion of the consumer's food dollar.

Value added activities involve increasing the sales value of a commodity or product, in many cases though not necessarily, by owning it beyond the commodity stage. Examples of farm-level value added activities include the production of high oil content corn, hard white wheat, organically grown crops, and leaner animals. Retained ownership of bulk commodities through processing stages is another common method often considered for enhancing profitability, such as ownership of milling facilities or ethanol production facilities. With this in mind, numerous selected membership or closed cooperatives have emerged that engage in value added processing. Producers often consider forward vertical integration through investment in cooperatives as an important method for adding value beyond the farm gate.

Interest in value added activities has risen due in part to the continual widening of the farm-to-retail spread. Some producers believe that since the margin between farm and retail values continues growing larger and farm prices remain relatively low, then processors and manufacturers are making excess profits. For them, value added activity is seen as one way to capture a portion of those excess profits.

An alternative way to define value is that of increasing expected return and/or reducing risk. Brealey and Myers note that a complete understanding of the risk and return relationship still does not exist. One of the major theoretical finance questions remaining with risk and return concerns the idea of whether or not risk can be *hedged* through investment in the value chain. Brealey and Myers discuss the idea that it is appropriate for people with different tastes to hold different portfolios. Thus, holding different portfolios allows individuals to hedge their individual needs with investments in appropriate assets. Little research has examined the concept of hedging risk

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by vertically integrating through stock investment. The objective of this study is to examine the risk and return relationships between agricultural commodities and stock investment. Specifically, the study will examine correlations of returns to determine whether financial risk for agricultural producers can be reduced by stock investment in the value chain.

### **Alternative Value Added Approaches**

An alternative investment approach for producers wanting to enhance profits through value added activities is investment in one or more publicly traded companies. Here, value is defined as added expected return and/or reduced risk. Using a portfolio stock investment approach with publicly traded firms provides a more liquid method for a producer to retain ownership of commodities and to link a farm operation to downstream processing and marketing activities than an equity investment in a cooperative for building and equipment investment. This alternative type of investment involves the purchase of publicly traded stocks in one or more firms that purchase, process, and/or market the raw commodity(ies) the producer produces. This method of investment allows producers to vertically integrate backwards as well as forward by purchasing stock in companies associated with inputs used in the farmer's operation. This backwards vertical integration allows the producer to participate in the profits achieved by input suppliers in the same manner as available with forward vertical integration value added investment in processing and marketing firms.

Siebert, Jones, and Sporleder note that the purchase of stock in publicly traded agribusiness firms offers producers several advantages over equity investment in a cooperative with value added intentions. Investment in publicly traded firms does not require purchasing facilities and equipment, hiring new employees or management, developing new products, or targeting and acquiring new customers. With the exception of the stock price, this type of investment eliminates many of the costs associated with vertical integration. Additionally, the time required for managing a stock portfolio may be less than that needed for extending an individual farm into value added activities or for participating in the governance of a cooperative. Consequently, some control or influence on processing and marketing activities may also be less.

Siebert, Jones, and Sporleder also suggest that the risks associated with the purchase of stock in public firms is buffered by several factors. First, producers have the ability to diversify their investments by investing in more than one company. Second, producers can diversify their investment dollars and spread risk by purchasing stock in companies operating in a large number of finished product markets and/or companies operating in a large number of regions or countries. Finally, the high liquidity offered by investment in publicly traded stocks also serves to absorb risk. An additional advantage of a portfolio stock investment approach is that it allows producers the flexibility to design portfolios specifically customized for their operations, their risk preferences, and their tastes.

As noted, one of the motivations for value added cooperative investments is that market power might persist at levels before and after the farm gate. If firms have market power, input suppliers are able to charge prices above the competitive level, while output demanders are able to pay prices below the competitive level. The ability to exert market power leads these firms to realize

returns above those that would be competitively determined. Thus, the ability to retain ownership of agricultural production or obtain ownership before the farm gate would lead to enhanced returns for the farmer.

At least two mechanisms exist for retained ownership beyond the farm gate. The first is the purchase of shares in corporate enterprises involved in the food industry. As with most decisions, there are advantages and disadvantages associated with this. The main advantage is that the purchase can be made individually by the farmer without coordination with other farmers. The main disadvantage is that if the market has already recognized a firm has market power, the monopoly profits would already be bid into the stock price and a farmer would not benefit from those returns. The second mechanism for retained ownership is the investment in a value added business, for example a cooperative. The advantage to this mechanism is that if excess profits exist in an industry, this type of investment will allow the participants to obtain those profits. The disadvantage is that a large amount of coordination needs to be done to make this type of investment work. Caution should be taken if market power exists; existing firms will not likely allow additional investment to take place without a market response. In the case of Snapple® which was purchased by Quaker Oats, other soft drink manufacturers did not allow the continued entry of Snapple® into the market without a competitive response. As such, Quaker Oats lost \$1.4 billion dollars on that investment.

### **Historical Stock Returns**

Examining the historical returns of various agriculturally related companies provides an understanding of earnings of those firms compared to earnings in the farm sector.

It is important to recognize that the average rate of return on equity for Kansas Farm Management Association (KFMA) farms from 1973 through 1997 was 4.7%.<sup>1</sup> However, it is important to recognize that these earnings are highly variable among farmers with many farmers earning much more. This again makes the case for a farm to keep detailed records on the rate of return to equity so that it is able to make a comparison of the farm's profitability with nonfarm investments.

The average return for the S&P 500 from 1973 through 1997 was 13.1%. It is important to note that the risk characteristics of the investment streams also need to be considered. Featherstone and Daniel found that an optimal investment portfolio which considers risk contained farm investment along with stock investment. As indicated by Table 1, several agriculturally related firms have had higher returns than the S&P 500 over the last 25 years. These include Hormel, Smithfield Foods, Pioneer Hi-Bred, Monsanto, Albertson's, Kroger, Winn Dixie, ConAgra, General Mills, Kellogg's, Quaker Oats, Eli Lilly, Pfizer, Seaboard, and ADM. Other companies also have offered returns in excess of the S&P 500, but information about these firms is not publicly available for the entire 25-year period. Figure 1 compares the annual returns of several

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<sup>1</sup>Return on equity for KMAR farms is averaged by farmer rather than by income category which the USDA uses. Mean return may be skewed downward if the number of small farms having small returns is large.

meat packing firms and the S&P 500. The chart indicates that in most years returns for some firms exceeded the S&P return. Figure 2 compares food processing firms' returns with that of the S&P 500 and indicates that these firms typically performed better than the S&P 500 as well. In general, it appears that retail, processing, and pharmaceutical companies tend to offer relatively higher returns than other agriculturally related firms. Whether these companies will continue to return those higher rates of return in the future is uncertain.

### **Risk Relationships between Agricultural Commodities and Stock Investment**

One of the issues still unresolved in modern finance theory is the possibility of *hedging* risk within a value chain. The idea is that firms may be able to hedge their risks by having an invested interest in multiple sectors of the value chain. Specifically, can cattle feeders or hog producers reduce their risk by purchasing stock in a processor? Conventional wisdom would suggest that if cattle or hog prices are low, the processors profits will be high because the farm commodity comprises of a large proportion of the cost of goods sold. If returns for farm commodities and processors are inversely correlated, a farmer could reduce financial risk by this type of investment.

An investment process such as that described is similar to cross hedging. Some agricultural producers routinely use hedging to reduce price risk by hedging their cash commodities in the futures market. In cases where a futures market does not exist for a particular commodity, a producer may cross hedge, which is hedging the cash commodity in the futures market of a related commodity. An example of a cross hedge is hedging grain sorghum by taking futures positions in the corn futures market. Cross hedging generally works for reducing price risk if the prices of the cash commodity and futures contract are closely related and follow one another in a predictable manner, meaning that hedged price risk is less than unhedged price risk (Graff et al.).

A type of cross hedging activity may be applied to vertically integrating in order to capture added value by investing in publicly traded companies. This cross hedging approach may be used by a producer on both the input purchase side and on the raw commodity output sales side. Producers can "hedge" their output or input costs by investing in companies whose returns are related to the producers' cash commodity returns. When cross hedging in this manner, a negative relationship between cash commodity and stock returns will generally provide the most risk reduction. For example, a producer who purchases stock in a company that provides production inputs is protected against decreases in returns since these decreases should be recaptured in the increases in the firm's returns. Inputs may cost more, however, the producer's investment in the input company will make money. Ideally, under portfolio theory, one would like to invest in companies whose returns move opposite cash returns. However, investing in companies whose returns are not negatively related to cash returns can still be beneficial.

Vertical integration risk reduction examines the correlations of returns to determine where to invest. It should provide some risk reduction while also possibly increasing expected returns, either of which can be considered added value. Three issues should be addressed when using this method. First, the publicly traded firm in which to cross hedge the raw agricultural commodity must be determined. A company whose stock return is closely related to the cash return is generally the one to use. Second, the size of the stock position to hold must be determined. This

will be determined by the “hedge” ratio, which must be estimated. Finally, the riskiness of the cross hedge investment should be considered.

Determining the amount of stock to purchase for the cross hedge requires estimating a hedge ratio. The hedge ratio is determined by estimating the relationship between the stock return and the cash commodity return, and is given by the following equation:

$$\text{Expected Cash Return} = \alpha + \beta(\text{Stock Return}) \quad (1)$$

where  $\alpha$  is the intercept or expected basis and  $\beta$  is the hedge ratio.

A traditional hedge ratio is defined as the investment quantity position divided by the cash market quantity being hedged. Applying this to the vertical integration scenario, gives the hedge ratio as the stock quantity amount divided by cash quantity amount. Using this definition, the cash value of the commodity to be integrated can be determined using the following equation:

$$\text{Cash \$ Value} = \frac{N\text{Share} * \text{Share Price}}{\beta} \quad (2)$$

where *Share Price* is the price of one share of stock in the publicly traded firm;  $\beta$  is the estimated hedge ratio; and *NShare* is the number of shares of stock purchased, which typically is at least 100.

The quantity of the cash commodity being vertically integrated can then be determined with the following equation:

$$\text{Cash Quantity} = \frac{\text{Cash \$ Value}}{\text{Cash Price}} \quad (3)$$

where *Cash \$ Value* is the value determined in equation (5), and *Cash Price* is the price of one unit of the cash commodity.

### Data

The data used in the study were weekly stock returns for 25 publicly traded agribusiness and weekly cash crop and livestock returns for 1962-1997. Stock returns were obtained from the *Center for Research in Security Prices (CRSP) Database*, and cash crop and livestock price series were obtained from the *Bridge/CRB Electronic Database*.

The agricultural stocks examined consisted of those for meat packing firms, crop input suppliers, machinery dealers, grocery firms, food processors, pharmaceutical firms, and others. The specific firms analyzed were Hormel, IBP, Smithfield, Excel, Pioneer Hi-Bred, Monsanto, Agco, John Deere, Case-IH, New Holland, Fleming Corporation, Albertson’s, Kroger, Safeway, Winn Dixie, ConAgra, General Mills, Kellogg’s, Quaker Oats, Eli Lilly, Pfizer, Seaboard, ADM, McDonald’s, and Wendy’s.

Weekly average agricultural cash price series were used for both crops and livestock. The crop price series included Kansas City wheat, Chicago corn, sorghum, soybeans, soybean meal soybean oil, malted barley, and flour. The livestock price series included live cattle, feeder cattle, lean hogs, pork bellies, heavy hides, and broilers.

### **Empirical Results**

The relationship between agribusiness stock returns and various agricultural commodities was estimated using ordinary least squares regression (OLS). Tables 2, 3, and 4 summarize the results by the type of relationship found (none, positive, or negative). Results indicate that no significant relationship between returns on stock and agricultural commodities existed for 9 of the 25 companies (Table 2). Eleven companies exhibited a positive significant relationship between stock returns and at least one agricultural commodity, and 6 companies had such a relationship with more than one commodity (Table 3). Table 4 provides the 5 companies that were found to have significant negative relationships between their stock returns and agricultural commodity returns. The negative relationship implies that when agricultural commodity price returns are low, the stock returns of these companies will be high. The inverse relationship suggests that investment in these companies could be used to reduce financial risk.

Table 5 presents examples for vertically integrating wheat, corn, flour, live cattle, pork belly, and broiler returns in various publicly traded companies using the cross hedging technique. Results presented in Table 5 are for those companies having inverse relationships with the cash commodity returns. Results for Pfizer suggest that a cattle producer who purchases 100 shares of stock at \$37 per share for an investment of \$3,700 will be "hedging" \$110,448 worth of live cattle. At a cash price of \$63.69/cwt for live cattle, this amounts to roughly 1,734 cwt or 173,400 pounds of live cattle. At an average live weight of 1215 pounds, this is roughly 143 head of live cattle which a producer would have "hedged" in the value chain. Similarly, results for Kellogg's suggest that a wheat producer investing \$3,800 for 100 shares of stock will be "hedging" \$108,262 worth of wheat. At a wheat price of \$2.92/bushel, this is roughly 37,076 bushels of wheat. The positive relationships of cash commodity returns and stock returns (not shown in Table 5) do not suggest that financial risk can be reduced with these investments by the conventional approach.

The risk relationships between the agricultural commodities and stock investments presented in this study suggest that in some cases it may be possible for producers to capture added value through risk reduction by investing in publicly traded agribusinesses. However, the majority of the relationships examined do not exhibit risk reducing correlations. These positive relationships suggest returns move together in the same direction or are uncorrelated. Further examination of additional relationships and continued analysis is necessary to better understand the risk relationships and their implications for investments by producers.

### **Conclusions and Implications**

Value added activities aimed at increasing producer market position and price are thought to be the means for capturing an additional share of retail or processor profits. Producers often



consider forward vertical integration through investment in cooperatives as the method for adding value beyond the farm gate. An alternative mechanism for retaining ownership beyond the farm gate which should be considered is the purchase of shares in publicly owned corporate enterprises involved in the food industry. Both investment mechanisms have advantages and disadvantages that should be carefully evaluated.

Investment in public stock as an alternative approach for retaining commodity ownership and adding value can be thought of in a cross hedging framework. The “cross hedging” approach examines the risk relationships between agricultural commodities and stock investment to determine if producers can reduce risk by investing along the value chain. The examination of the risk relationships between agricultural commodities and stock returns suggests that “hedging” risk within the value chain may be possible in some cases for producers. However, continued research is necessary.

Aside from the value added investment motive, historical stock returns suggest that returns on investment in many agriculturally related firms throughout the marketing channel have been relatively higher than the S&P 500 and average farm return on equity. Whether these returns will continue in the future is uncertain. However, if the belief is that processors and retailers are going to continue to see relatively high returns, then it might be reasonable to capture part of that profit by investing and becoming a shareholder—keeping in mind that financial risk might increase.

There are several limitations to this study. First, continued research is necessary to better understand the risk and return relationships between agricultural commodities and stock returns. Second, additional companies and stocks should be examined. Third, different time periods need to be examined. Here using monthly data instead of weekly data may provide a better understanding of risk and return correlations. Fourth, actual farm returns need to be examined for correlations with stock returns. Nonetheless, results of this study suggest that relationships which may increase expected returns and/or reduce risk do exist. Hence, producers should keep stock investment in mind when considering value added investment alternatives.

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**Table 1. Investment Returns from 1973 to 1997 of Various Agriculturally Related Corporations**

<b>Company</b>	<b>Industry</b>	<b>Investment Return</b>
S&P 500	Broad Market Index	13.1%
Hormel	Meat Processor	17.9%
IBP <sup>1</sup>	Meat Processor	9.6%
Smithfield Foods	Meat Processor	15.0%
Excel <sup>2</sup>	Meat Processor	25.7%
Pioneer Hi-Bred	Crop Input	17.5%
Monsanto	Crop Input	17.0%
Agco Corporation <sup>3</sup>	Agricultural Machinery	36.4%
Deere & Company	Agricultural Machinery	12.2%
Case-IH <sup>4</sup>	Agricultural Machinery	34.8%
New Holland <sup>5</sup>	Agricultural Machinery	14.3%
Fleming Corporation	Groceries	7.6%
Albertson's	Groceries	23.1%
Kroger	Groceries	23.5%
Safeway <sup>6</sup>	Groceries	33.6%
Winn Dixie	Groceries	13.9%
ConAgra	Food Processing	24.1%
General Mills	Food Processing	14.4%
Kellogg's	Food Processing	18.2%
Quaker Oats	Food Processing	13.5%
Eli Lilly	Pharmaceuticals	14.7%
Pfizer Inc	Pharmaceuticals	17.6%
Seaboard	Hog Production	19.1%
ADM	Commodity Processing	17.4%
McDonald's	Fast Food	11.7%
Wendy's <sup>7</sup>	Fast Food	11.5%

<sup>1</sup> 1987 through 1997; <sup>2</sup> 1973 through 1997; <sup>3</sup> 1992 through 1997; <sup>4</sup> 1994 through 1997; <sup>5</sup> 1996 through 1997; <sup>6</sup> 1990 through 1997; <sup>7</sup> 1976 through 1997.

**Table 2. Investment Returns with No Statistically Significant Relationship to Agricultural Commodities**

<b>Company</b>	<b>Industry</b>
IBP	Meat Processor
Seaboard	Hog Production
General Mills	Food Processing
Monsanto	Crop Input
New Holland	Agricultural Machinery
Fleming Corporation	Groceries
Albertson's	Groceries
Kroger	Groceries
McDonald's	Fast Food

**Table 3. Investment Returns with a Statistically Significant Positive Relationship to Agricultural Commodities**

<b>Company</b>	<b>Industry</b>	<b>Commodities</b>
Smithfield Foods	Meat Processor	Feeder Cattle, Soybeans
Excel	Meat Processor	Feeder Cattle, Corn, Broilers
Case-IH	Agricultural Machinery	Flour
Deere & Company	Agricultural Machinery	Wheat, Soybeans, Soybean Meal, Corn
Agco Corporation	Agricultural Machinery	Sorghum, Soybeans, Soybean Meal, Corn, Broilers
Pioneer Hi-Bred	Crop Input	Soybeans, Wheat
Quaker Oats	Food Processing	Soybeans
Wendy's	Fast Food	Wheat
Safeway	Groceries	Broilers
ConAgra	Food Processing	Broilers
ADM	Commodity Processing	Wheat, Soybeans, Hogs

**Table 4. Investment Returns with a Statistically Significant Negative Relationship to Agricultural Commodities**

<b>Company</b>	<b>Industry</b>	<b>Commodities</b>
Hormel	Meat Processor	Corn
Winn Dixie	Groceries	Wheat
Kellogg's	Food Processing	Wheat, Live Cattle
Eli Lilly	Pharmaceuticals	Live Cattle, Broilers
Pfizer Inc	Pharmaceuticals	Wheat, Flour, Pork Bellies

Table 5. Cross Hedge Estimates for Vertically Integrating Various Commodities in Various Publicly Traded Firms

Commodity	Company	Hedge Ratio	Intercept	R-square	Share Price	Investment		Cash	
						Cash Value	Cash Price		Quantity <sup>1</sup>
Wheat	Kellogg's	-0.0351	0.0360	0.0021	\$38.00	\$3,800	\$108,262	\$2.92	37,076
Wheat	Winn Dixie	-0.0465	0.0474	0.0034	\$30.00	\$3,000	\$64,516	\$2.92	22,095
Wheat	Eli Lilly	-0.0415	0.0427	0.0032	\$68.00	\$6,800	\$163,855	\$2.92	56,115
Corn	Hormel	-0.0311	0.0320	0.0019	\$41.00	\$4,100	\$131,833	\$2.20	59,924
Flour	Winn Dixie	-0.0382	0.0387	0.0034	\$30.00	\$3,000	\$78,534	\$8.86	8,864
Live Cattle	Eli Lilly	-0.0437	0.0446	0.0057	\$68.00	\$6,800	\$155,606	\$63.69	2,443
Live Cattle	Pfizer	-0.0335	0.0343	0.0038	\$37.00	\$3,700	\$110,448	\$63.69	1,734
Pork Bellies	Winn Dixie	-0.1025	0.1051	0.0027	\$30.00	\$3,000	\$29,268	\$46.66	627
Broilers	Pfizer	-0.0820	0.0841	0.0031	\$37.00	\$3,700	\$45,122	\$0.58	77,796

<sup>1</sup> Quantity units are cwt for live cattle, pork bellies, and flour; bushels for wheat and corn; and pounds for broilers.

Figure 1.

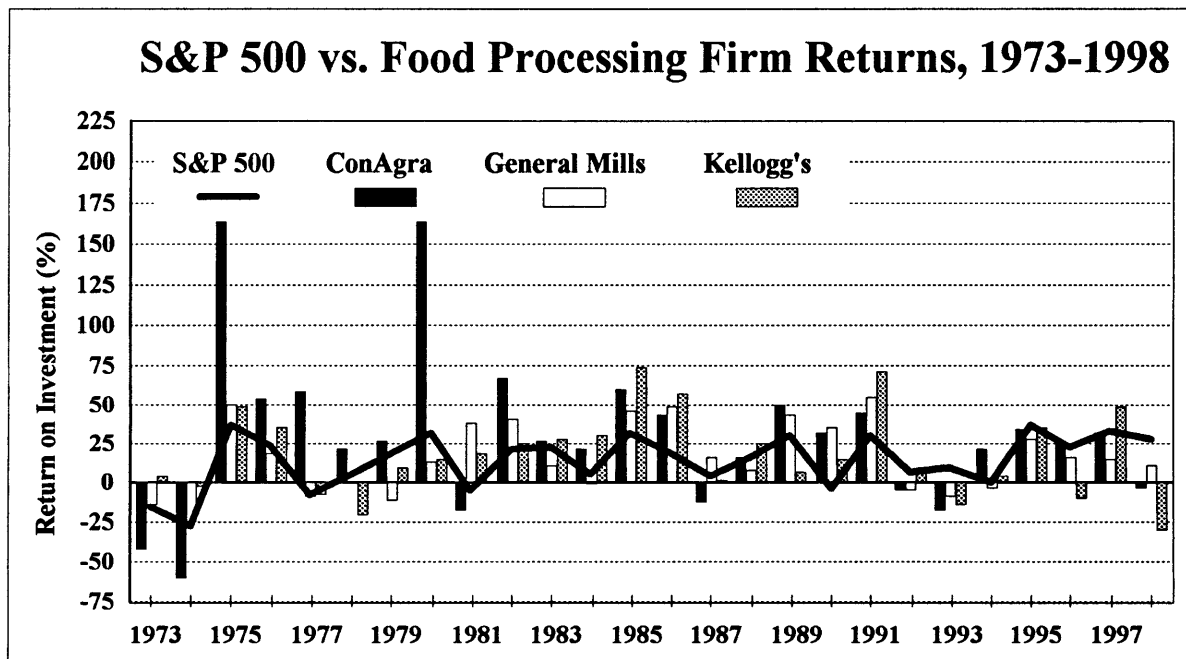
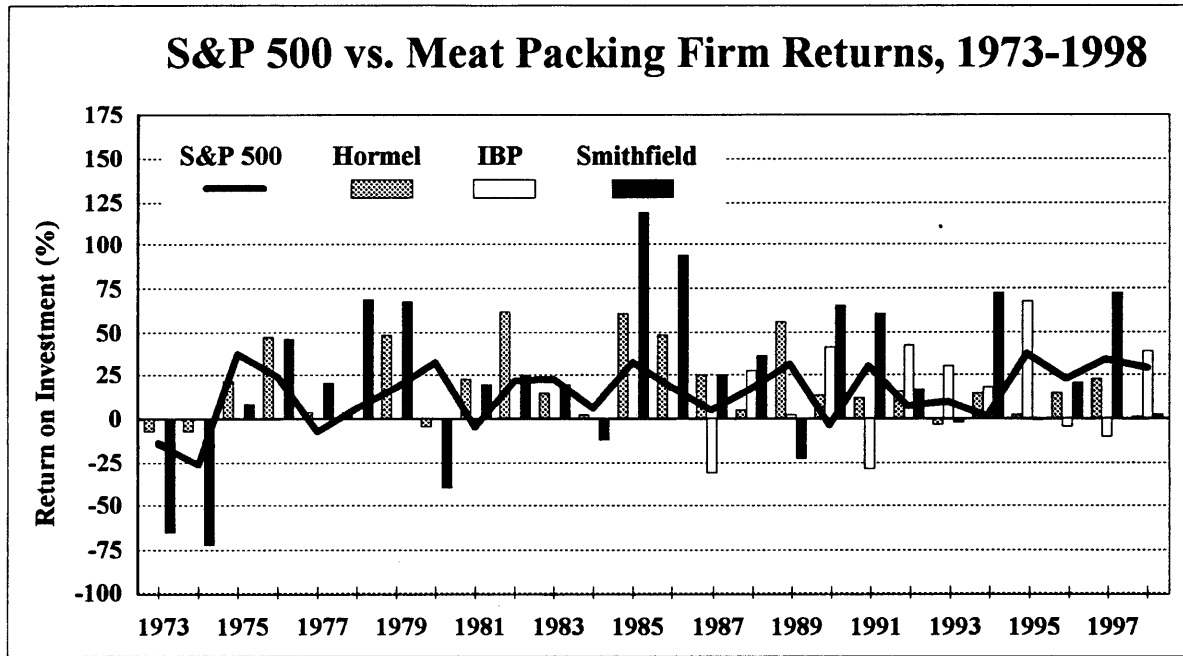


Figure 2.



**Factors Affecting Off-Farm Investment of Farm Households: A Logit  
Analysis**

**Ashok K. Mishra  
&  
Mitchell J. Morehart\***

**Factors Affecting Off-Farm Investment of Farm Households: A Logit  
Analysis**

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### *Abstract*

This investigation considers factors affecting off-farm investment of farm households. A national farm level survey was used to evaluate the effects of various farm and operator characteristics on the likelihood of off-farm investment. Results suggest differences in level of education, age of the operator, off-farm income, household net worth, farm size, farm diversification, management skills, and location influence off-farm investment decisions.

*Key words:* off-farm investment, farm household, logit