Profitability and Risk Measures for Investor-Owned Firms

Staff Paper 00-07

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Funding for this research was provided, in part, by funding from the U.S. Department of Agriculture Rural Business Cooperative Services. Contribution no 00-470-D of the Kansas Agricultural Experiment Station.

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Profitability and Risk Measures for Investor-Owned Firms[1]

The objective of this study was to summarize trends in return on investment (ROI), return on equity (ROE), economic value added (EVA®), market value added (MVA), coefficient of variation (CV), and other risk measures for 103 investor-owned firms.[2] An accompanying staff report summarizes information on these firms and how they were classified into Standardized Industrial Classification (SIC) categories.[3]

Profitability Measures

Return on Investment

Return on Investment (ROI) measures the percentage return of a company based upon the amount invested in the company by providers of capital, common stock holders, preferred stock holders, and bondholders. This measurement is derived by dividing income before taxes by the total of long-term debt, book value of preferred stock, and book value of common stock.

$$ROI = \frac{\text{Income}}{\text{Common Equity} + \text{Other Equities} + \text{Long} - \text{Term Debt}}$$

Other Equities are these held in preferred stock and minority ownership and Long Term Debt is capital that has been raised through the sale of debt securities such as bonds or through loans from financial institutions. The ROI measures the rate at which a corporation is increasing or decreasing the level of its common equity as a portion of the sum of total equity and total long-term debt. Because debt is repaid before equity when a corporation is dissolved, this measurement effectively reflects the corporation's ability to raise capital internally through profitability to repay debt and equity holders.

ROI is very similar to another financial performance measurement, Return on Assets (ROA). Because the left side of the balance sheet, assets, must equal the right side of the balance sheet, equities and liabilities, the only portion of the equities and liabilities that is not used in the calculation of ROI is current liability.

Return on Equity

Return on Equity (ROE) is a measurement of income before taxes divided by the book value of the total amount of common equity.

$$ROE = \frac{\text{Income}}{\text{Equity}}$$

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[1]Two other publications by the authors have been developed to accompany this report. "Summary of Data and Company Information for 220 Investor-Owned Firms and Cooperatives," which is Department of Agricultural Economics Staff Paper 00-07 and "Competition, Strategy, and Food and Agribusiness Firm Performance" which was published electronically in *Proceedings of the International Food and Agribusiness Management Association* annual meetings, which was held in Chicago on June 25-28, 2000 (http://www.ifama.org).

[2] The data were obtained form Standard and Poors "Standard & Poors Research Insight® COMPUSTAT® (North America) and Stern Stewart Management Services "FINANSEER® Analysis Software." EVA® has been trademarked by Stern Stewart.

Income is the net operating income before taxes and Equity is the amount of capital paid-in through primary market sales of common stock plus any capital surplus plus retained earnings plus preferred stock outstanding less any treasury stock held by the company. Retained earnings are the corporation's accumulated earnings less any losses and dividend payments that have occurred since the corporation's inception. Because Equity represents the total share of the corporation's worth to which the shareholders are entitled in the event of dissolution of the corporation, the ROE of a firm indicates the rate at which a firm is increasing or decreasing the level of common shareholder equity as a percentage of total common equity.

ROE normally would not include Preferred Stock Outstanding in this definition of Equity and would use only Common Equity. However, many new closed cooperatives have issued preferred stock as a means to raise capital, and we have elected to include it in the denominator.

There is a drawback to using the ROE to evaluate financial performance. The amount of long-term debt held by the company can affect the ROE measurement because long-term debt that is used to purchase or finance income-enhancing assets could increase Income without significantly changing the amount of Equity paid into the company. Because ROE measures the change in the level of book equity and significant differences could occur between equity and total investment, understanding this difference is imperative.

The differences between ROE and ROI must be understood when comparing performances of different corporations. A highly leveraged firm could appear to increase the shareholders' equity, yet the corporation would not necessarily increase its ability to repay both debt and equity holders.

Economic Value Added

Economic Value Added (EVA) is a measurement of how much economic value actually is added through the company's operations. It often is referred to as "Value Added". EVA is computed by taking the net operating income after taxes (NOPAT) and subtracting the cost of debt and equity capital.

$$EVA = NOPAT - [(\text{Weighted Average Cost of Capital}) * (\text{Operating Capital})]$$

The Weighted Average Cost of Capital is the weighted average of the required rates of return on both equity and debt securities, and Operating Capital is the total level of capital raised through primary sales of stock, debt, and retained earnings. Because the weighted average cost of capital is an indicator of the level of risk involved in an investment, the measurement of EVA represents the wealth created for the owners that is above and beyond the returns they could expect to receive from investments of similar risk elsewhere.

Market Value Added

Whereas EVA represents the value the company adds through its operations, Market Value Added (MVA) measures the change in market value a company adds to its shareholders. It is computed by multiplying the value of a company's stock by the amount of shares outstanding, and then subtracting the equity invested by shareholders.

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[3] Freberg, C., M. A. Boland, and D. Barton. "Summary of Data and Company Information for 220 Investor-Owned Firms and Cooperatives," Staff Report 00-08, Department of Agricultural Economics, Kansas State University, Manhattan, KS, 2000.

MVA = [(Value of Stock Per Share) * (Shares Outstanding)] – Total Shareholder Equity

MVA measures the change in value of the company's stock through the company's operations. This is an important measurement for organizations that seek to maximize shareholder return and illustrate to their stockholders how their investment has performed.

Both EVA and MVA have characteristics that make reporting them very useful for firms. EVA measures the ability of a company to increase the value of a company's equity over and above the required costs of equity and debt capital. Companies with the ability to increase the value of equity are attractive to investors. Companies such as Coca-Cola, Hormel Foods, and AT&T are examples of companies that use EVA. MVA measures the ability of a company to increase the value of total shareholder worth. It is entirely dependent on market capitalization, and, therefore, must be based on the assumption that markets are efficient and working properly. It is the goal of financial managers to maximize MVA. MVA and EVA are linked. If EVA, the amount of value added to a company's equity above the cost of capital in a particular year, is positive, then its MVA will increase, and if the EVA is negative, the MVA will decrease.

Risk Measurements

Coefficient of Variation

The coefficient of variation (CV) is a measurement of variability relative to the size of the mean of a particular sample of data. A CV of ROE or ROI is computed using the following formula:

$$CV = \frac{\text{Standard Deviation of ROE or ROI}}{\text{Mean of ROE or ROI}}$$

The CV in the context of this study was used to determine how variable the ROI and ROE are with respect to their means. Because it describes the variability around its mean as a percentage of the mean, the measurement is scale invariant. The CV commonly is used to measure risk in terms of variability of returns, not necessarily market risk or portfolio risk like the equity beta.

Equity Risk Premium

Risk is not the only determinant of a company's returns; its management of debt and equity is important as well. As a company issues more debt to acquire income-producing assets, the risk and return on the assets do not change. However, ROE does change, because more of the remaining profits are used to cover debt payments. The equity risk premium is the difference between holding equity and debt. Because the ROI includes returns to long-term debt that is used to finance the company's operations, it is essentially a measurement of how debt affects the returns to companies in the industry aggregated for the study.

Debt financing is through the primary market sale of bonds, whereas equity offerings are through primary market of stock sales and initial public offerings. Each financial instrument, stocks and bonds, has its own required rate of return because the levels of risk related to each instrument are different. Bonds generally are seen as more stable because they are liabilities that must be repaid before the repayment of common stock capital can be made in the case of company liquidation. Therefore, stockholders generally are compensated for this additional amount of risk by yielding higher returns.

Comparisons between the uses of debt and equity have been made for several reasons. Interest paid on debt results in an income-tax shield, which reduces the tax burden on the company and results in higher returns to the investors, the stockholders and the bond holders. The value of the firm and, thus, the value of a company's stock will increase by the net present value of the tax shield. Companies in industries that have high levels of tangible assets, such as manufacturing, normally are associated with high use of debt financing, whereas growth-oriented firms in industries, such as e-commerce companies, generally have higher levels of risk and high levels of intangible assets financed predominantly through equity. This is because the debt can be secured to tangible assets in case of default on the debt.

Three-Month Treasury Bill Data

The three-month Treasury bill rates were obtained from the St. Louis Federal Reserve Bank's Federal Reserve Economic Data database. The secondary market monthly averages were used to calculate yearly averages as a benchmark, "risk-free" rates to use for comparison against each industry's weighted average cost of capital.

Data

Each firm was classified using the first three digits of its SIC. For example, the industries of Meat Packing Plants (SIC 2011), Sausages and Other Prepared Meats (SIC 2013), and Poultry Slaughtering and Processing (SIC 2015) were aggregated into one industry classification as Meat and Poultry Products (201). The classification resulted in 60 subindustry categories that were aggregated into 15 different industries: Agriculture Production-Crops (SIC 100), Food & Kindred Products (200), Meat & Poultry Products (201), Dairy Products & Ice Cream (202), Fruits & Vegetables-Preserved (203), Grain Mill Products (204), Bakery Products (205), Sugar Products (206), Fats & Oils (207), Beverages (208), Miscellaneous Food Products (209), Farm Machinery (352), Groceries and Related Products (514), Grocery & Convenience Stores (541), and Eating Places (581).

Profitability Measure Results

Return on Equity and Investment

The aggregated time-series weighted average of all industries' ROE indicated an upward trend from near 16% in 1980 to almost 25% in 1997, an increase of 8.5% (Figure 1). The aggregated, time-series, weighted average of all industries' ROI indicated a definite upward trend as well, increasing from 11.3% in 1980 to 15.3% in 1997. During this period of time, interest rates decreased, making it less expensive to borrow. The difference (4%) indicates an increase in the amount of debt used to finance investments (Figure 2). The aggregated level of equity financing in food and agribusiness during this period decreased from 70% to 62%. The weighted-average ROI across all industries was 10.99%.

Above-Average Industries

The Grain Mill Products industry is heterogeneous but was highly leveraged. Firms encompassed by this industry range from breakfast cereal manufacturers with large research and development and marketing budgets to flour millers that supply a quality specific product but are engaged in a very commodity-like market. Cereal manufacturers, through a diverse product line, must appeal to a broad spectrum of consumers with diverse tastes, whereas flour millers with a

standardized offering target a market that ranges from industrialized bakeries to independent bakers to individual consumers.

Another category involved in the Grain Mill Products is corn processing, a commodity-like industry that has grown in number and value of product offerings, yet decreased in profitability. This industry was profitable during the 1980s and early 1990s, when high fructose corn syrup was a very inexpensive substitute for sugar and there were few competitors in the industry. Even though fixed capital costs are considerable when entering and expanding, the industry expanded in the mid-1990s, and intense competition reduced the profitability of corn sweeteners. However, profits declined as corn prices increased in 1994 and 1995.

Industries with ROE above the average included Food and Kindred Products, Fruits and Vegetables-Preserved, Sugar Products, and Beverages are characterized by value-added consumer product offerings. With few exceptions, mostly within the Beverage industry, these firms' process and market branded products. Most of these companies have extensive marketing and market research budgets to understand consumers' preferences. The exceptions are sugar processors and private-label, soft drink bottlers. Because of the commodity-like status of sugar, processors rely on a low-cost, high-volume strategy.

Below-Average Industries

Industries that performed furthest below average between 1980-1997 were Bakery Products, Ag Production-Crops, Fats and Oils, and Farm Machinery. Because of downward pressures on the price of bakery products caused by staple-good characteristics of bread and similar products, the amount of increased value addition to the product is limited. Fresh produce companies generally add only the value of location to their goods, because no processing activities are involved.

Crop research and development companies in the Ag Production-Crops industry and farm equipment manufacturers are heavily dependent on a healthy agricultural sector in the economy. Firms in these industries depend on farmers purchasing new and improved varieties and equipment. When commodity prices are low, sales decrease sharply. The Fats and Oils industry was highly successful during the 1980s and early 1990s.

The below-average industries with regards to ROI did change. Bakery Products and Ag Production-Crops maintained with the lowest ROI, followed by Grocery/Convenience Stores, Farm Machinery, Groceries-Wholesale, and Meat and Poultry Products. The greatest consistency within industries occurred in Farm Machinery, Agricultural Production-Crops, and Food and Kindred Products, which had no significant expansion that would require extraordinary levels of capital to be raised through additional debt usage.

The mean annual ROE and ROI of each industry were analyzed to determine if they were statistically equal using equality of means tests (Table 1). Farm Machinery and Agricultural Production-Crops were the two exceptions. Heavy losses in Farm Machinery in the early 1980s drove equity levels to historically low levels, even though the value of their assets did not decline as rapidly (e.g., firms' debt increased). Agricultural Production-Crops experienced similar circumstances during this time period. For all other industries, ROE was significantly greater ($p<0.05$) than ROI. This result is not surprising given that most firms strive to achieve balanced levels of debt and equity. If they succeed, the denominator in ROI will be twice as high as the denominator in ROE.

Figure 1. Overall ROE and ROI for 103 Food Processing, Wholesaling, and Retailing Firms, 1980-1997

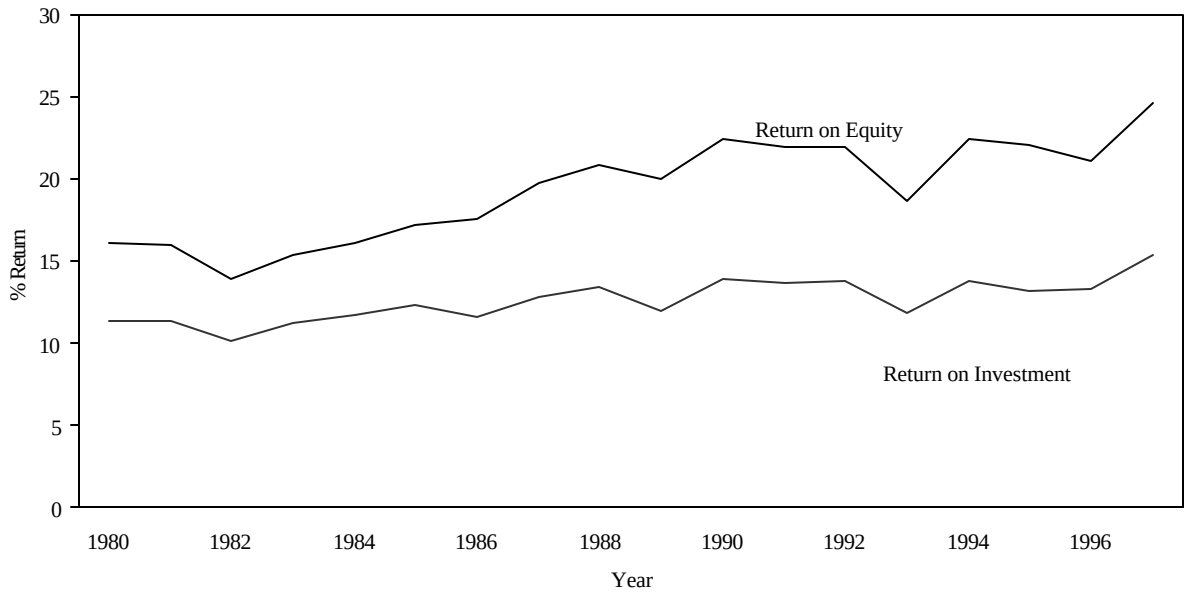


Figure 2. Aggregated Return on Equity and Return on Investment By Industry, 1980-1997

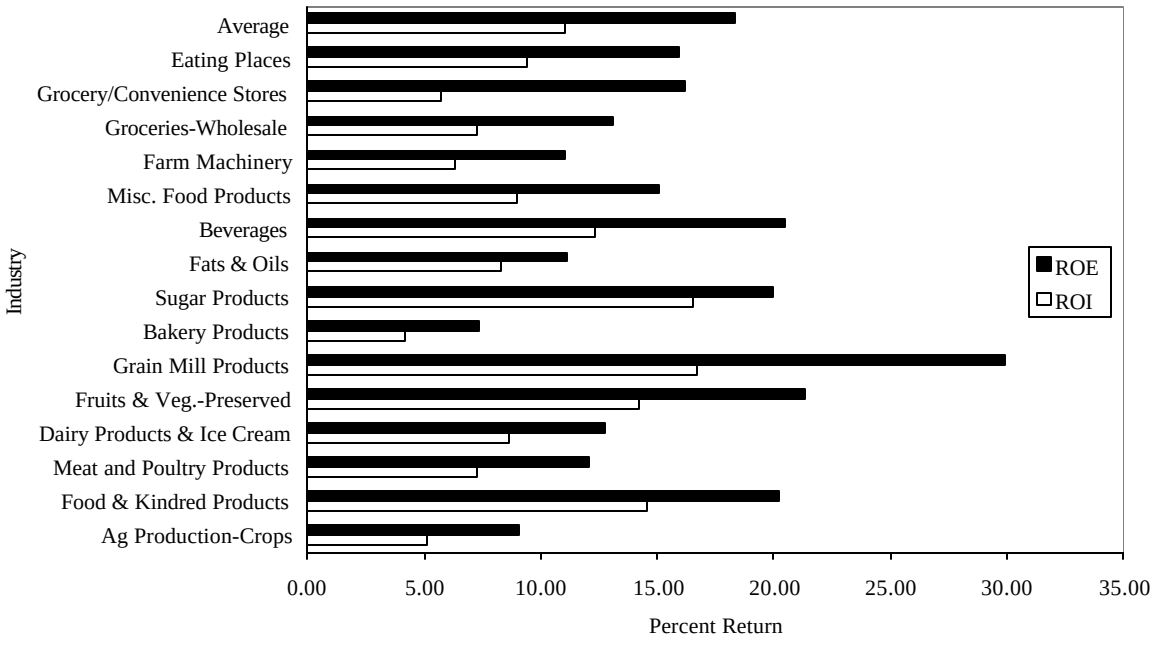


Table 1. Statistical Results of Equality of Means Tests between Mean Aggregate ROE and ROI for Each Industry, 1980-1997

Industry	P-Value	
Ag Production-Crops	0.06	
Food and Kindred Products	0.00	*
Meat and Poultry Products	0.00	*
Dairy Products and Ice Cream	0.01	*
Fruits and Vegetables-Preserved	0.00	*
Grain Mill Products	0.00	*
Bakery Products	0.00	*
Fats and Oils	0.01	*
Sugar Products	0.00	*
Beverages	0.00	*
Miscellaneous Food Products	0.00	*
Farm Machinery	0.36	
Groceries-Wholesale	0.00	*
Grocery/Convenience Stores	0.00	*
Eating Places	0.00	*

*Statistically significant at the 95% level ($p < 0.05$)

These results were not surprising given that although ROE and ROI share a common numerator, most firms issue significant amounts of debt. Therefore, the denominator of ROI would be significantly larger than that of ROE because of the long-term debt added in. Thus, another issue is whether certain industries have significantly greater performance relative to other industries. An equality of means test was conducted between each pair of SIC category pairs. The p-values are presented in Appendix A.

In general, the ROE or ROI of one industry was significantly different than that of another. However, there were exceptions. For example, Food and Kindred Products had a ROE that was not significantly different at the 95% significance level ($p < 0.05$) than the ROEs of Dairy Products -and Ice Cream, Sugar Products, Beverages, and Eating Places. However, with respect to ROI, Food and Kindred Products was significantly not different only from Fruits and Vegetables-Preserved.

Given the previous results, industries were grouped by the numbers that had statistically smaller and larger ROE and ROI (Tables 2 and 3). Grain Mill Products has an ROE significantly greater than those of all other industries. Some general observations can be made. First, industries that provide inputs to producers, Agricultural Production-Crops and Farm Machinery, had the lowest ROE and ROI. Second, industries that had a large increase in demand, such as Grain Mill Products, and Beverages, had above-average ROE and ROI. Third, industries such as Meat and Poultry Products, Bakery Products, Groceries-Wholesale, and Grocery/Convenience Stores have had significantly lower ROE and ROI relative to other industries in the processing sector of the food and agribusiness value chain.

Table 2. Equality of Means Test Results for Number of Industries with Statistically Smaller and Larger Mean ROE than Each Other Industry, 1980-1997

Industry	Mean ROE	Industries with Smaller ROE	Industries with Larger ROE
Grain Mill Products	29.34%	14	0
Fruits and Vegetables-Preserved	20.36%	12	1
Beverages	19.19%	8	3
Fats and Oils	19.11%	8	2
Food Kindred Products	18.72%	7	3
Eating Places	17.38%	7	3
Dairy Products and Ice Cream	15.89%	5	3
Miscellaneous Food Products	14.96%	4	7
Grocery/Convenience Stores	14.60%	2	6
Groceries-Wholesale	14.04%	4	7
Bakery Products	12.81%	2	8
Meat and Poultry Products	12.51%	1	10
Sugar Products	11.51%	1	10
Ag. Production-Crops	8.65%	0	14
Farm Machinery	6.73%	0	14

Table 3. Equality of Means Test Results for Number of Industries with Statistically Smaller and Larger Mean ROI than Each Other Industry, 1980-1997

Industry	Mean ROI	Industries with Smaller ROI	Industries with Larger ROI
Grain Mill Products	16.62%	13	1
Fats and Oils	16.07%	13	1
Fruits and Vegetables-Preserved	13.92%	11	3
Food and Kindred Products	13.65%	11	3
Beverages	11.77%	9	5
Dairy Products and Ice Cream	10.91%	7	5
Eating Places	10.02%	7	6
Miscellaneous Food Products	9.38%	5	6
Sugar Products	8.60%	3	8
Groceries-Wholesale	8.43%	3	8
Meat and Poultry Products	7.97%	3	9
Bakery Products	7.64%	0	9
Grocery/Convenience Stores	5.86%	0	12
Ag. Production-Crops	5.35%	0	12
Farm Machinery	3.80%	0	12

Industry Analysis of Publicly Traded Companies

In the previous section, we showed that certain industries had significantly different financial performance relative to other industries. Thus, an analysis of each industry was undertaken to discern what happened with respect to competition and profitability over this time period (1980-1997). In the following sections, a list of the firms aggregated within each industry is provided as well as discussion involving industry behavior and ROE, ROI, EVA, and MVA performance indicators.

Agricultural Production-Crops (SIC 100)

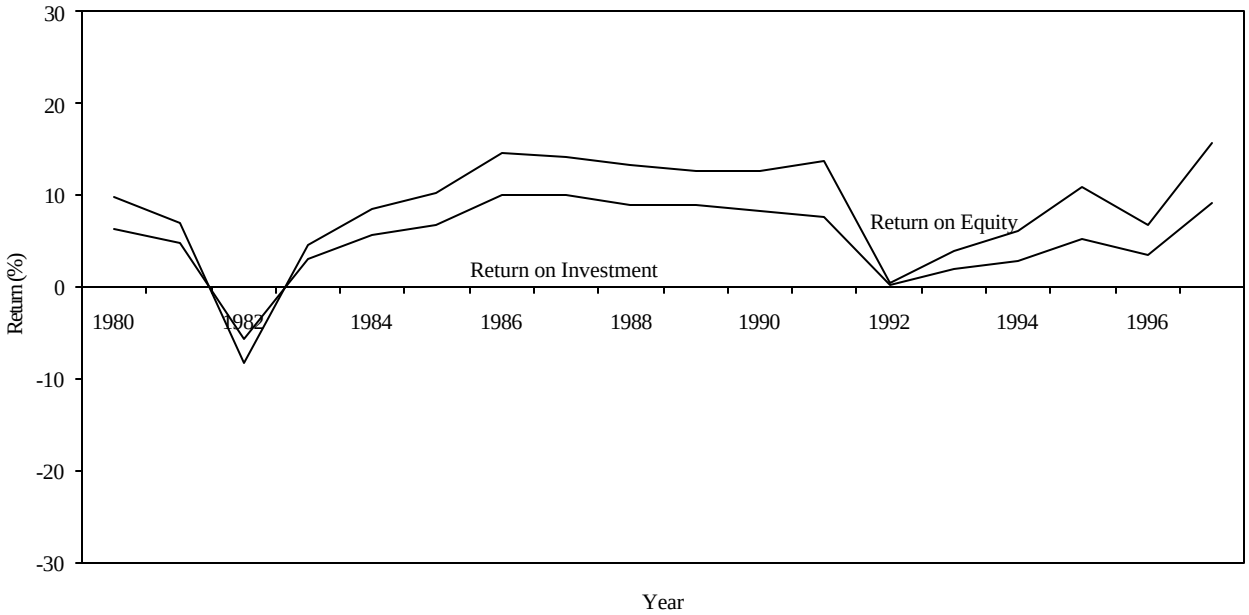
Companies included: Chiquita Brands International, Dekalb Genetics, Del Monte Fresh Produce, Inc, Dole Food Company, Inc., Northland Cranberries, Inc., and Pioneer Hi-Bred International. These industries include crop production and production and development of new seed stock and genetics for crop production.

Large companies that are very experienced dominate this industry. Chiquita and Dole represent older, well-known names that are traditional main players in the fresh fruit and vegetable production industry. However, these two companies are quite different. Chiquita owned and operated the John Morrell meat business between 1970 and 1995 as part of a risk-diversification strategy and, during the 1990s, acquired several vegetable canners including the Stokley brand from Quaker Oats. The canning acquisitions were the integration of the supply chain. Whereas Quaker chose to exit this industry and concentrate on their grain based food business, Chiquita vertically integrated into the preserved fruits and vegetables industry and reduced the risks involved with the variable returns associated with the perishable side of the fruits and vegetable industry.

Dole has remained in the fresh fruit and vegetable industry, with the exception of controlling one of the three largest tuna fleets that are owned by processors. Dole also has expanded farther into the value chain by increasing its presence in fruit and vegetable canning. Meanwhile, Pioneer Hi-Bred has been an active participant in crop seed breeding and genetics. The two industries represented in this industry classification are very different. The fruit and vegetable companies all have significant, fixed, capital requirements in land that are generally at a higher risk because of the perishability of their product, and they market a commodity product. Meanwhile, seed companies are constrained by the genetic libraries of their varieties, have high research and development costs, and have a differentiated product through their different varietal product offerings.

Compared to the other industries, the ROE and ROI over the aggregated period of time were lower (Figure 3). In particular, the ROE during this period of time was the second lowest of any industry. The difference between ROE and ROI was less than 1%. This could be the result of low long-term debt use by these companies because of their age and their history of previous success in this industry (e.g., little investment in assets over the time period because of lower income). The behavior of returns in this industry has been highly variable. ROEs of 10-15% have been common; however, returns periodically have been low to negative, returns as well in the early 1980s because of the financial stress on production agriculture at that time.

Figure 3. Ag Production-Crops Average Annual ROE and ROI, 1980-1997



Because many of these firms engage in production agriculture through ownership of orchards or plantations, they tend to be less profitable at the same time as producers. Average annual EVA remained negative throughout the time period, becoming positive only in 1997 (Figure 4). Average annual MVA reflected the negative EVA, remaining stable and near zero until growing slightly after 1994 (Figure 5). Thus, this industry did not grow in a manner that created value in the companies.

The two different types of firms, crop production and seed research, also can be characterized by different methods of adding value. Crop production firms such as Dole and Chiquita add value to their products through geographically transporting their products from areas of production to areas of consumption (e.g. marketing services). Strategies consistent with this type of industry are low cost leadership, high volume, high market share, low transportation costs, and movement up the value chain into further processing activities and products. However, these services are typically generic in nature and have low returns. These companies have begun to create value through processing activities such as canning and dehydration. Chiquita's entrance into this category with their purchase of Stokley is an example. Differentiation is increasing with branding activities by Dole and Chiquita, especially in banana and pineapple.

Seed research companies continually add new value to their products through techniques such as crossbreeding, hybridization, and genetic modification. The results are products with characteristics that are demanded by consumers of the seed. The strategies of these companies have been to continually differentiate their products offered through their seed genetics with new characteristics. Success in this industry has been driven by the ability to use new technology such as gene splicing, proprietary information (patents), and genetics effectively. While adding value, these methods also create barriers to entry, which can be used to increase returns.

Figure 4. Ag Production-Crops Average Annual Economic Value Added, 1980-1997

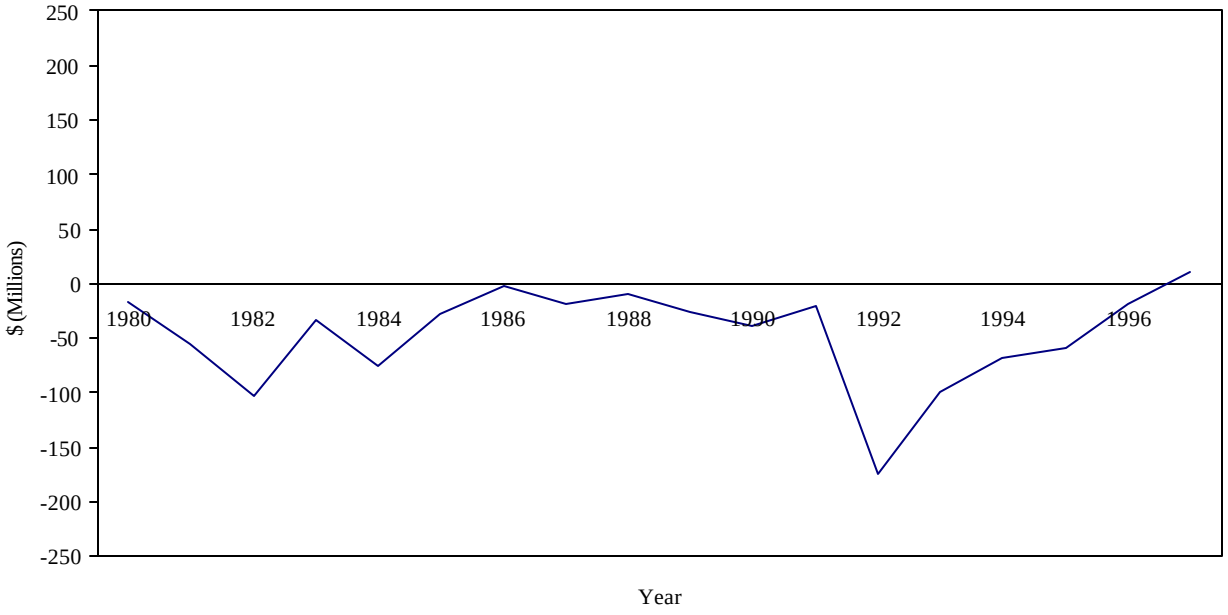
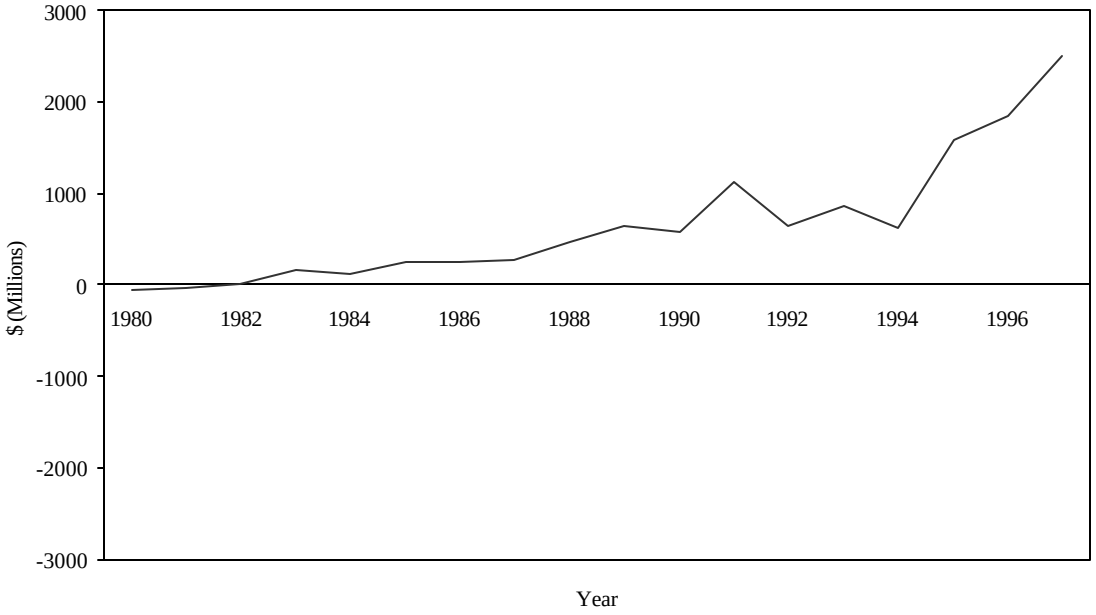


Figure 5. Ag Production-Crops Average Annual Market Value Added, 1980-1997



Food and Kindred Products (SIC 200)
Companies included: ConAgra, Inc., Hain Food Group, Inc., Michael Foods, Inc., Nestle S.A., Sara Lee Corp., Unilever NV, and Unilever PLC. This industry involves the processing of commodities and secondary processed products into branded products that are sold on regional, national, and international bases in retail and wholesale outlets. Fixed capital requirements such as processing facilities and brand name recognition and marketing constrain new entrants from entering into this industry. Firms also have highly diversified product offerings, reducing risk from any one particular product and transferring management and processing expertise across product lines. This industry has been moderately to highly successful during the 1980s and 1990s, with continuous growth in both the ROE and the ROI (Figure 6). The difference between the ROE and ROI indicates significant use of long-term debt to fuel this growth. This debt most likely was used to strengthen companies' positions through acquisitions and expansion of production.

Average annual EVA remained slightly positive throughout the 1980s and 1990s with negative fluctuations in 1993 and 1994 from buyouts and acquisitions by firms such as Unilever and Nestle that increased long-term debt (Figure 7). Average annual MVA reflected this pattern with continuous growth in market value before it slightly decreased in the two aforementioned negative EVA years (Figure 8). The companies in this industry use high amounts of branding and product research and development to add value. Products such as ConAgra's Healthy Choice™ line of foods that were developed and heavily branded is an example of how companies in this industry added value to their shareholders.

Figure 6. Food and Kindred Products Average Annual ROE and ROI, 1980-1997

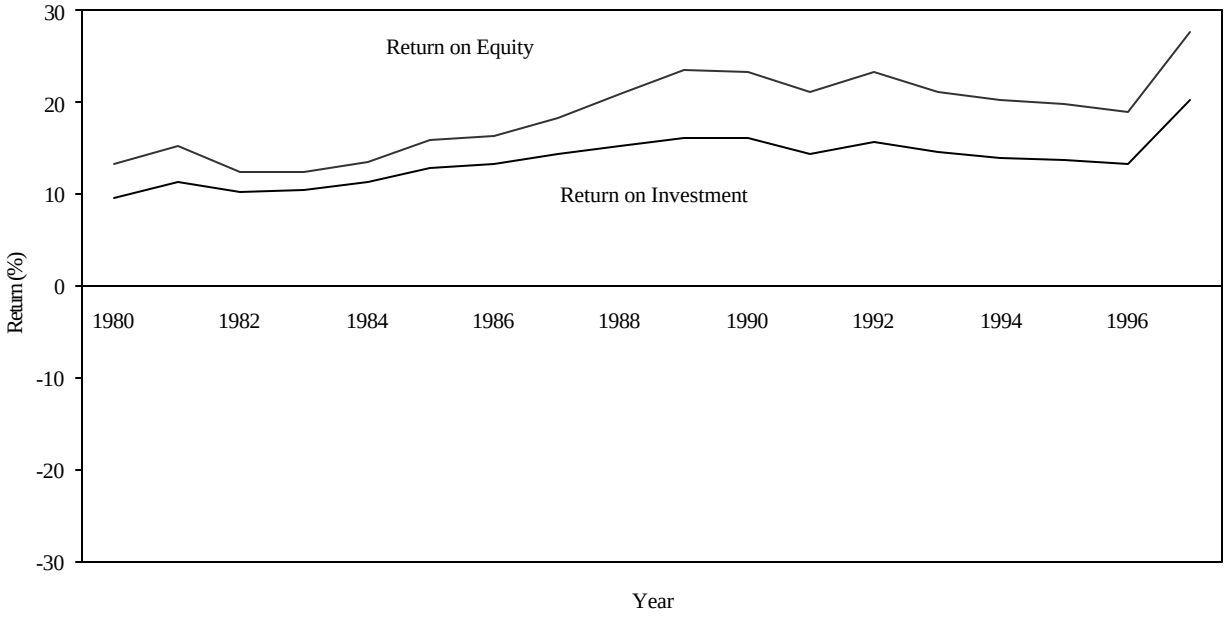


Figure 7. Food & Kindred Products Average Annual Economic Value Added, 1980-1997

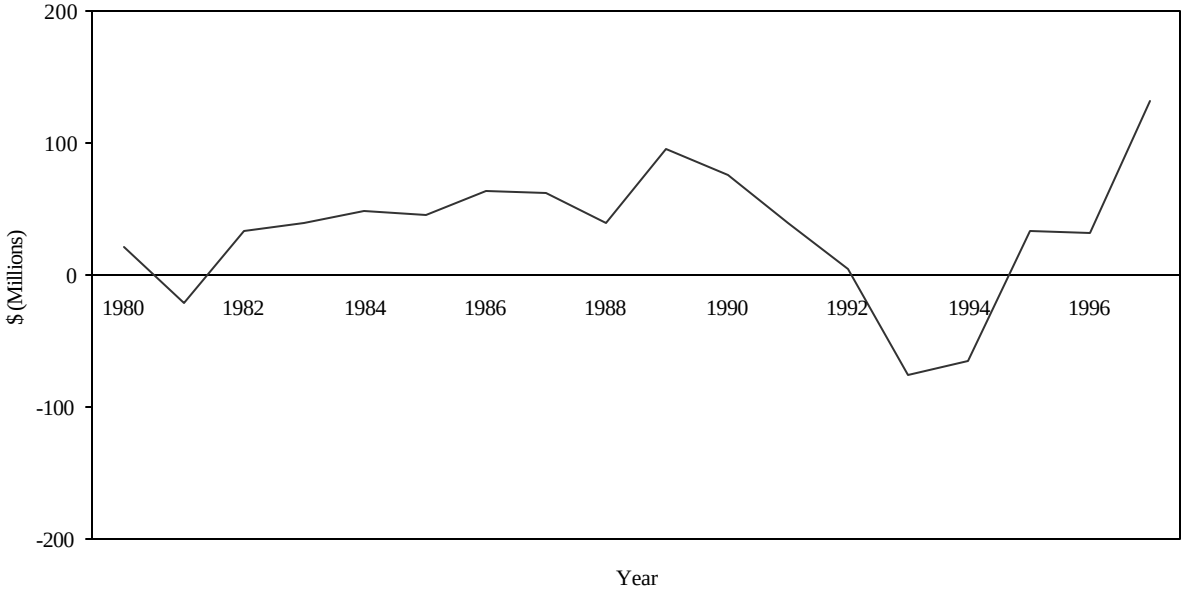
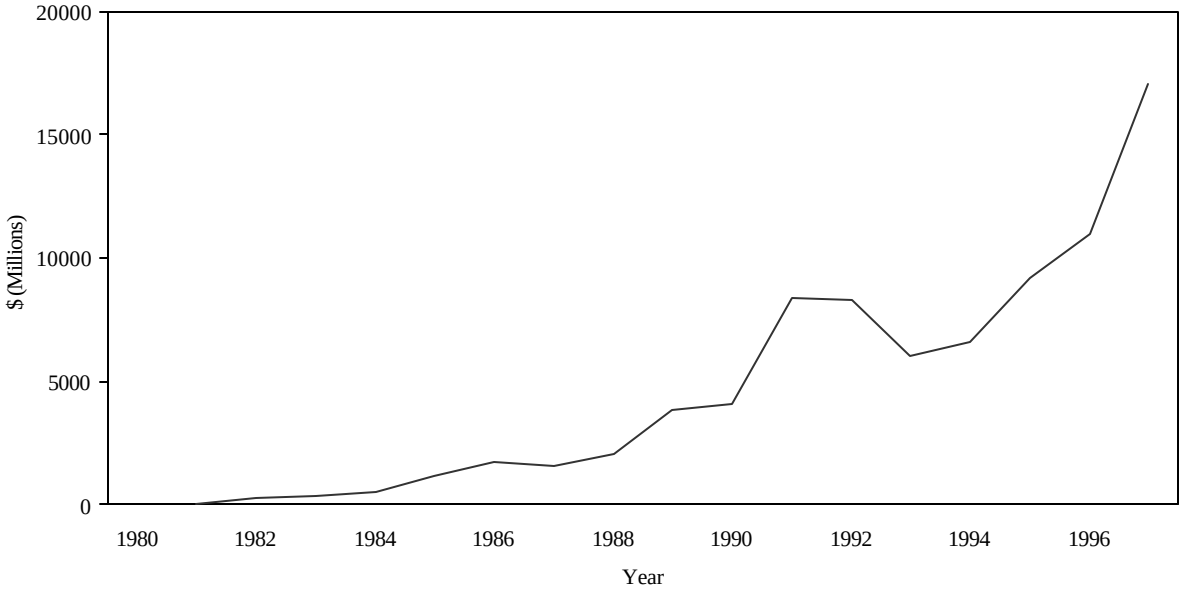


Figure 8. Food & Kindred Products Average Annual Market Value Added, 1980-1997



Meat and Poultry Products (SIC 201)
Companies included: Hormel Foods, IBP, Seaboard Corporation. Smithfield Foods, Thorn Apple Valley, Rymer Foods, Pilgrim's Pride, Tyson Foods, and WLR Foods, Inc. These industries include meat packing plants, sausage and other prepared meat processing, and poultry processing. According to the 1992 Census of Manufacturers by the U.S. Department of Commerce, companies in this industry accounted for $90.4 billion in sales while adding $19.1 billion in value through processing activities. Sales and value added through processing activities were up from $46.2 billion and $7.4 billion, respectively, in 1977.

The companies in this industry are large with homogeneous product offerings, taking advantage of high economies of scale. However, later in the time period studied, some firms had begun to produce differentiated products. Concentration in the beef slaughter industry changed drastically since 1980. The four largest firms handled 36% of the steer and heifer slaughter in 1980; concentration rose to 80% in 1993. By comparison, the hog slaughter market's four largest firms controlled only 56% of the market in 1998, but this was up from 36% in 1977. However, government studies have found few anticompetitive effects from the high level of concentration.

Although the average ROE and ROI are noticeably different, the annual averages are almost identical (Figure 9). Average annual EVA and MVA both remained quite low; comparative to other industries, they were near zero between 1980 and 1997 (Figures 10 and 11). EVA decreased dramatically in 1996 and 1997 because of depressed commodity prices and reduced exports that further depressed profits.

Figure 9. Meat and Poultry Products Average Annual ROE and Average Annual ROI, 1980-1997

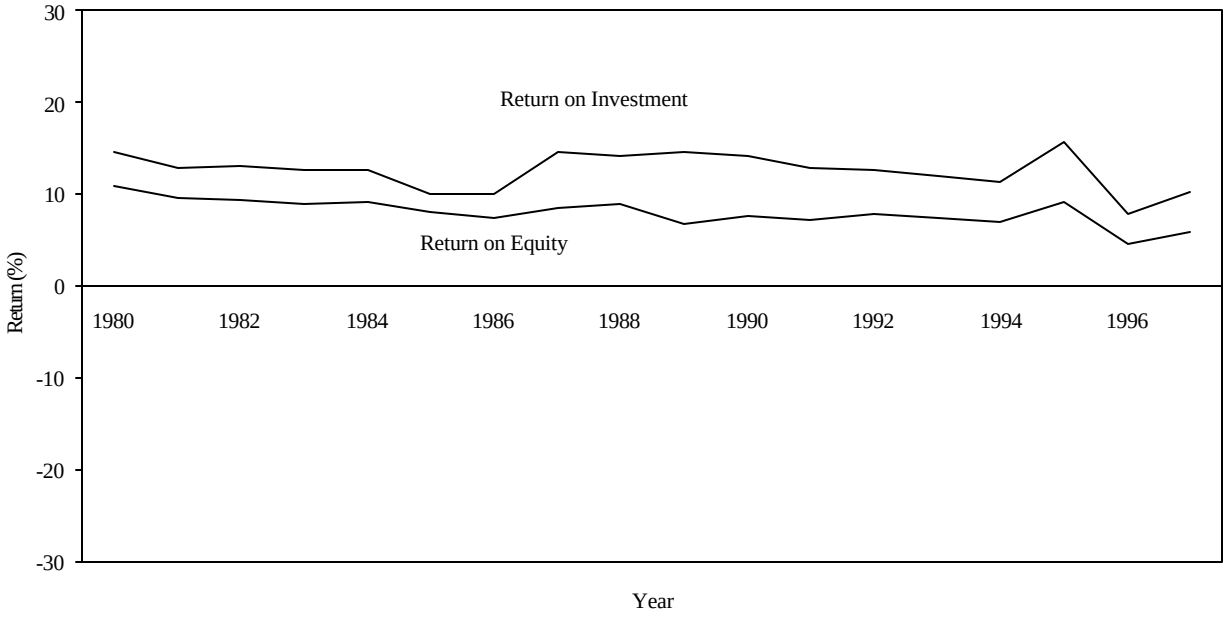


Figure 10. Meat and Poultry Products Average Annual Economic Value Added, 1980-1997

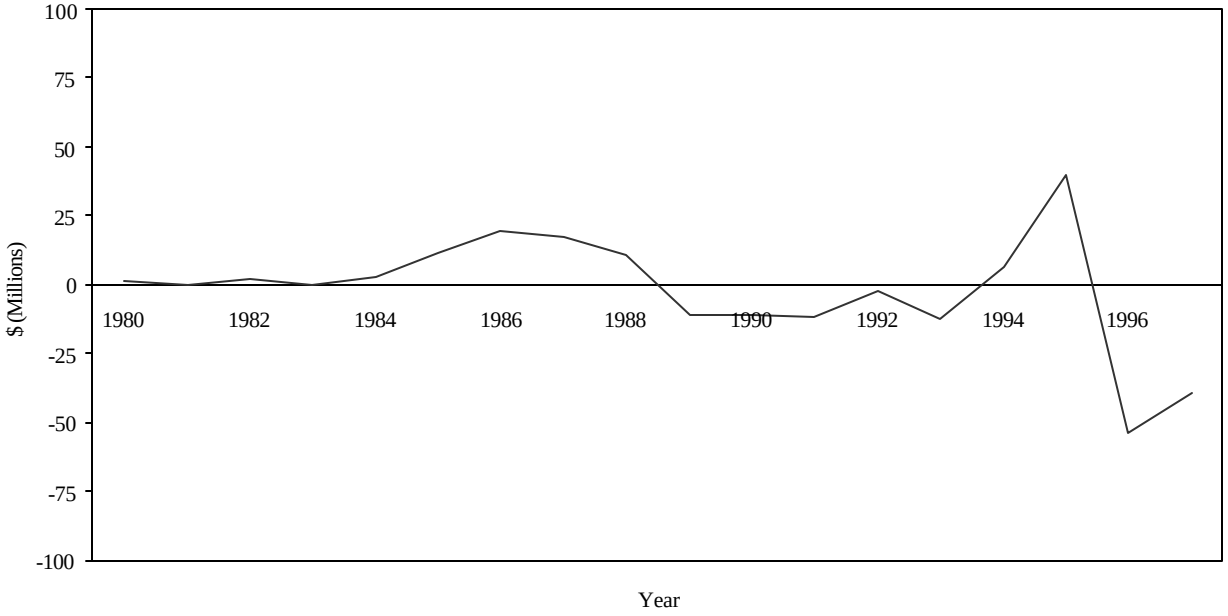
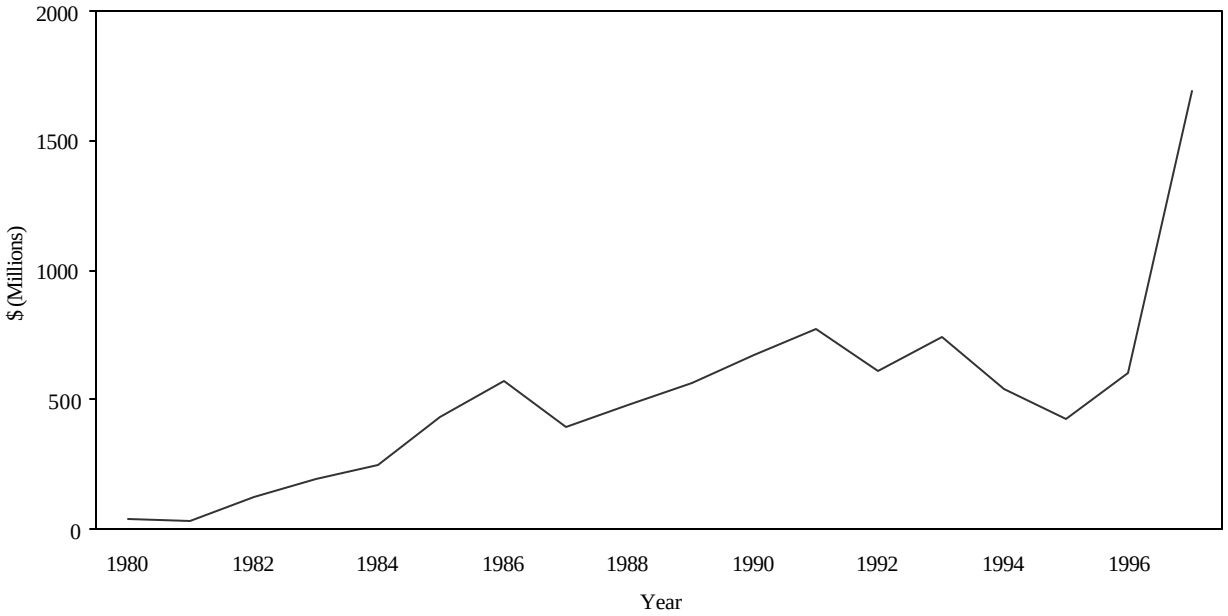


Figure 11. Meat and Poultry Products Average Annual Market Value Added, 1980-1997



Dairy Products and Ice Cream (SIC 202)
Companies included: Dean Foods, Lifeway Foods, Inc., Ben and Jerry's Homemade, Inc., and Dreyer's Grand Ice Cream. These industries include creamery butter; cheese; natural and processed, dry, condensed, and evaporated dairy products; ice cream and frozen desserts, and fluid milk. The dairy products market increased significantly between 1977 and 1992. Sales increased from $26 billion to $54.6 billion, and value added through processing activities increased as well from $5.6 billion to $16 billion. More importantly, the portion of the sales that was due to value added to the product increased from 21.5% to 29.6% during this same period.

The numbers of firms producing milk and manufactured dairy products has declined since the 1970s. Market power has changed over time, away from the processor and to the retailer. This is a direct result of the shift of the milk industry's emphasis on service to that of a commodity, focusing on efficiency and minimal costs. Because of the commodity status of fluid milk and the dominance of cooperatives in procuring milk and processing milk in some market segments, most large corporations in this industry focus on value added and branded market categories such as cheese, yogurt, and ice cream.

Differences in ROE and ROI show a sizable use of long-term debt to finance growth and expansion in the industry (Figure 12). The use of debt to finance acquisitions and mergers could be explained by the use of tangible assets in the milk and dairy processing sector. Average annual EVA and MVA remained quite low, near zero between 1980 and 1997 (Figures 13 and 14). The decrease in EVA in 1996 was due to the depressed milk prices during that time. Similar to the meat industry, the activities associated with adding value to the product are relatively low compared to the price of the input, milk. Accordingly, value addition would be expected to remain low.

Figure 12. Dairy Products and Ice Cream Average Annual ROE and ROI, 1980-1997

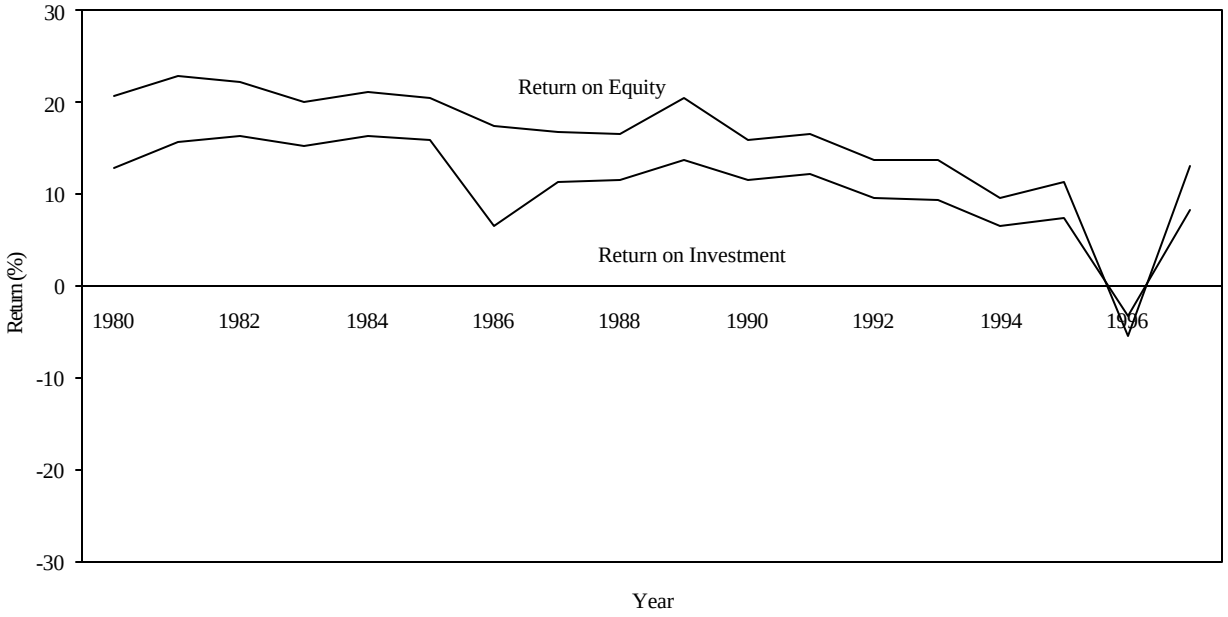


Figure 13. Dairy Products & Ice Cream Average Annual Economic Value Added, 1980-1997

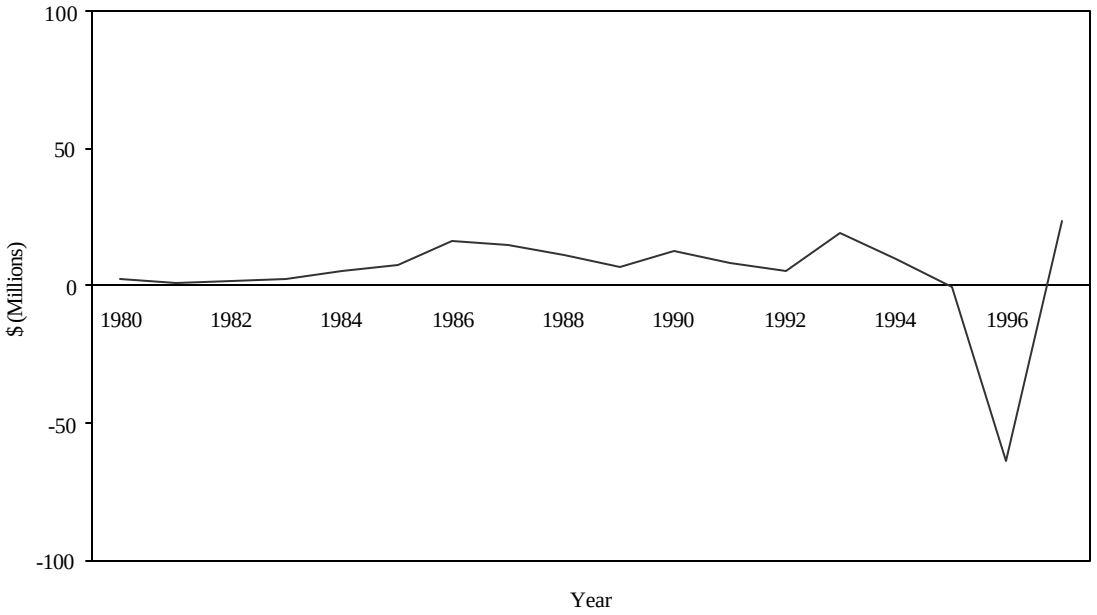
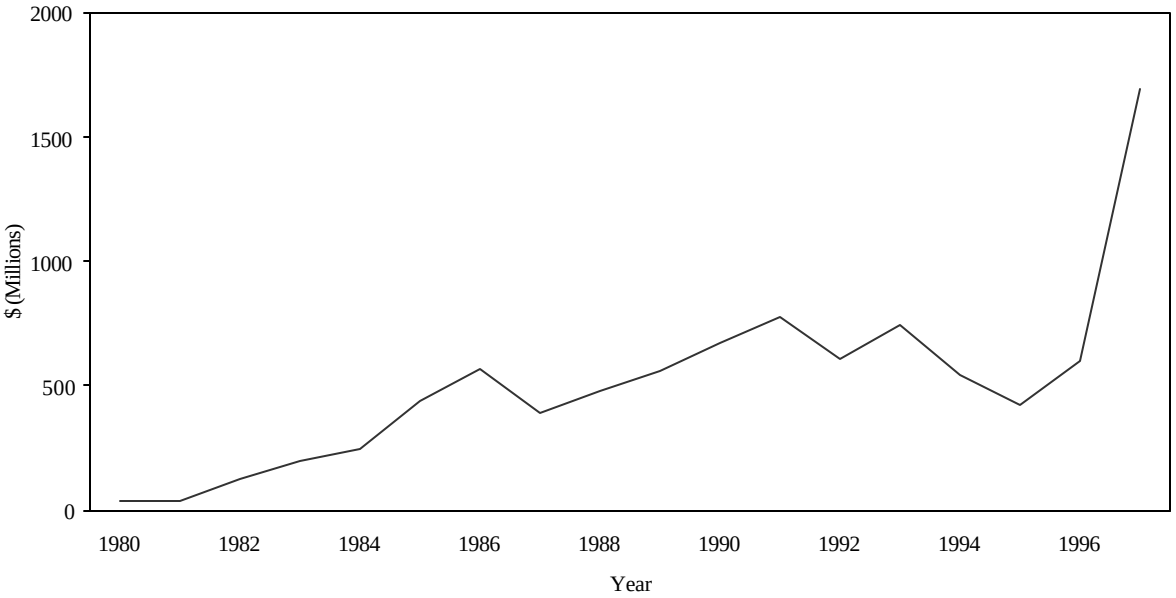


Figure 14: Dairy Products and Ice Cream Average Annual Market Value Added, 1980-1997



Fruits and Vegetables-Preserved (SIC 203)
Companies included: Bestfoods, Campbell Soup Company, H. J. Heinz Company, Hanover Foods, Organic Food Products, Inc., and J.M. Smucker Company. These industries include canned specialties; canned fruits and vegetables; dehydrated fruits, vegetables, and soups; pickles, sauces, and salad dressings; and frozen fruits and vegetables. Sales and value added through processing have more than doubled in the preserved fruits and vegetables industry. Sales for this industry increased from $16.9 billion to $38.5 billion, and value added through processing activities rose from $6.5 billion to $17.2 billion. This increase was accompanied by an increase in the proportion of value added as a part of sales, from 38.4% to 44.7.

This industry group had moderate to high ROE and high ROI (Figure 15). The average annual return on equity was very stable, with ROE consistently between 12% and 18%. The difference between the ROI and the ROE increased from 1980-1997, revealing increased long-term debt usage. This high debt is more the exception than the rule; many successful companies even in high-debt industries use minimal levels of debt because of high cash flows that result in internal financing rather than use of further debt or equity offerings to finance expansion or acquisition.

The average annual EVA grew in the mid-1980s and experienced further growth during the early and mid-1990s before decreasing by almost 50% after 1995 (Figure 16). During this period of time, Campbell Soup Company divested a portion of its product lines including the Swanson and Vlasic lines, and Bestfoods spun off its corn-refining division to become Corn Products International. Investors viewed these as positive moves, because the MVA did not reflect the changes in the EVA; rather the MVA remained near a constant growth trend because of higher market capitalization (Figure 17).

Figure 15. Fruits and Vegetables-Preserved Average Annual ROE and ROI, 1980-1997

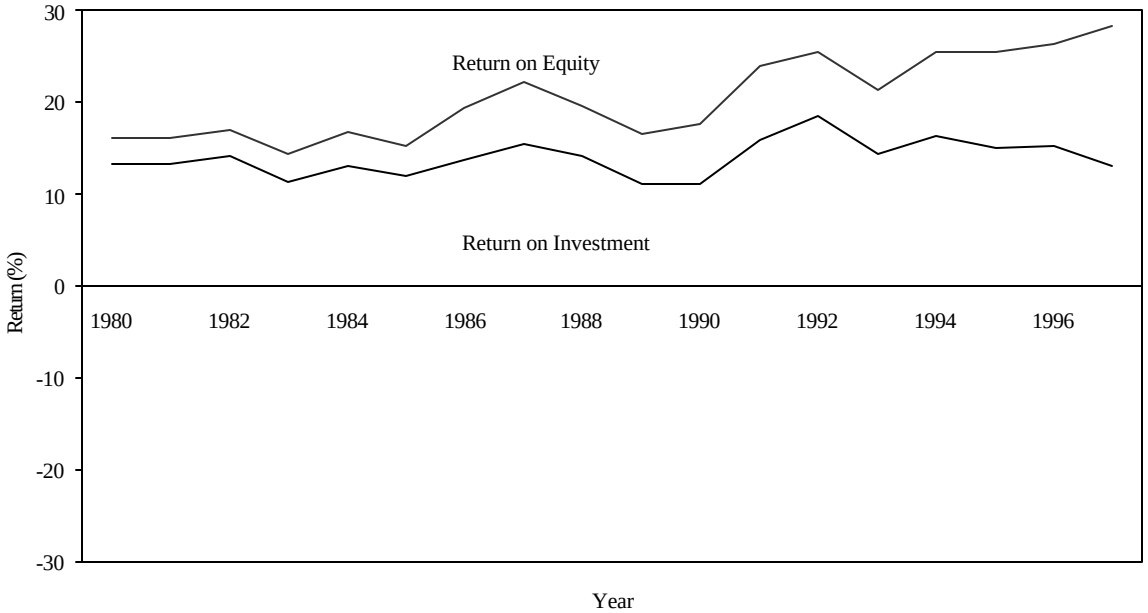


Figure 16. Fruits & Veg.-Preserved Average Annual Economic Value Added, 1980-1997

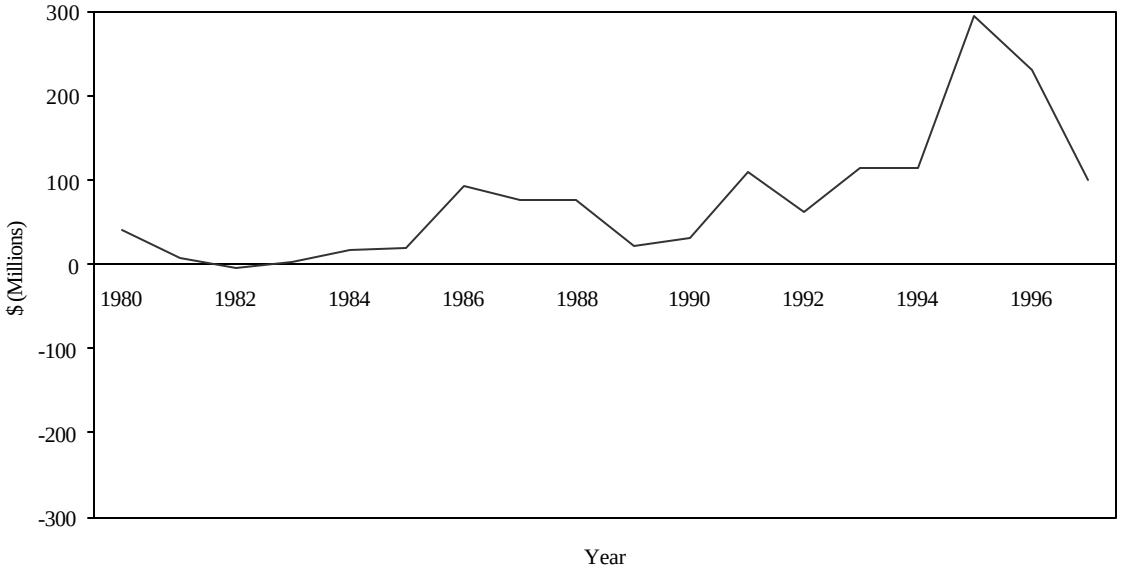
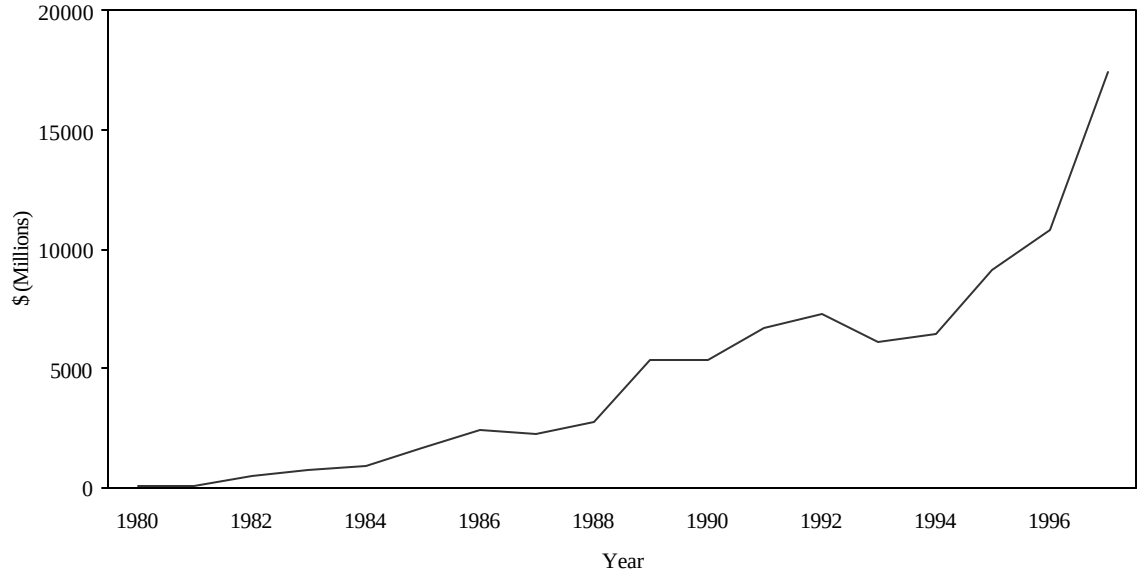


Figure 17. Fruits & Veg.-Preserved Average Annual Market Value Added, 1980-1997



Grain Mill Products (SIC 204)

Companies included: Corn Products International, General Mills Incorporated, Kellogg Company, Midwest Grain Products, Quaker Oats Company, Ralston Purina Company, and Riviana Foods. These industries include flour and other grain mill products, cereal breakfast foods, rice milling, prepared flour mixes and doughs, wet corn milling, dog and cat food, and prepared feeds. The grain mill products industry represents a diverse group of industries that revolve around grain or a grain product as their main input. However, the products range from commodity types of products such as flour or corn sweeteners to highly branded products such as breakfast cereals. Growth of this industry group between 1977 and 1992 was rapid. During this period of time, sales grew from $8.1 billion to $23.1 billion, and value added through processing grew from $2.9 billion to $12.2 billion. This growth included an increase in value added activities from 35.8% of sales to 52.8% in that 15-year period.

Two main factors explain this high level of growth in the industry. First, advances in production techniques of corn sweeteners and sugar subsidies reflected by artificially high sugar prices have given corn sweeteners a cost advantage over sugar, increasing corn sweetener's share of the sucrose market from 16% in 1970 to 56% in 1997. Combined with the fact that caloric sweetener consumption rose by 34 pounds per capita in the United States from 1982 to 1997 and worldwide high levels reached 154 pounds per capita, this resulted in a dramatic increase in the use of corn by processors. In addition to an increased demand for corn products, an increased demand for grain and fiber-based products can be attributed to health-conscious consumers and the United States Department of Agriculture's Food Guide Pyramid suggesting high consumption of grain-based foods for health reasons.

The ROE grew from 17.2% in the 1980s to 48% during the mid 1990s, only to collapse to less than 10% in 1997 (Figure 18). This decline is attributable to several factors including the decline for breakfast cereals, which traditionally had high margins, increased competition from private label products, and the inability to fully utilize capacity resulting from the two previous factors. The ROI grew at a slower rate than the ROE but still collapsed from a high of 20.6% to 3% in 1997. This difference between the two returns indicates heavy debt financing of assets in this industry.

The average annual EVA experienced rapid growth during the mid-1980s and then remained stable, decreasing only in 1997 (Figure 19). MVA mirrored this trend, with slow growth in the early 1980s, higher rates of growth beginning in the mid-1980s, then slow growth in the mid-1990s (Figure 20). The low growth and reduced profitability in the mid-1990s were results of overcapacity that was built up because of attractive profitability in the grain processing industry, especially that of corn processing. For example, ProGold L.L.C., a North Dakota joint venture between sugarbeet processing cooperatives, built a corn processing facility in 1996, only to lease it to Cargill less than 1 year after opening it because of heavy losses as a result of low prices for corn sweeteners.

Figure 18. Grain Mill Products Average Annual ROE and ROI, 1980-1997

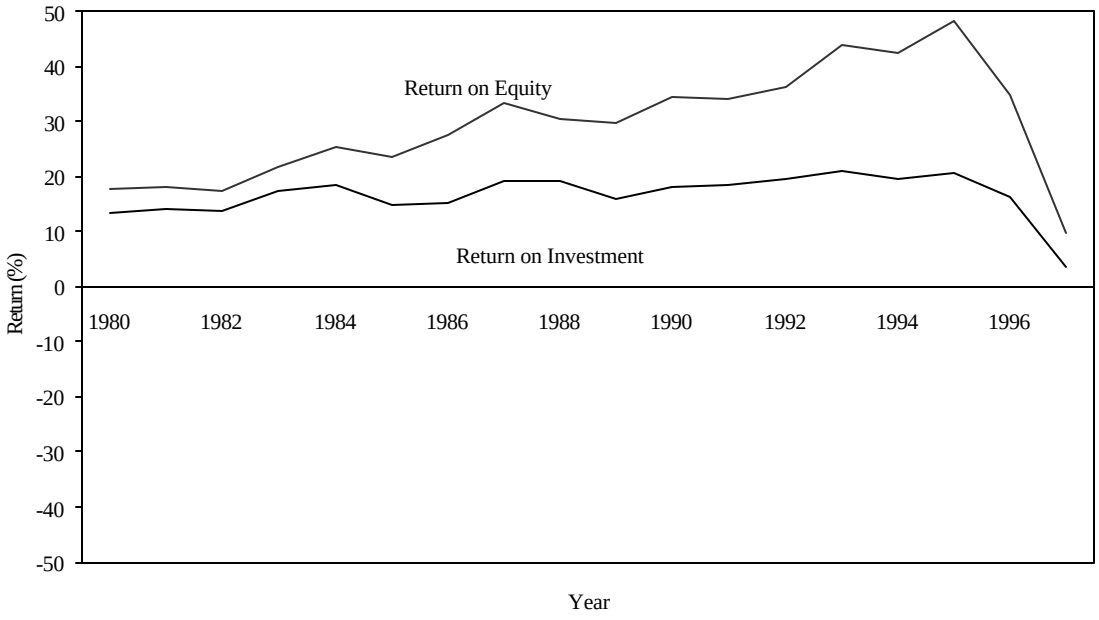


Figure 19. Grain Mill Products Average Annual Economic Value Added, 1980-1997

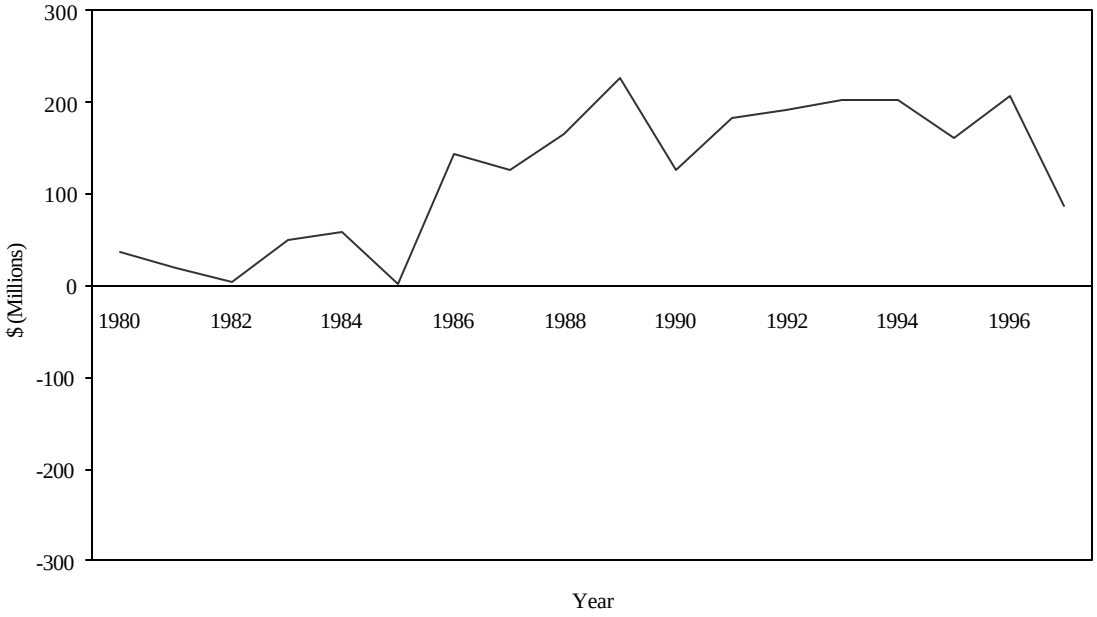
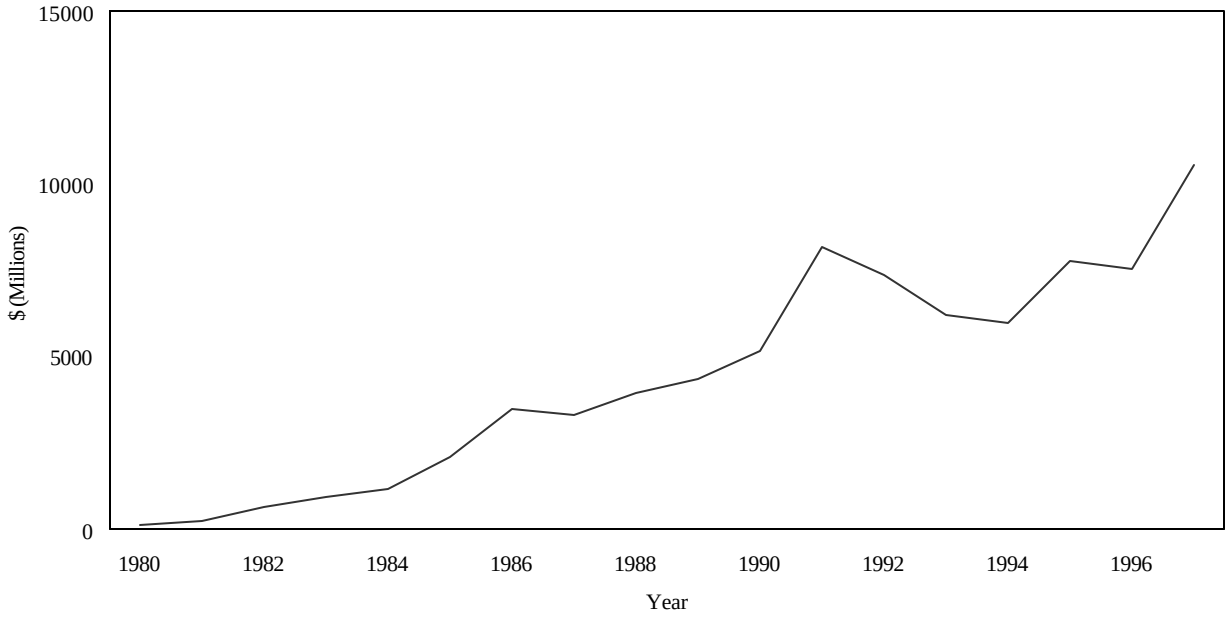


Figure 20. Grain Mill Products Average Annual Market Value Added, 1980-1997



Bakery Products (SIC 205)

Companies included: Flowers Industries, Fresh Foods Incorporated, Interstate Bakeries CP, Lance Incorporated, Nabisco Holdings Corp., and Silverado Foods, Inc. These industries include bread, cake, and related products; cookies and crackers; and frozen bakery products, except bread. This industry group is relatively homogeneous. These companies' core businesses revolve around baking. There are basically no substitutes for bread and other grain-based consumer foods in the American diet, so these products are almost immune to macroeconomic changes. Sales increased 235% from $11.6 billion in 1977 to $27.4 billion in 1992. Per capita consumption of wheat flour rose 35% from 1970 to 150 pounds per capita in 1997. This large surge in grain consumption was due to consumers including more fiber in their diets, aggressive advertising and health claims by food processors, in addition to the convenience of grain-based foods. The value added to the product has been stable, remaining at 61% of total sales value. Bakery goods have not changed significantly, and their characterization as a staple good results in downward pressure on the price of bread. The stability of the level of value added to the product reveals a reduction in in-home baking and a continued reliance on commercial bakeries for bakery products.

ROE during the 1980s and the early 1990s remained stable as well. It remained near 15% until 1993, whereas ROI fluctuated near 10% until 1988, then decreased and remained near 5% (Figure 21). The average annual EVA and MVA were stable near zero with slight growth in the MVA during the last 2 years that resulted from restructuring moves made by companies such as Interstate Bakeries in acquiring Continental Baking from Ralston Purina, which purchased it when Anheuser-Busch divested its bakery goods business unit (Figures 22 and 23). Both EVA and MVA reflect the lower levels of additional value created through this industry.

Figure 21. Bakery Products Average Annual ROE and ROI, 1980-1997

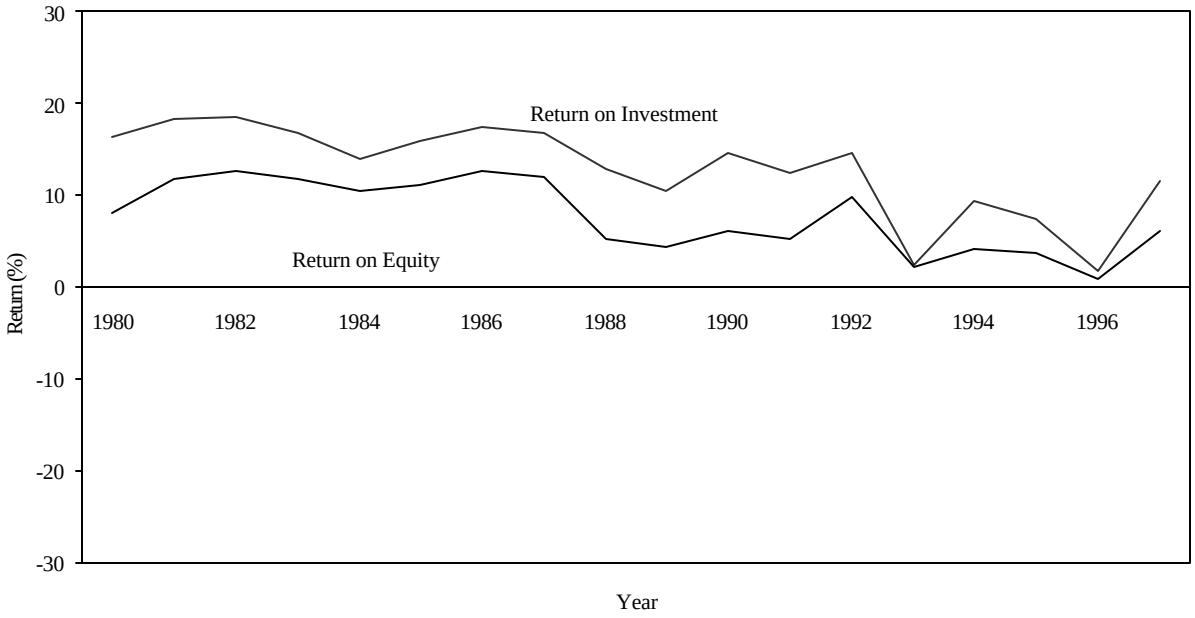
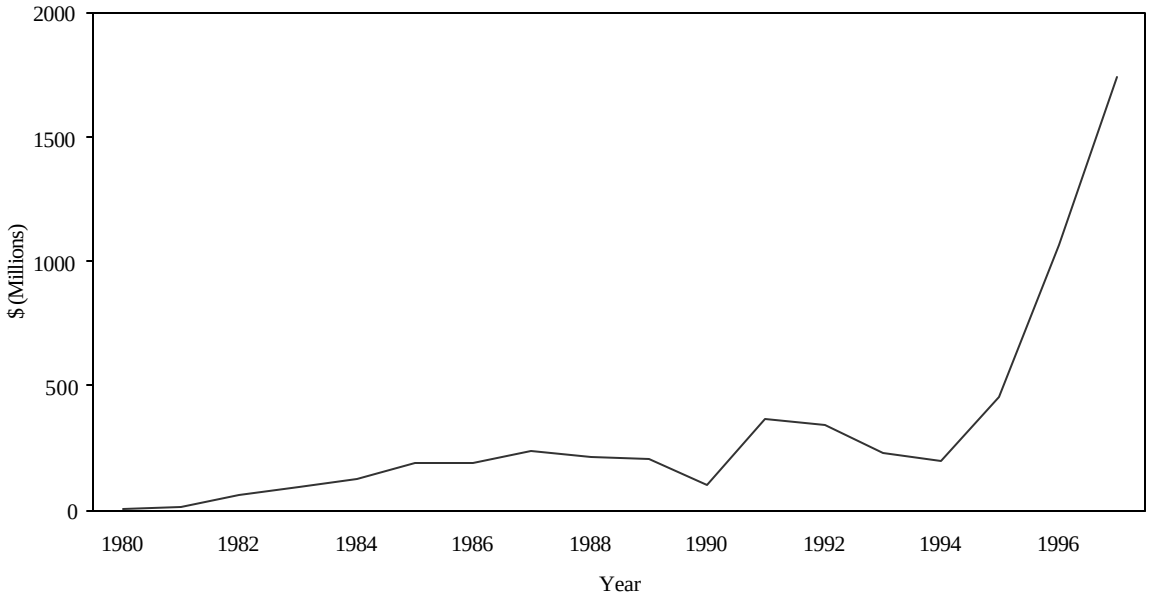


Figure 22. Bakery Products Average Annual Economic Value Added, 1980-1997

Figure 23. Bakery Products Average Annual Market Value Added, 1980-1997



Sugar Products (SIC 206)

Companies included: Hershey Foods Corporation, Imperial Sugar Company, Sterling Sugars, Inc., Tootsie Roll Industries, and W.M. Wrigley Company. These industries include raw cane sugar, cane sugar refining, beet sugar, candy and other confectionary products, chewing gum, chocolate and cocoa products, and salted and roasted nuts and seeds. This industry group is highly diversified within the sugar industry, from refiners of sugar that supply the baking, snack, and confectionary industry to producers of confectionary products. Sales in this industry in 1992 were $22.7 billion, adding $11 billion worth of value through manufacturing activities, a 48.2% addition. This industry averaged moderate to high ROI and ROE with sustained annual growth throughout the 1980s and 1990s. The sharp increase in ROE in 1997 was a result of the acquisition of Savannah Foods by the Holly Sugar Company doubling its size to form the Imperial Sugar Company. Differences between the two returns indicate moderate use of long-term debt for financing (Figure 24).

The sugar industry has capitalized on a dramatic rise in a steep rise in caloric sweetener consumption since the mid-1980s, although only a small portion of that increase was attributable to an increase in refined sugar. From 1985 to 1996, consumption of caloric sweeteners rose from 128.6 pounds per capita to 152.3 pounds per capita; however, consumption of refined sugar rose only from 63.2 to 66.9 pounds per capita. The remainder of the growth in caloric sweetener consumption was due to strong growth in corn-derived products. The strong growth of the corn processing facilities also helped keep downward pressures on input costs for sugar and confectionary products. Average annual EVA was relatively low, near zero (Figure 25). EVA growth occurred beginning in 1991 and continuing through 1997. Average annual MVA grew steadily from the late 1980s through 1997 (Figure 26).

Figure 24. Sugar Products Average Annual ROE and ROI, 1980-1997

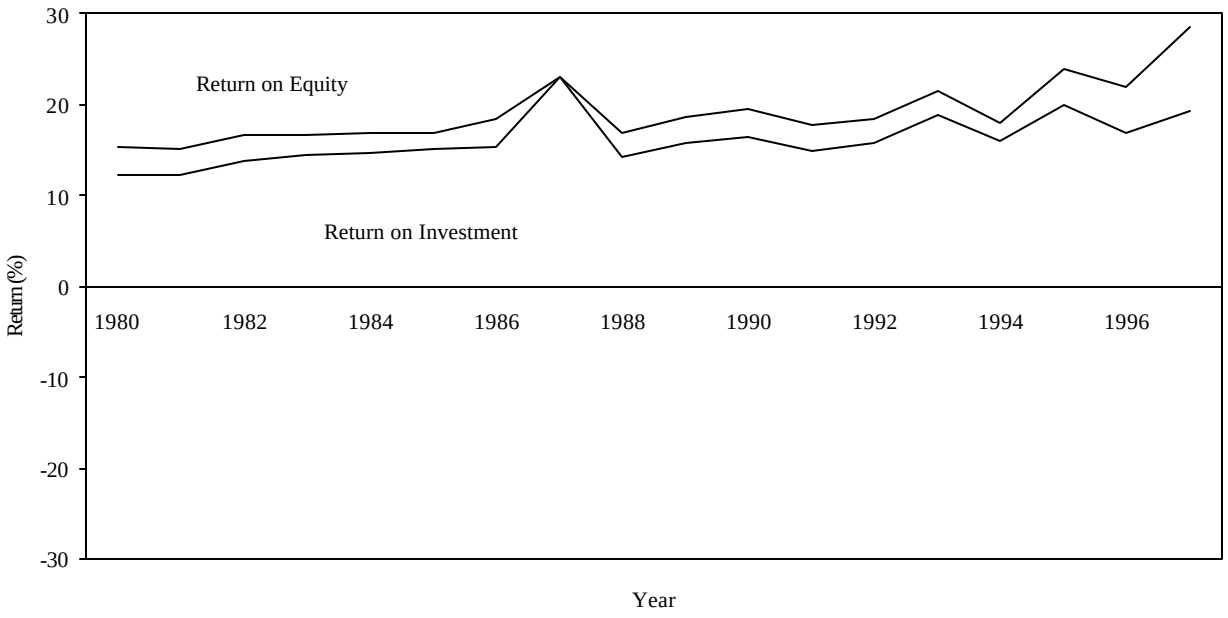


Figure 25. Sugar Products Average Annual Economic Value Added, 1980-1997

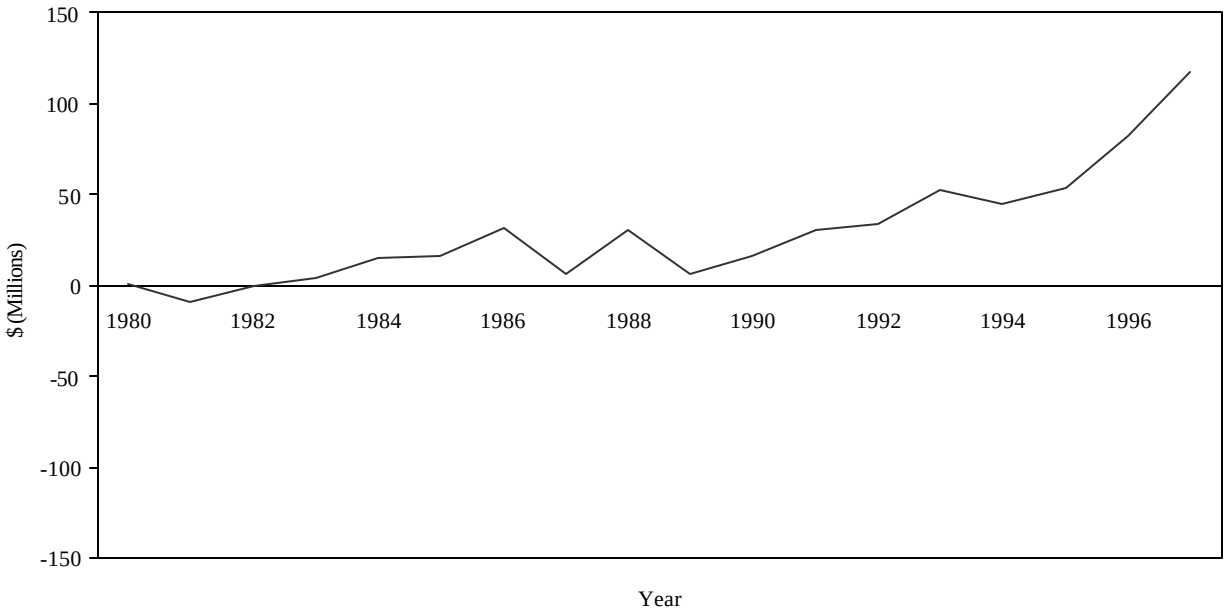
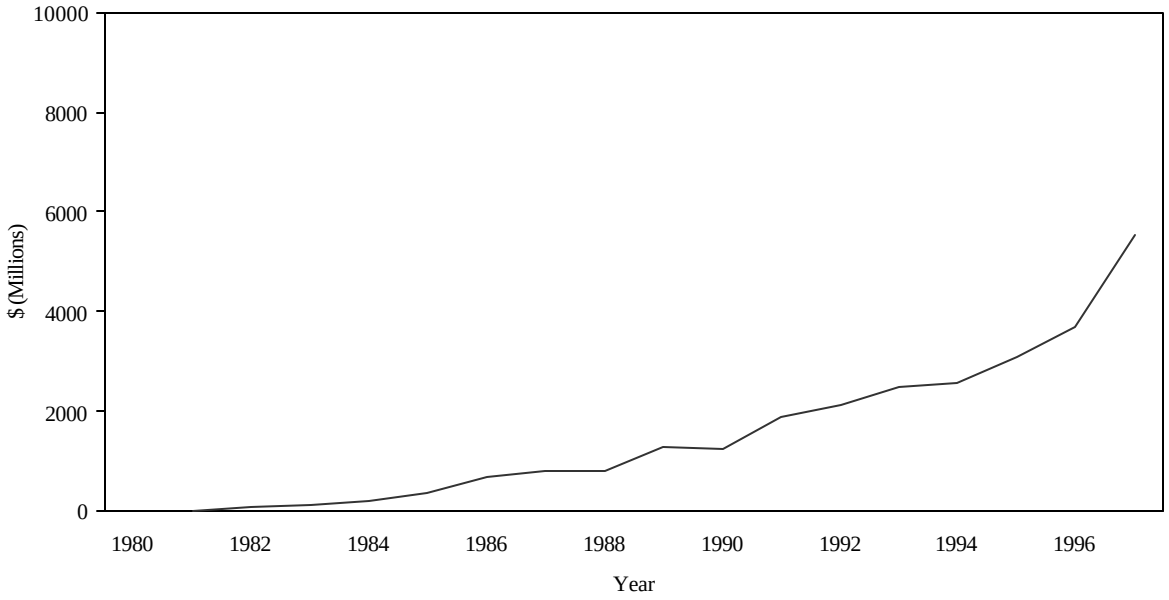


Figure 26. Sugar Products Average Annual Market Value Added, 1980-1997



Fats and Oils (SIC 207)

Companies included: Archer Daniels Midland Company. These industries include cottonseed oil mills, soybean oil mills, vegetable oil mills, animal and marine fats and oils, and edible fats and oils. This is an important industry that has not consistently returned well on equity or investment. However, this does parallel how much value is added through processing activities. The percentage of value added through processing of final product value, although growing, has remained substantially lower than that of other industries. Between 1977 and 1992, value added through processing activities increased 97% from $1.9 billion to $3.75 billion. During the same period of time, sales in this industry increased 29% from $14.5 billion to $18.7 billion. The share of value-added as a part of sales grew from 13.2% to 20%, still relatively low compared to other industries. Both ROE and ROI were relatively low, ROI remained between 5% and 10% and ROE fluctuated around 10% (Figure 27).

The average annual EVA remained negative, increasing to positive only in 1988, 1995, and 1996, before decreasing in 1997 (Figure 28). This reflects the overcapacity in the oilseeds crushing industry that was built up during the 1980s and 1990s. Average annual MVA did grow significantly during the late 1980s and fluctuated at a moderately stable level during the remainder of the 1990s (Figure 29). Archer Daniels Midland's two main industries that process commodity products resulting in commodity-like products (e.g., oilseed crushing and corn processing) have come under heavy competition because of industry overcapacity, thus creating downward pressures on prices and profitability.

Figure 27. Fats and Oils Average Annual ROE and ROI, 1980-1997

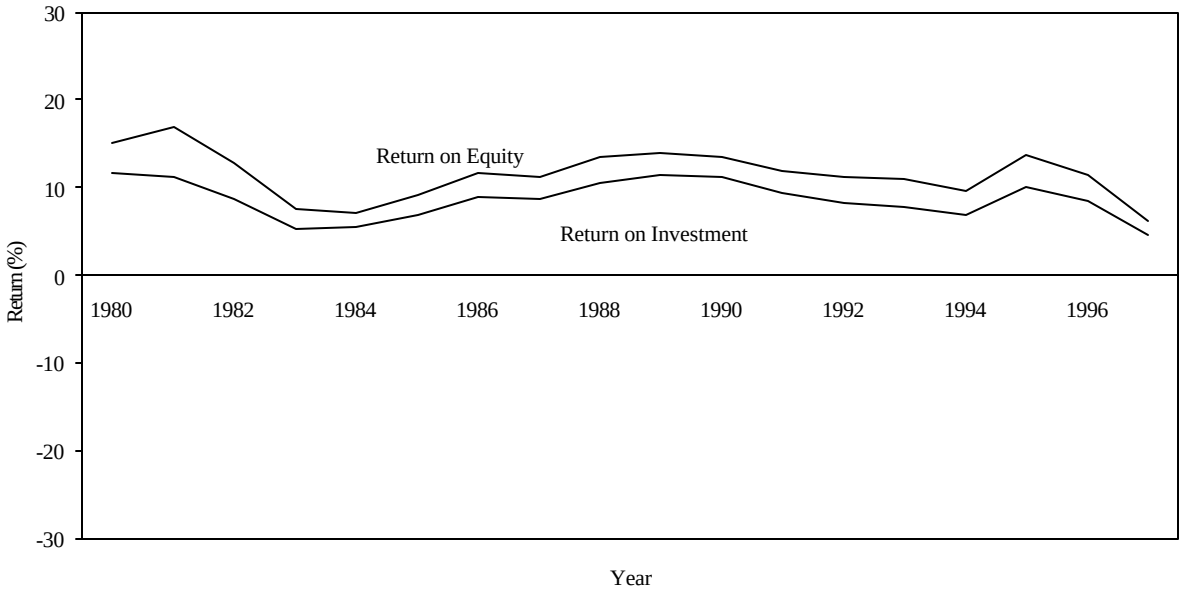


Figure 28. Fats & Oils Average Annual Economic Value Added, 1980-1997

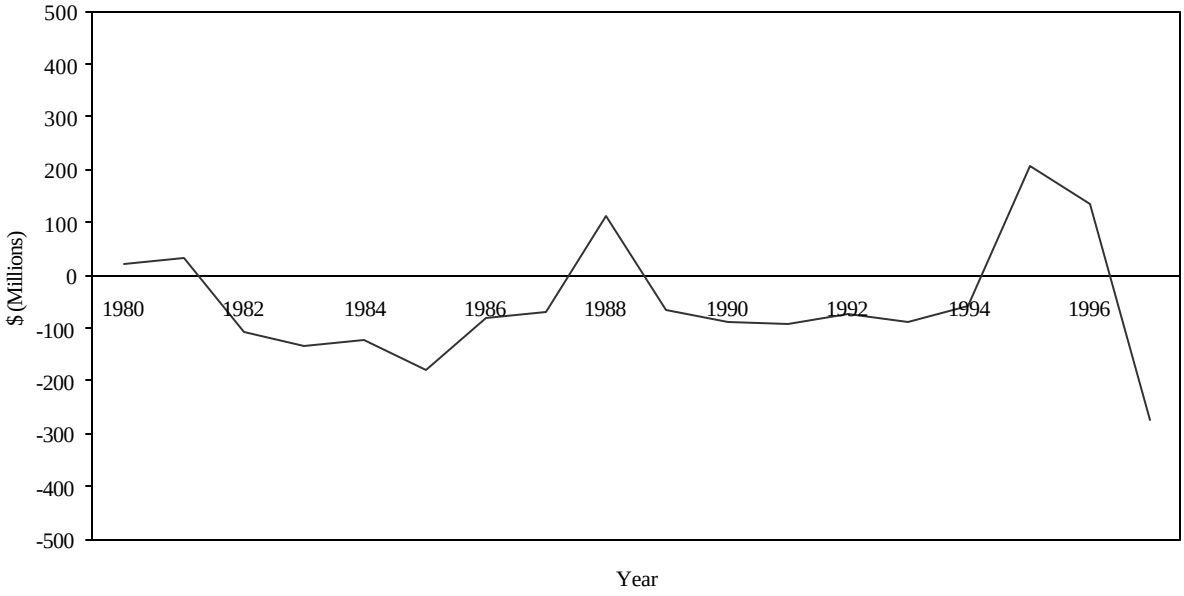
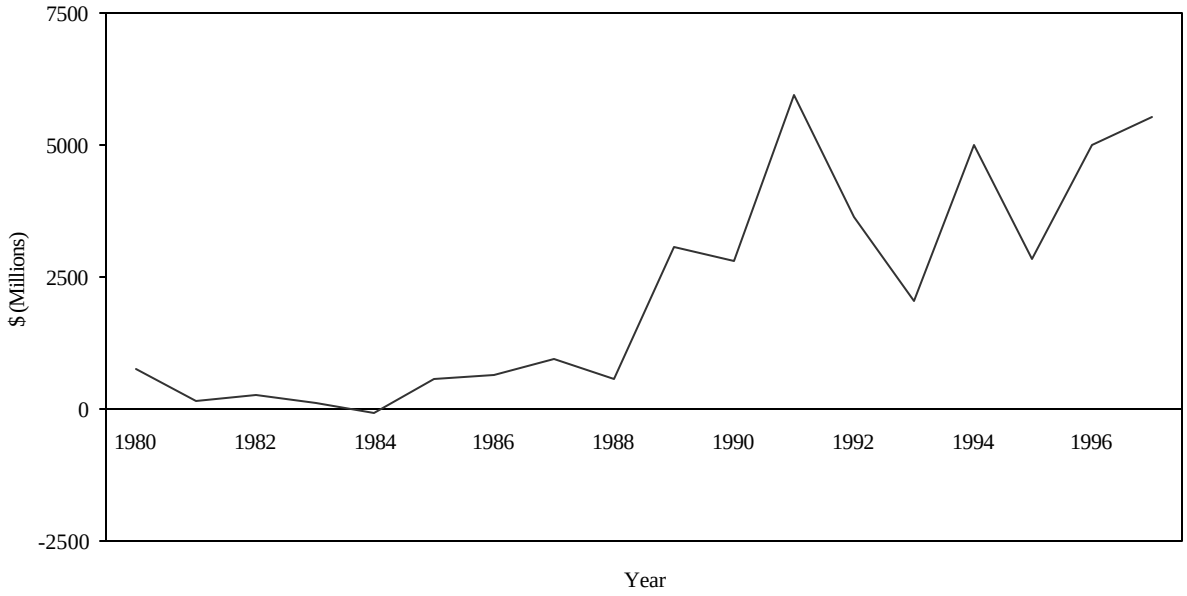


Figure 29. Fats and Oils Average Annual Market Value Added, 1980-1997



Beverages (SIC 208)

Companies included: Coca-Cola Company, Pepsico, Incorporated, Triarc Companies Incorporated, Anheuser-Busch Companies Incorporated, Boston Beer, Inc., Adolph Coors Company, Seagram Company Ltd., Cadbury Schweppes PLC, Coca-Cola Bottling Company, Cott Corp., National Beverage Corp., Stokely Van Camp Incorporated, and Whitman Corporation. These industries include malt beverages, malt, wines, brandy, and brandy spirits; distilled and blended liquors; bottled and canned soft drinks; and flavoring extracts and syrups. The beverage industry was highly successful during the 1980s and 1990s. A 148% increase in sales between 1977 and 1992 from $23.3 billion to $57.9 billion helped this industry remain successful. Value added through processing increased as well by 195% from $9.9 billion to $29.2 billion, and the share of value added increased from 42.4% to 50.5%. This industry contains highly branded products with high costs for advertising and marketing.

Average annual ROE and ROI in the beverage industry grew throughout the 1980s and 1990s (Figure 30). The average annual EVA began a growth trend in 1984 that remained strong throughout the 1990s (Figure 31). The average annual MVA followed the same trend, consistently growing with exceptionally rapid growth particularly after 1994 (Figure 32). The success of this industry can be attributed to two key factors, high growth in consumption and low cost inputs. During the period of time between 1986 and 1997, consumption of soft drinks rose from 28 gallons per capita to 41 gallons per capita, an increase of 47%. During this same period, major expansion in the corn milling industry from high profits resulted in the overcapacity of that industry in the late 1990s. This overcapacity, coupled with low corn prices, has kept downward pressures on the price of corn sweeteners, a key ingredient of soft drinks.

Figure 30. Beverages Average Annual ROE and ROI, 1980-1997

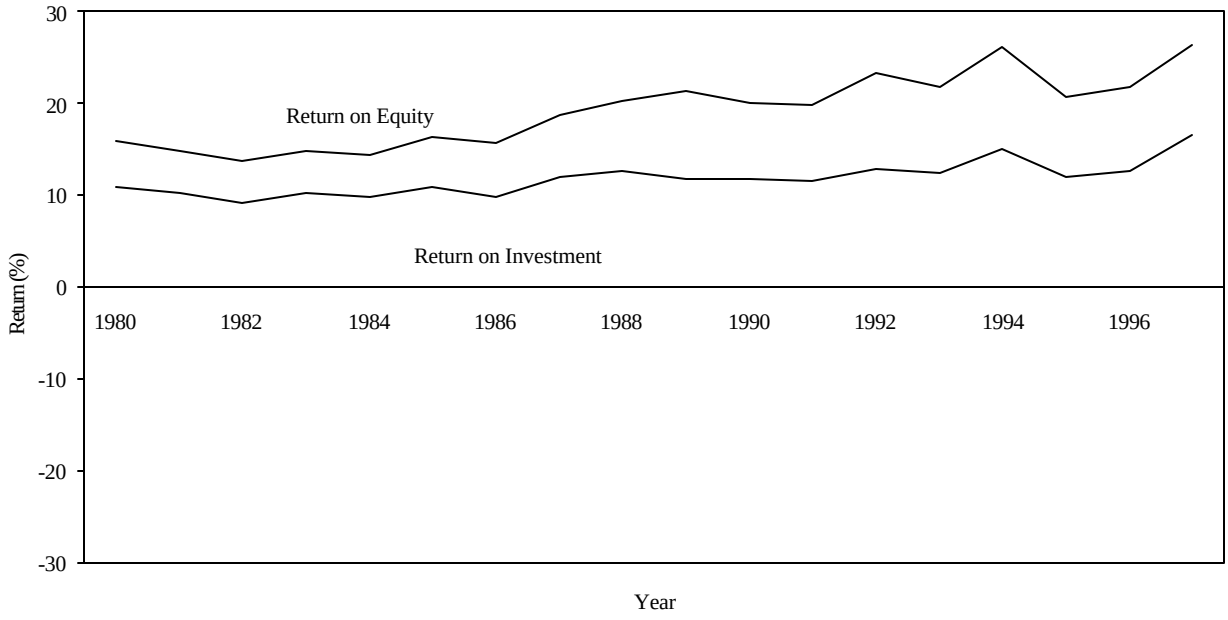


Figure 31. Beverages Average Annual Economic Value Added, 1980-1997

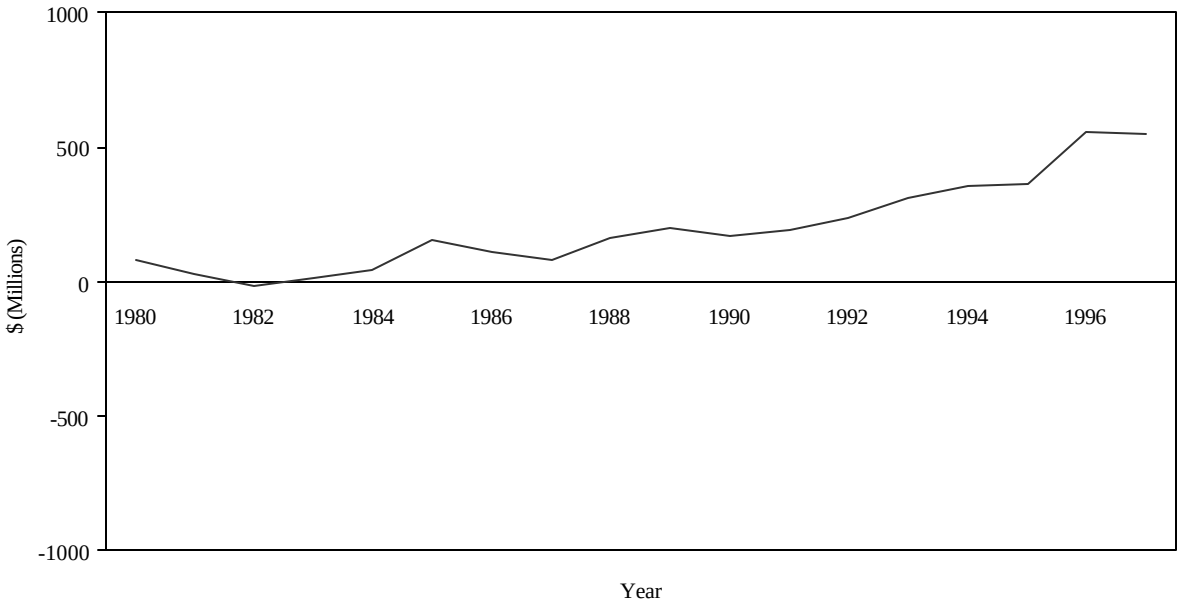
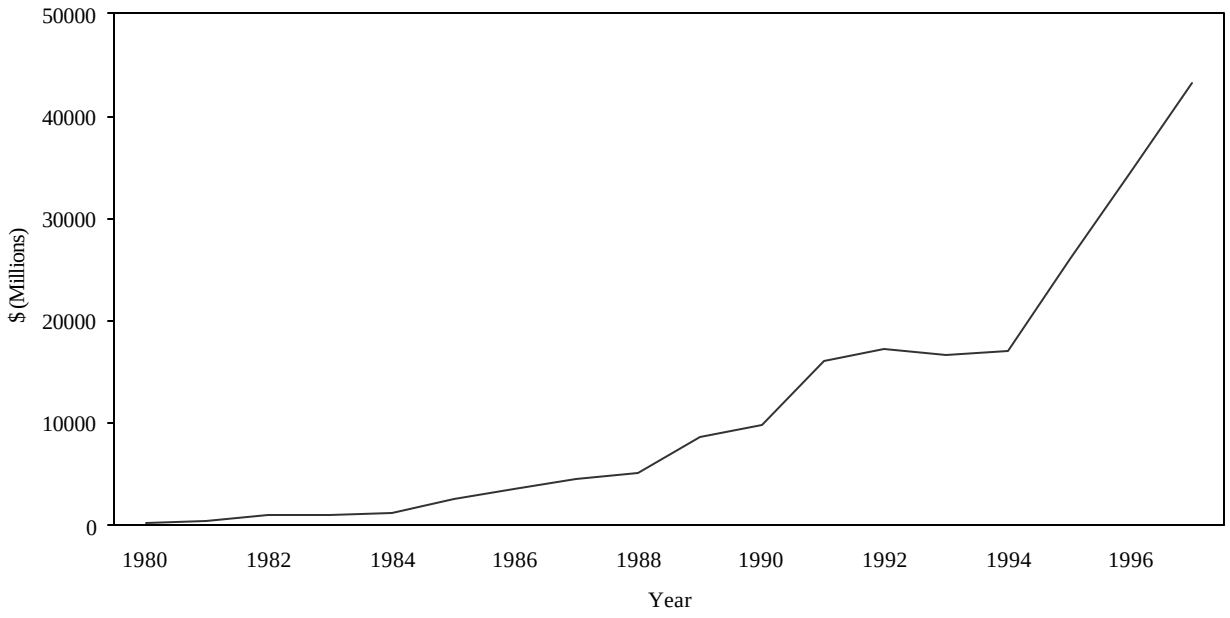


Figure 32. Beverages Average Annual Market Value Added, 1980-1997



Miscellaneous Food Products (SIC 209)

Companies Included: American Italian Pasta Company, Celestial Seasonings, Chock Full O' Nuts, Golden Enterprises, McCormick and Company, and Sparta Foods. These industries include canned and cured fish and seafood, fresh or frozen prepare fish, roasted coffee, potato chips and similar snacks, manufactured ice, macaroni and spaghetti, and food preparations. This industry saw modest growth in the late 1980s and early 1990s, growing 18% in sales from $29.1 billion to $34.5 billion and having value-added growth of 19.3% from $13.7 billion to $16.3 billion between 1987 and 1992. However, the percentage of sales that was value added remained stable at 47%.

ROE and ROI remained moderate with little constant growth (Figure 33). Increased differences between ROE and ROI during the late 1980s through the 1990s indicate an increase in the usage of long-term debt financing in this industry. Because capital requirements could not be met through internal financing, the external debt market was used.

The average annual EVA and MVA trends remained stable throughout the period of study (Figures 34 and 35). EVA consistently fluctuated around zero, and the MVA remained near zero until 1989, then minimal growth occurred, and it remained stable through 1997.

Figure 33. Miscellaneous Food Products Average Annual ROE and ROI, 1980-1997

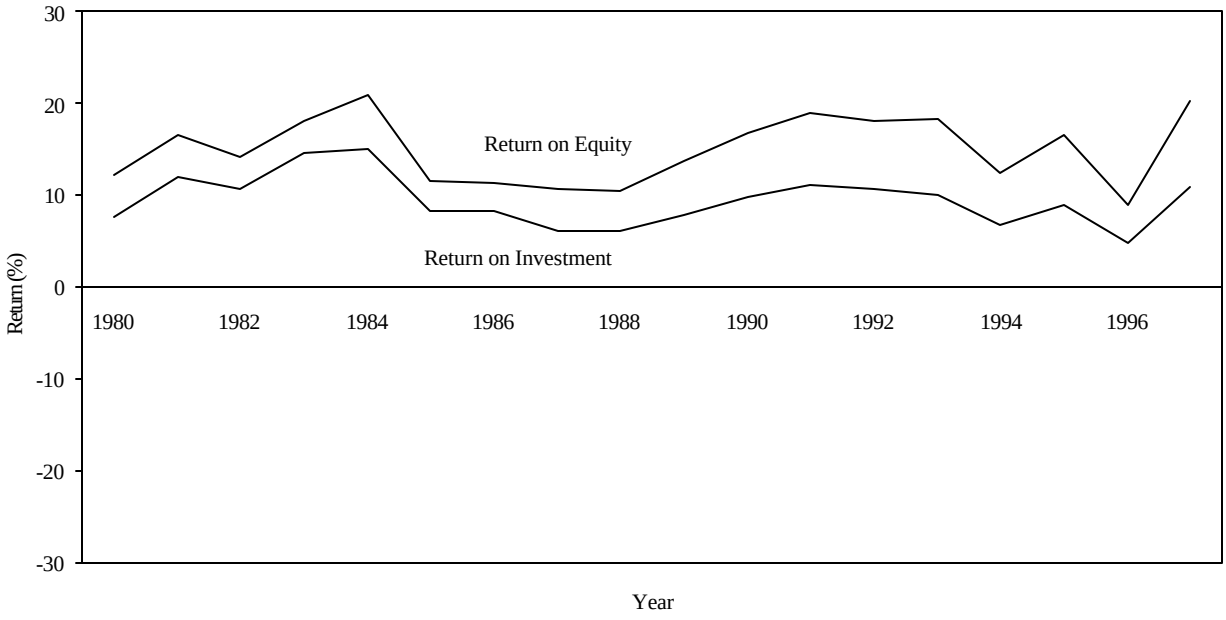


Figure 34. Miscellaneous Food Products Average Annual Economic Value Added, 1980-1997

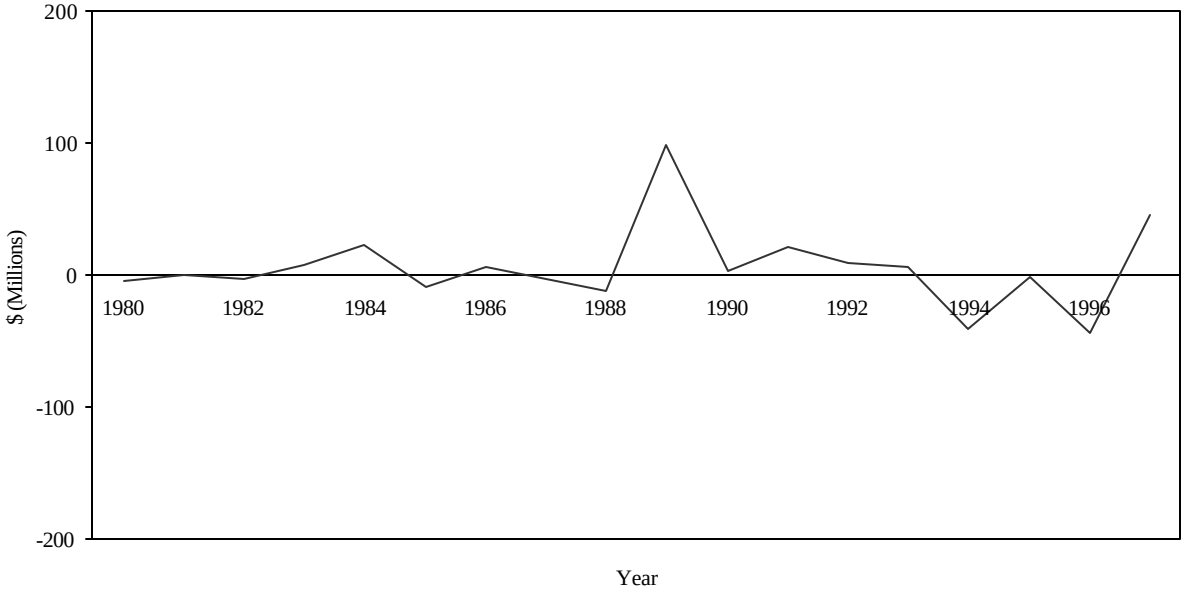
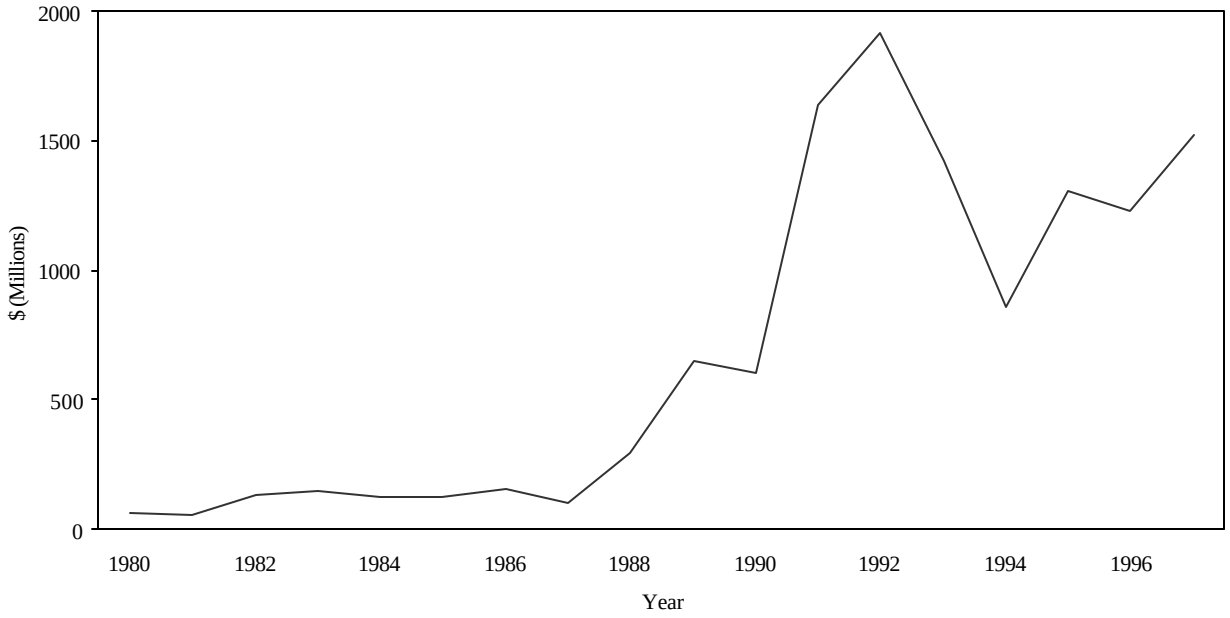


Figure 35. Miscellaneous Food Products Average Annual Market Value Added, 1980-1997



Farm Machinery (SIC 352)

Companies included: AGCO Corp., Deere and Company, Allis-Chalmers Corporation, Case Corp., and New Holland NV. These industries included farm machinery and equipment manufacturing. Because of the cyclical nature of the farm equipment manufacturing industry, many firms in this industry have diversified into lawn and garden equipment, heavy industrial equipment, and industrial components and parts manufacturing. Sales in this industry were highly variable between 1977 and 1992 because of farm income variability. Sales in 1977 were $10.3 billion and reached a high of $13.9 billion in 1981, a low of $6.7 billion in 1986, peaked again in 1990 at $11.5 billion, and fell again to $9.6 billion, for a net decrease of 6.5% in sales. During this same period of time, the percent of value added through manufacturing as apart of sales rose from 47.2% to 53.7%. The farm machinery industry's dependence on the farm sector for its sales leaves firms at risk to economic downturns from low commodity prices. The annual average ROE and the annual average ROI followed the same pattern as the sales, decreasing during the early 1980s, remaining negative in the early and mid-1980s, before becoming positive again in the late 1980s, only to decrease in the early 1990s (Figure 36).

The average annual returns also indicated heavy use of long-term debt financing; the ROI was almost half of the ROE. Average annual EVA remained negative between 1982 and 1994 (Figure 37). Negative EVA was most prevalent during the farm crisis years in the mid-1980s and the early 1990s. The average annual MVA corresponded to the EVA, remaining negative until the mid-1990s when the EVA became positive (Figure 38). After the1980s, firms in this industry built up unneeded capacity, which led to industry overcapacity. To remedy this problem, firms emphasized cost-cutting measures that would outweigh the high overhead from the high capacities. The benefits from these cost-cutting measures finally became apparent in the mid-1990s.

Figure 36. Farm Machinery Average Annual ROE and ROI, 1980-1997

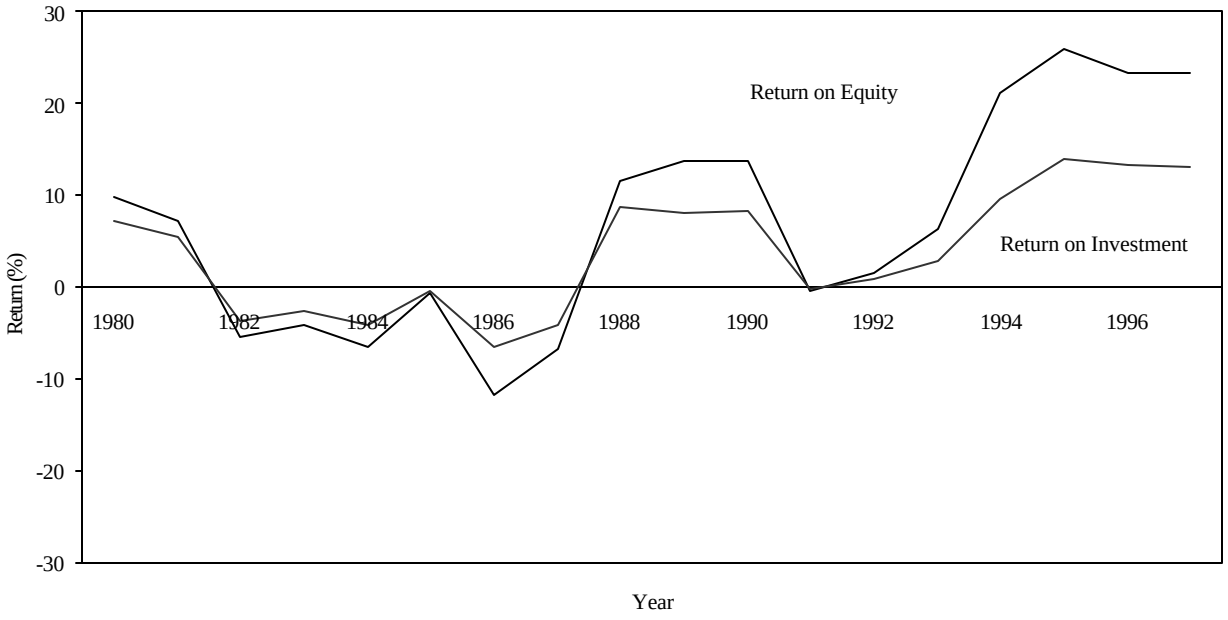


Figure 37. Farm Machinery Average Annual Economic Value Added, 1980-1997

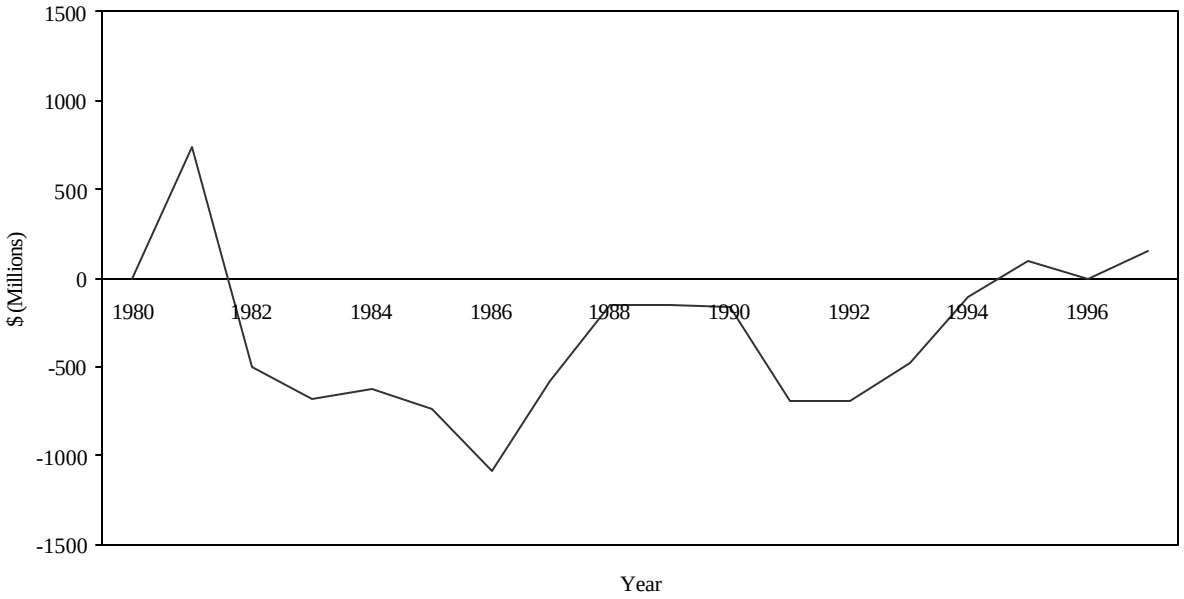
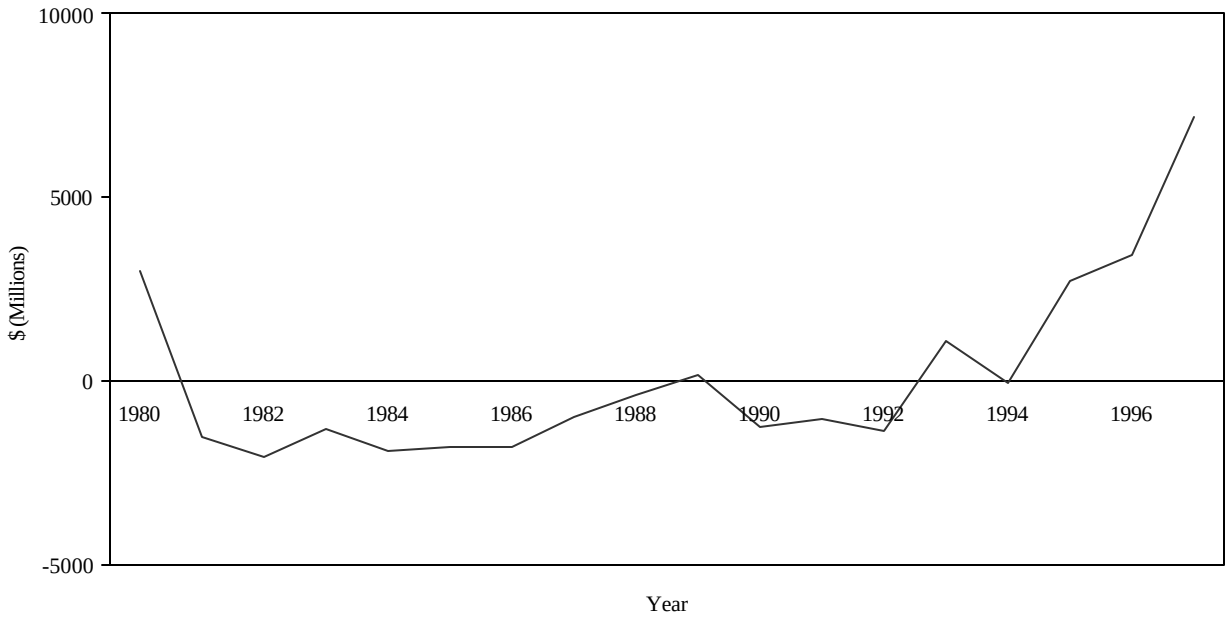


Figure 38. Farm Machinery Average Annual Market Value Added, 1980-1997



Groceries-Wholesale (SIC 514)

Companies included: International Multifoods Corporation, Richfood Holdings, Supervalu Incorporated, Sysco Corporation, Fleming Companies Incorporated, Nash Finch Company, and U.S. Foodservice. These industries include food service and food wholesale and distribution and local, regional, and national companies that service both food retailers well as institutional food customers. This is an industry segment that has experienced growth and decline in the number of firms. Although growth in the number of firms was significant since 1967, that number peaked in 1982 at 198,088 and began to decline to 191,798 firms in 1987. However, market share of the largest 50 wholesale firms rose from 48% in 1972 to 71.4% in 1987 and increased even more to 76.4% in 1992.

Average annual ROE and ROI both followed the same pattern, decreasing relatively slowly during the 1980s and 1990s (Figure 39). Average annual EVA remained stable and low with slight growth in the late 1980s. However, after that growth, the EVA did not significantly change (Figure 40). Average annual MVA had slight fluctuations around zero before turning negative in the early 1990s (Figure 41). This suggests that food wholesalers likely are becoming less important as large retailers consolidate and develop their own logistics and warehousing network.

Figure 39. Groceries-Wholesale Average Annual ROE and ROI, 1980-1997

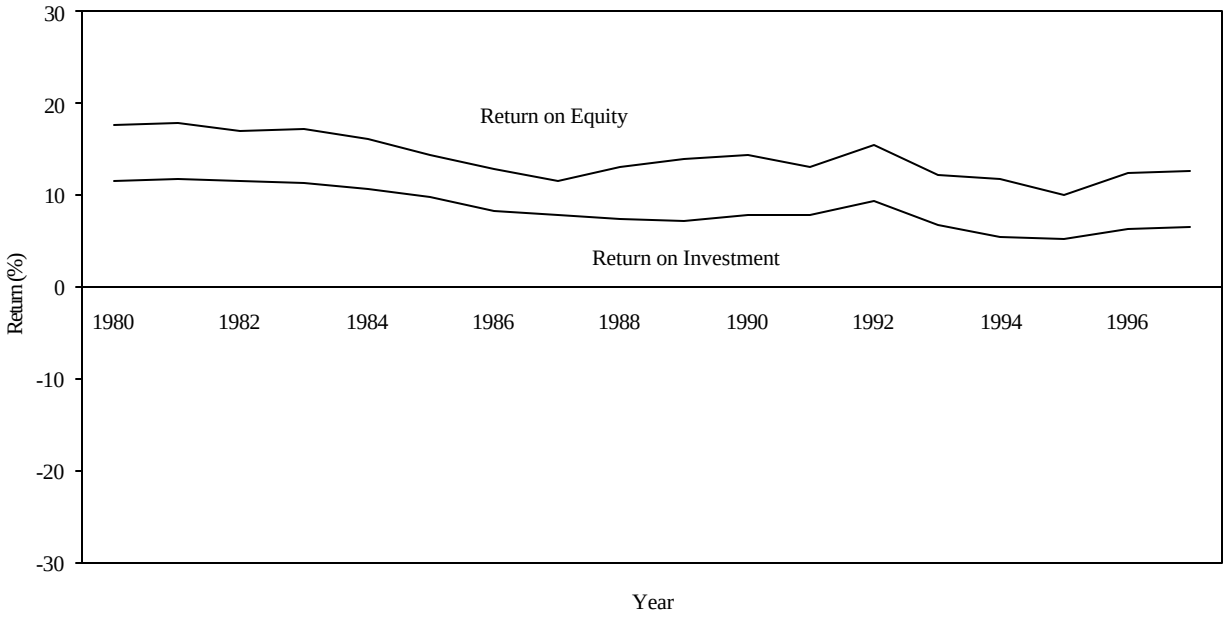


Figure 40. Groceries-Wholesale Average Annual Economic Value Added, 1980-1997

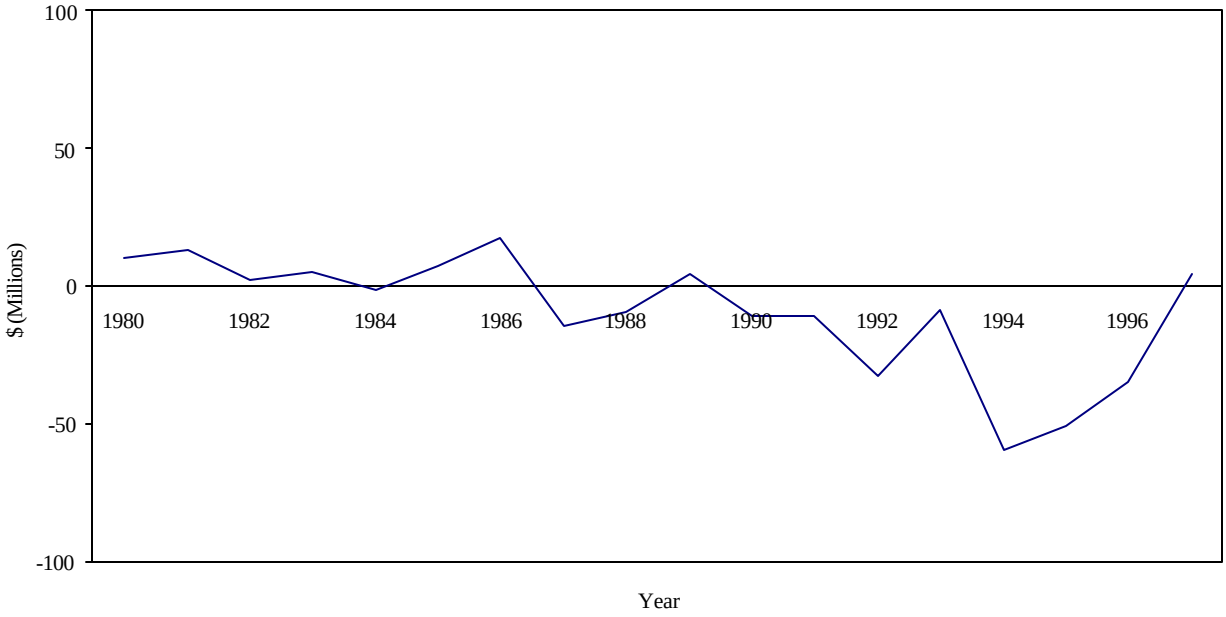
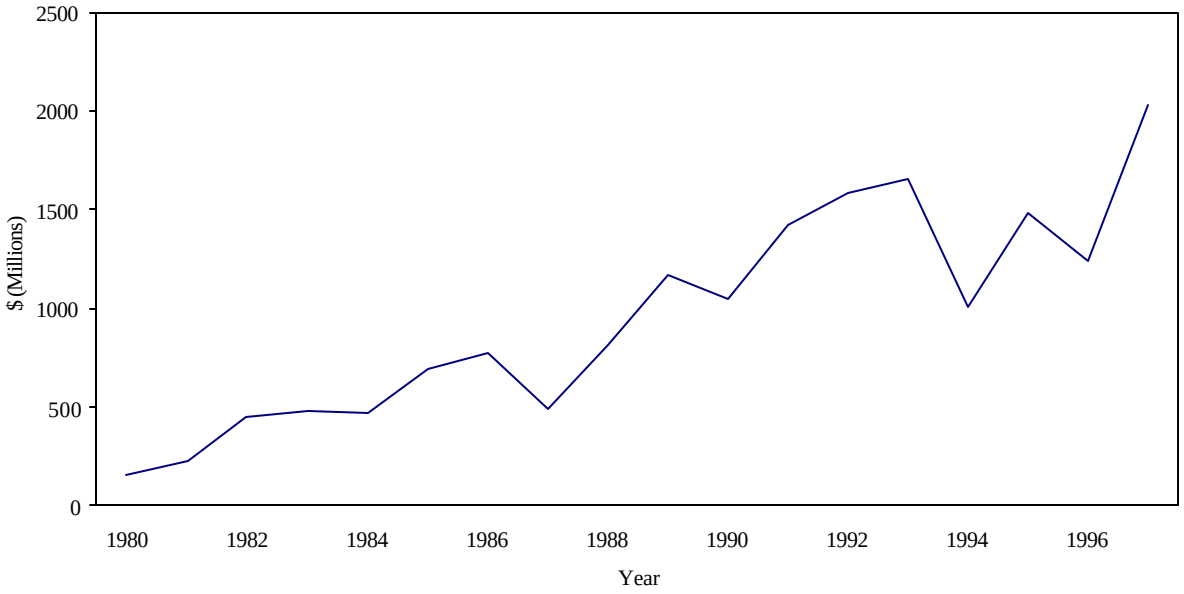


Figure 41. Groceries-Wholesale Average Annual Market Value Added, 1980-1997



Grocery/Convenience Stores (SIC 541)

Companies included: Albertsons, Incorporated, American Stores Company, Brunos Incorporated, Eagle Food Centers, Inc., Food Lion Incorporated, Foodarama Supermarkets, Fred Meyer, Great Atlantic and Pacific Tea Company, Hannaford Brothers Company, Kroger Company, Marsh Supermarkets, Ralph's Grocery Company, Ruddick Corporation, Safeway Incorporated, Supermarkets General Holding, Weis Markets Incorporated, Whole Foods Markets, Wild Oats Markets, Winn-Dixie Stores Incorporated, and 7-Eleven Incorporated. These industries included grocery stores and convenience stores

The firms in this industry serve as final conduits of food to the consumer. During 1998, this industry had sales of $436.3 billion with 76.7% of those sales in supermarkets with $2 million annual sales. From 1977 to 1997, the number of supermarkets and superettes declined from 30,831 to 23,538 and 118,211 to 76,064, respectively. However, the number of convenience store doubled from 30,000 to 62,105.

Moderate ROEs were achieved until the mid to late 1980s when consolidation of retailers began (Figure 42). Consolidation was rapid, with considerably more market concentration in the 1990s. This was accompanied by large amounts of long-term debt issued to support this consolidation and expansion. This is evidenced by the rapid decrease of ROI with moderate recovery of return in the 1990s. The trend in ROI became divergent across companies during the mid to late 1990s because of the larger amount of debt issued. During the same period of time, however, the trend of ROE remained more stable among companies in this industry.

Average annual EVA remained near zero until 1987, when it began to increase steadily (Figure 43). This was due to opportunities and success created from mergers and acquisitions during the mid- and late 1980s, such as the expansion by Kroger. That expansion was responsible for the dramatic decrease of annual ROE and ROI in 1988. An increase in the market share of the five largest retailers from 20% to 40% between 1993 and 1998, indicates industry consolidation. This increase was due largely to the effectiveness of large retailers in asserting buying power with food wholesalers and processors.

However, the average annual MVA did not experience growth until 1995 and 1997 (Figure 44). This delayed growth could have resulted from a delay in the realization of purchasing advantages gained during the early 1990s. This industry likely will be driven by the ability of retailers to effectively use information technology and manage their inventory. Retailers must be able to understand information generated through point-of-sale scanner data and consumer identification purchasing records to market effectively to the consumer. They also must manage their inventories effectively, where optimum amounts of inventory are held rather than constraining capital in extra inventory.

Figure 42. Grocery/Convenience Stores Average Annual ROE and ROI, 1980-1997

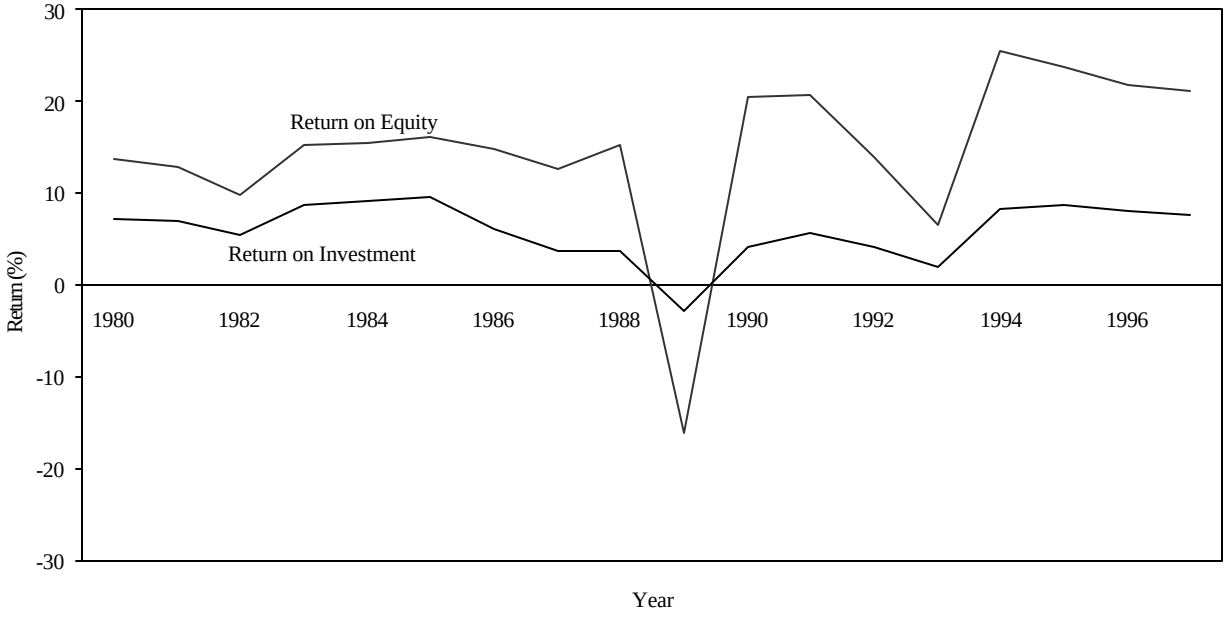


Figure 43. Grocery/Convenience Stores Average Annual Economic Value Added, 1980-1997

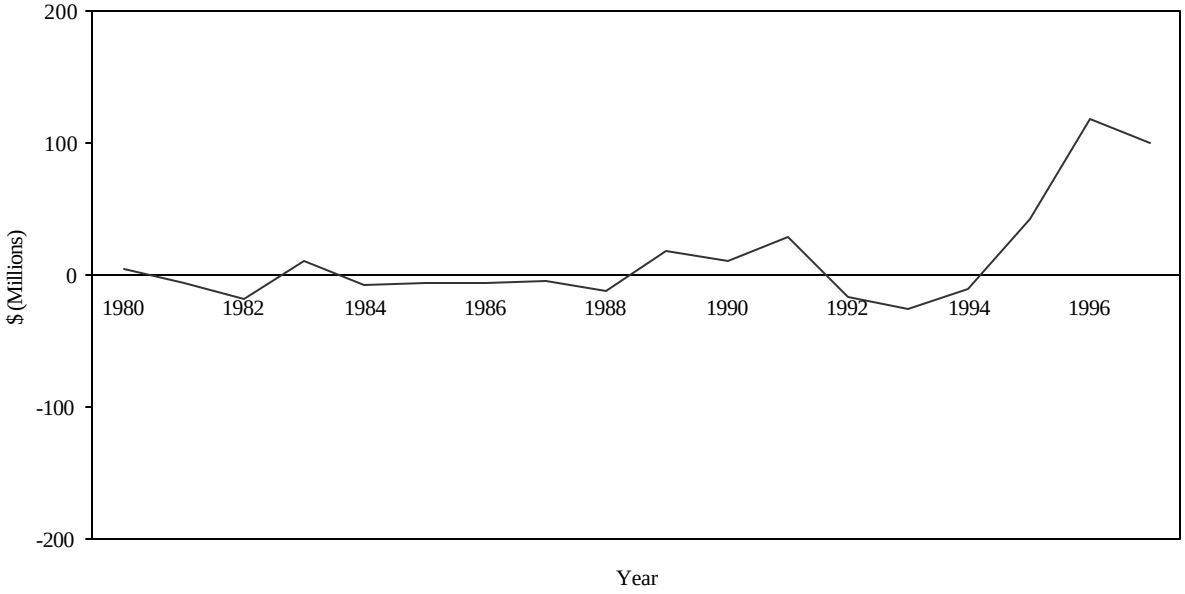
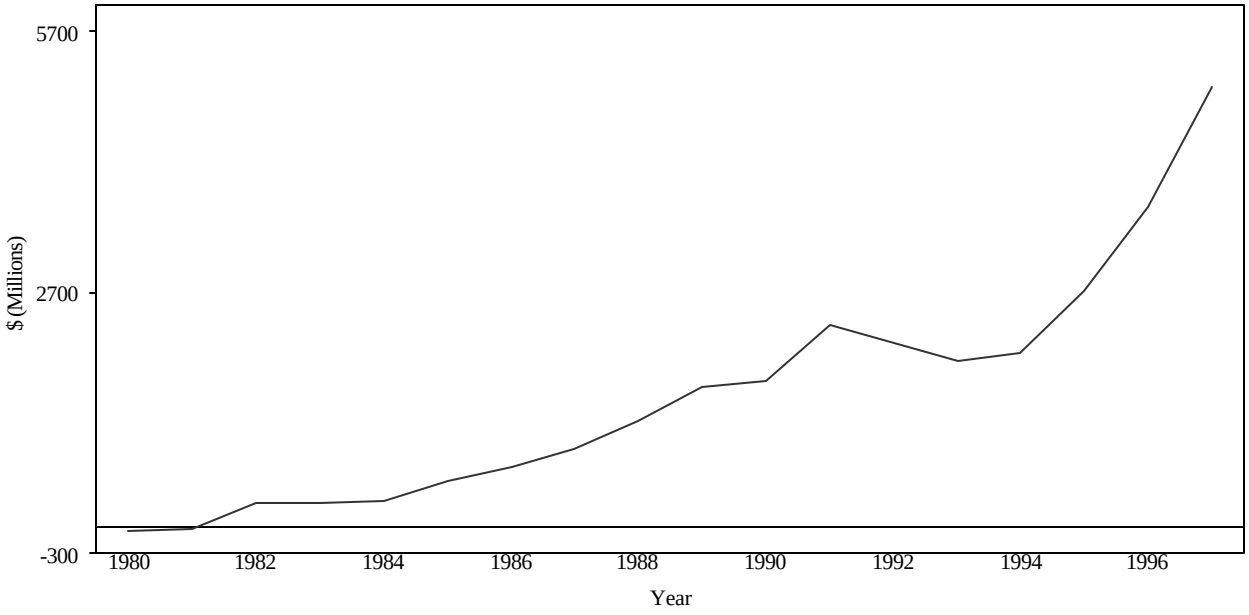


Figure 44. Grocery/Convenience Stores Average Annual Market Value Added, 1980-1997



Eating Places (SIC 581)

Companies included: McDonalds Corporation, Tricon Global Restaurants, and Wendy's International Incorporated. These industries include eating establishments. Considerable growth occurred in the number of eating places since the 1960s, from 271,182 in 1967 to 553,879 in 1992. This growth was fueled partly by consumers' changes in preferences from time-consuming food preparation to easy preparation and meals prepared away from home. The industry consistently performed well with respect to average annual ROE and ROI. The ROE fluctuated near 20%, whereas the ROI remained near 10%, indicating considerable use of debt (Figure 45). The eating-places industry saw mediocre, yet consistent, growth of MVA from 1980 to 1997; however, the growth of EVA during this time period was very low (Figures 46 and 47). This is indicative of a mature industry, in which 75% of all restaurants fail within the first year.

Figure 45. Eating Places Average Annual ROE and ROI, 1980-1997

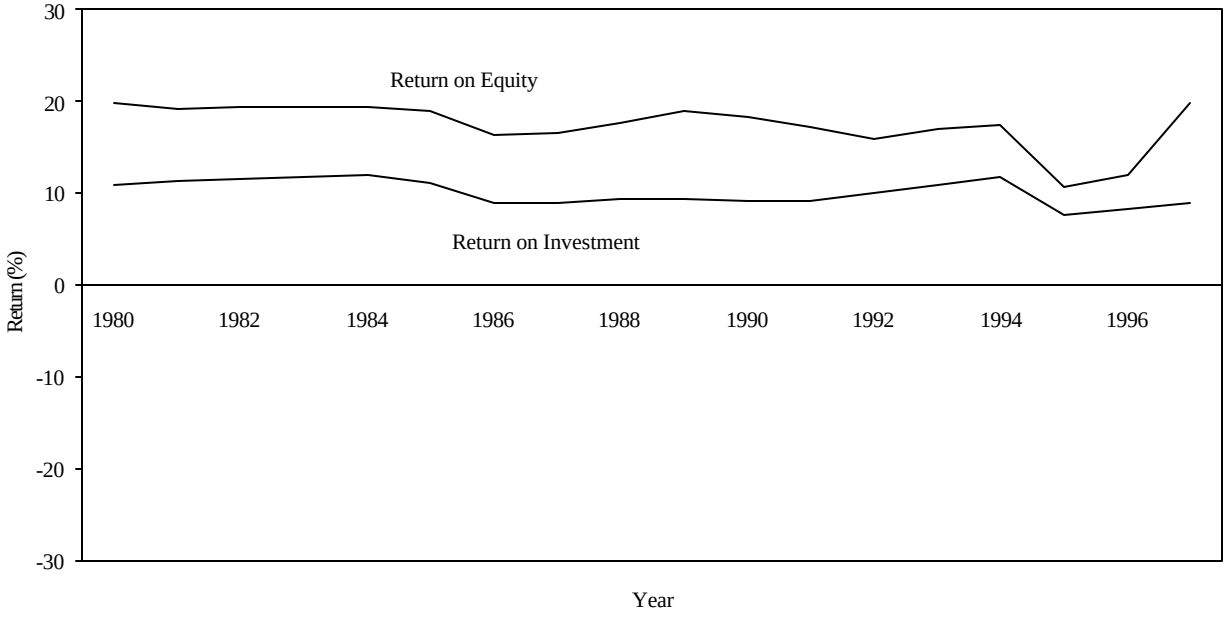


Figure 46. Eating Places Average Annual Economic Value Added, 1980-1997

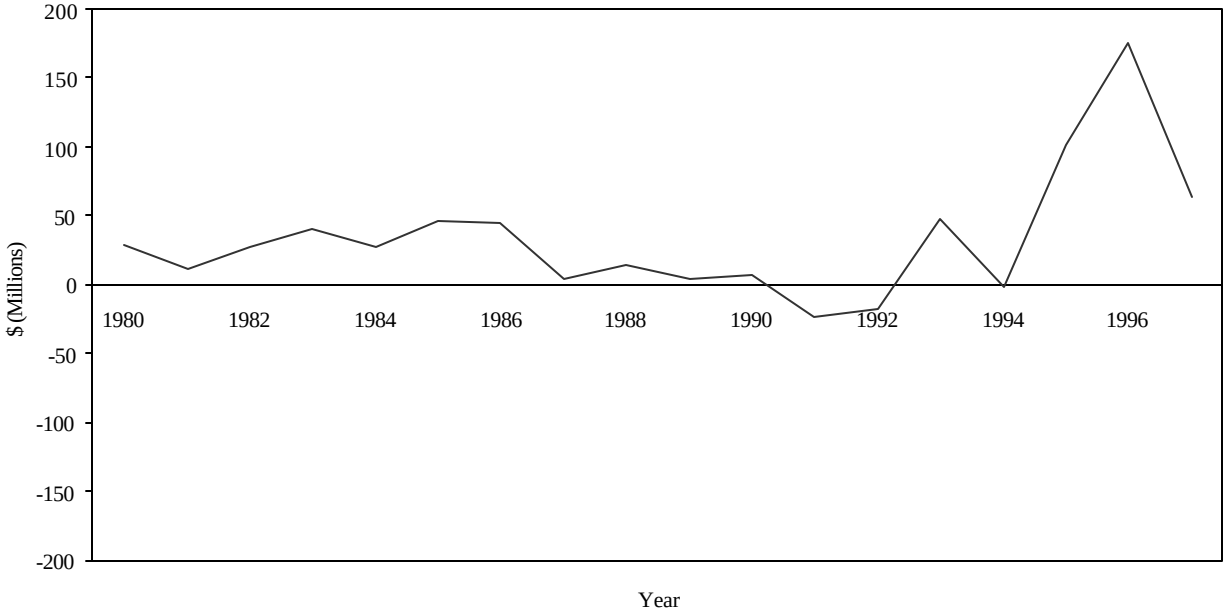
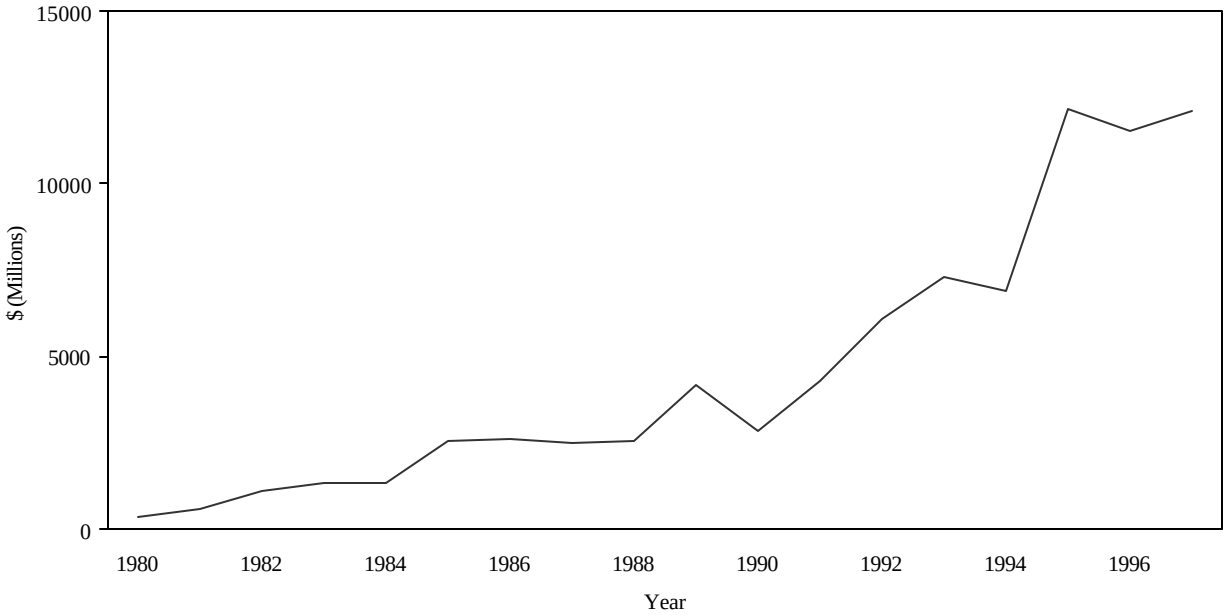


Figure 47. Eating Places Average Annual Market Value Added, 1980-1997



Weighted Average Cost of Capital

The "risk-free" rate of return decreased considerably during the 1980s and 1990s, when the 3-month average United States Treasury Bill rate decreased from 14.025% in 1981 to 2.99% in 1993 before increasing slightly to 5.06% in 1997. The weighted average cost of capital (WACC) is the weighted average of returns to debt and equity holders for supplying capital in a risk-bearing investment.

Depending on the level of risk in an industry, the WACC will vary between industries. Industries that bear greater levels of risk also will bear a greater cost of capital as higher returns reward investors for carrying the burden of additional risk on their investment. Most industries, although not following the behavior of the 3-month average Treasury Bill rate exactly nor to the same magnitude, had a downward trend in their WACC. The WACC for each industry is reported in Figures 48 through 52.

Industries that consistently had high WACC were Fats and Oils, Sugar Products, Fruits and Vegetables-Preserved, Grain Mill Products, and Eating Places. The first four industries are particularly fixed-asset intensive and involve high sunk costs. The Eating Places industry's WACC remained high likely because of the high failure rate of many restaurants that entered the market.

Two interesting trends involving the Meat and Poultry Products and Bakery Products industries were immediately apparent. Until 1985, the WACC for the Meat and Poultry Products industry was below the 3-month Treasury Bill rate. However, between 1986 and 1988, the WACC increased from 7.24% to 11.82%. During this period, the industry underwent a structural change that impacted it throughout the 1980s, 1990s, and into the 21st century. This change involved an increase in the size of slaughter plant capacities to take advantage of economies of scale and development of boxed beef that reduced transportation costs and increased slaughter efficiency. This large capacity increase and concentration resulted in higher risk to investors, reflected in higher WACC. The greater demand for capital in this industry drove borrowing costs to higher levels.

The Bakery Products industry's WACC was consistently below the 3-month Treasury Bill rate until 1990, when it increased from 6.01% to 10.27% in 1991 as a result of Interstate Bakeries Corporation, the largest wholesale baker in the United States, purchasing Continental Baking Company, the second largest wholesale baker in the United States, from Ralston Purina. This purchase involved Interstate Bakeries becoming highly leveraged to raise the capital to complete the purchase. As a result of the large amount of debt issued by Interstate Bakeries, the risk of default and, therefore, the WACC increased dramatically.

Figure 48. Food and Kindred Products, Beverages, and Misc. Food Products Average Annual Weighted Average Cost of Capital, 1980-1997

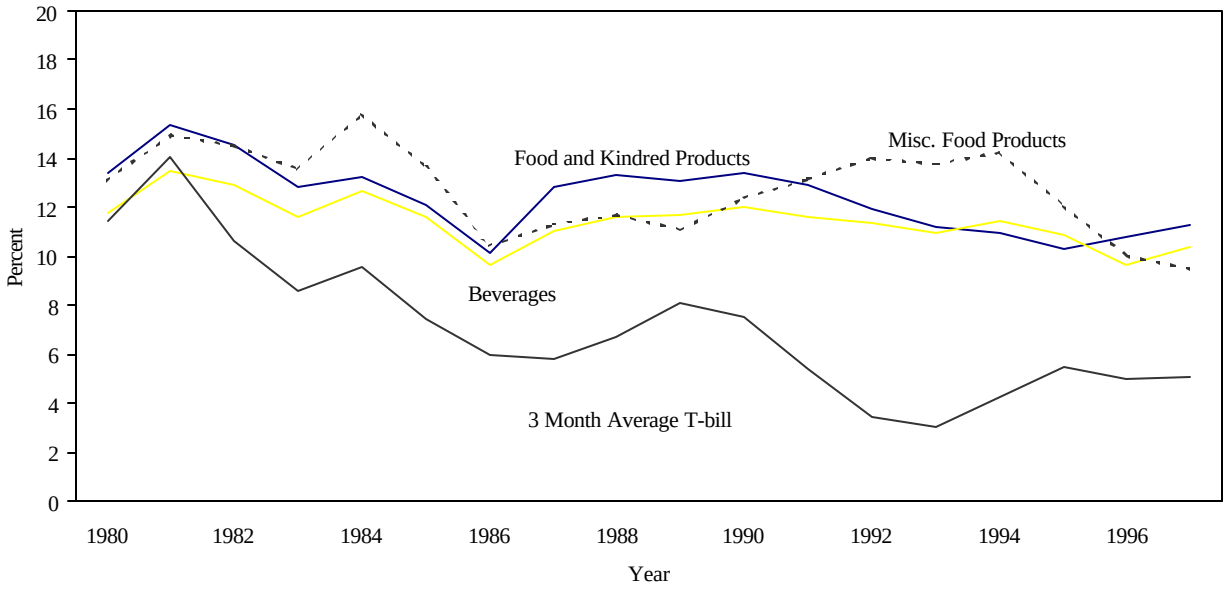


Figure 49: Meat and Poultry Products, Grain Mill Products, and Fats and Oils Average Annual Weighted Average Cost of Capital, 1980-1997

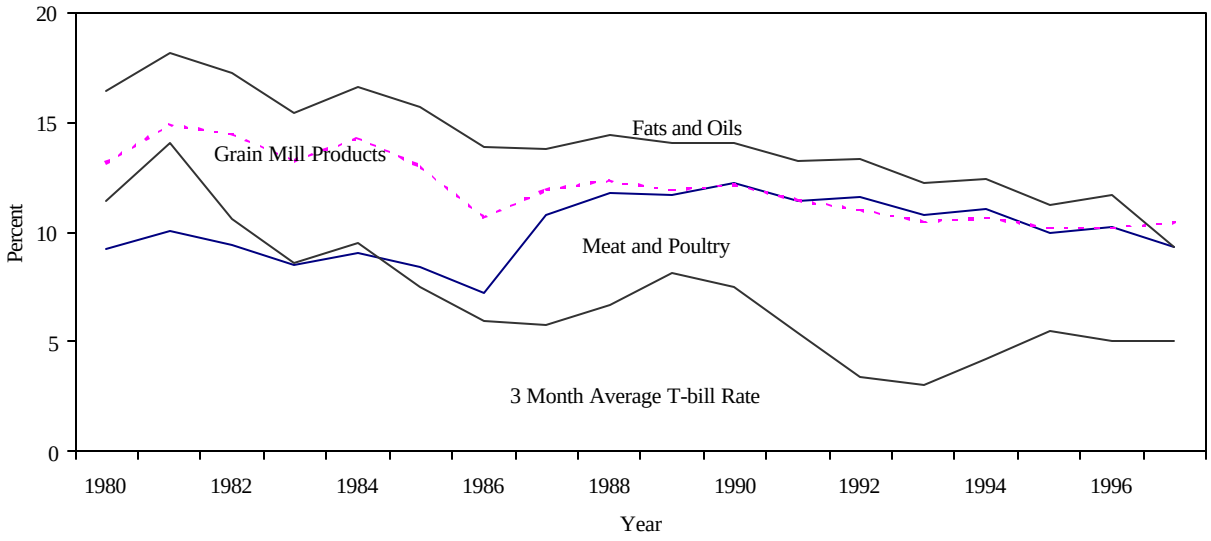


Figure 50. Dairy Products and Ice Cream, Fruits and Veg.-Preserved, Bakery Products, and Sugar Products Average Annual Weighted Average Cost of Capital, 1980-1997

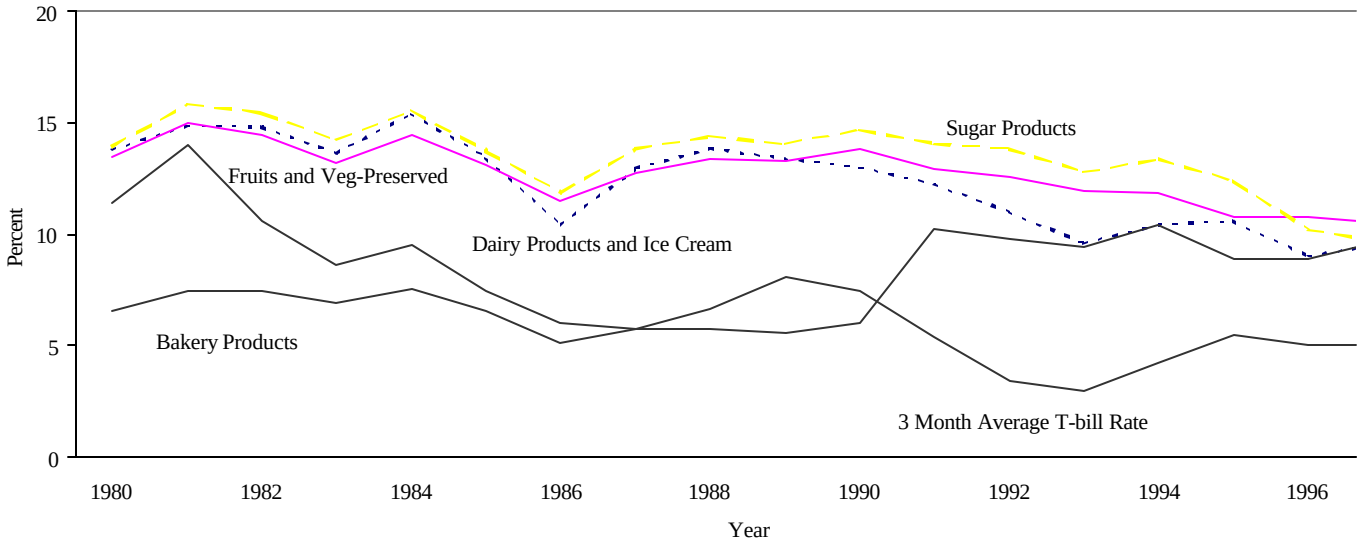


Figure 51. Groceries-Wholesale, Grocery/Convenience Stores, Eating Places Average Annual Weight Average Cost of Capital, 1980-1997

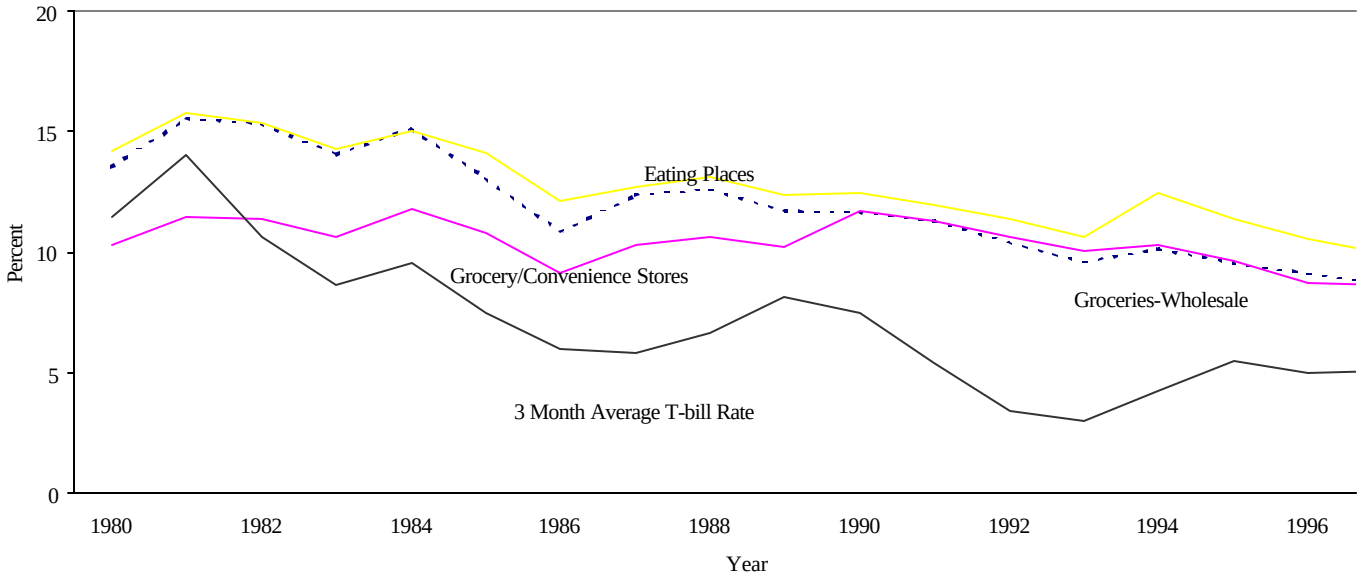
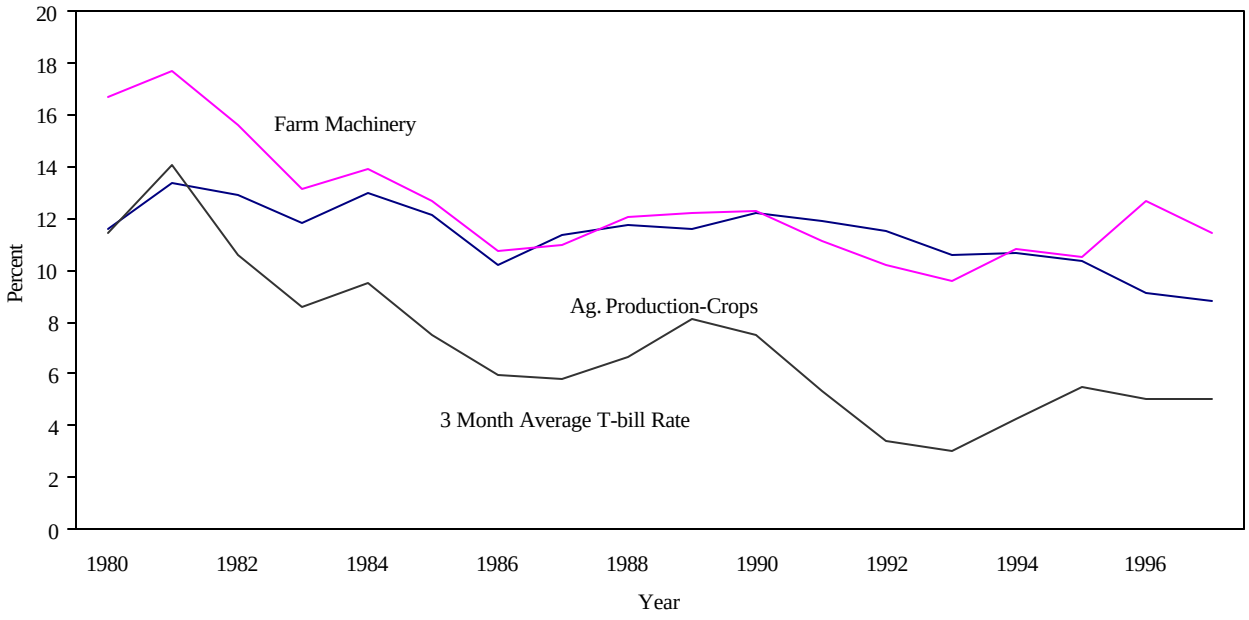


Figure 52. Ag Production-Crops and Farm Machinery Average Annual Weighted Average Cost of Capital, 1980-1997



Risk Measures

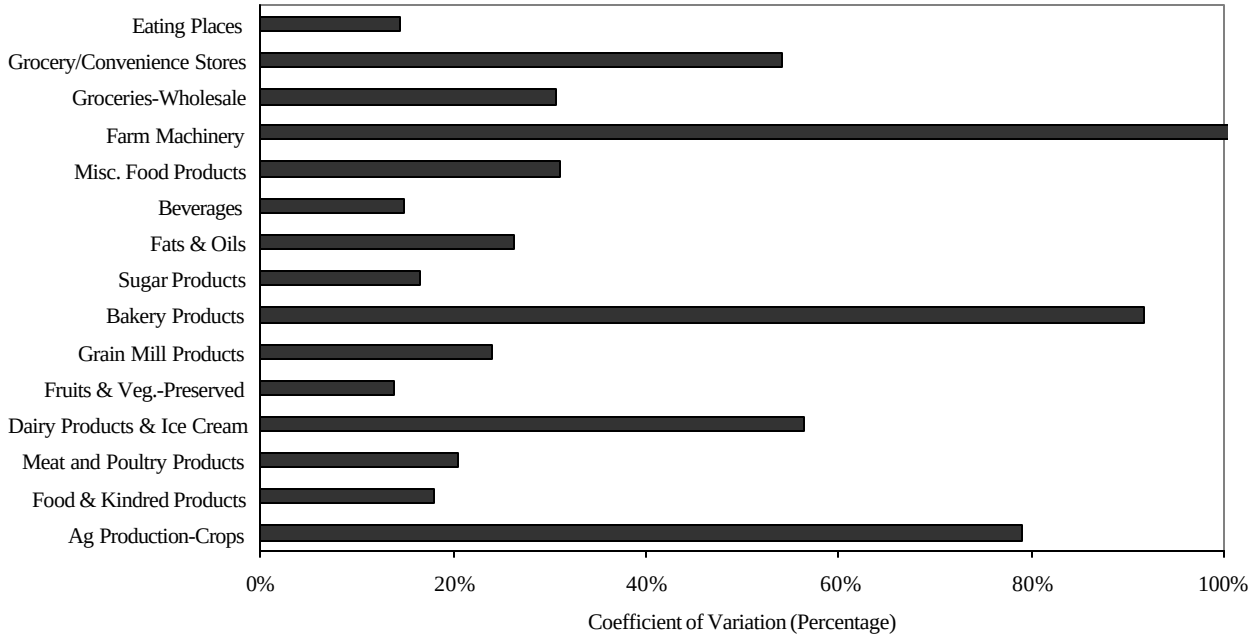
Coefficient of Variation

Higher variability of returns within an industry would indicate a greater amount of risk in that industry. Therefore, industries that had high variation around its mean also would have high returns. One statistic to measure this variability is the Coefficient of Variation (CV). This was clearly not the case for these industries, as seen in Figure 53. Farm Machinery and Ag Production-Crops, the two lowest performing industries, actually had the highest levels of variation. Farm Machinery had the highest CV of ROI variation around the mean, across years in the industry, followed by Bakery Products, Ag Production-Crops, Grocery/Convenience Stores, and Dairy Products and Ice Cream. The remainder of the industries had CVs of less than 30%.

Because of fluctuations in world fruit and vegetable prices and the agriculture sector, the CV for the Ag Production-Crops industry CV across 1980-1997 was the second highest for all industries in each indicator. The growth of ROE and ROI across the Food and Kindred Products industry and across the years when compared to the other industries was moderate. Average annual returns of the Meat and Poultry Products industry were some of the most stable; however, there was evidence of wider debt usage during 1980-1997. The CV of ROI in the Fruits and Vegetables-Preserved industry was lower because of debt usage to finance canning and preserving operations. Because most products in this industry are staple, preserved foods, returns would be affected less by changes in economic conditions. Similar results were found for ROE and are reported elsewhere. In addition, statistical analysis of the variance is reported in Freberg.[4]

[4] Freberg, C. 2000. "Profitability, Risk, and Strategy in Food and Agribusiness Industries and Firms." Unpublished MS thesis, Department of Agricultural Economics, Kansas State University, Manhattan, KS.

Figure 53. Aggregated Coefficients of Variation for Return on Investment, by Industry from 1980-1997



Mean and Standard Deviation

The standard deviation of ROI was plotted against the mean for each industry (Figure 54). Results for ROE were similar. In general, the most profitable industries over this time period did not experience the greatest variability. This would be observed in the long run. But in general, industries whose business was aimed directly at producers had greater variability and lower return on investment. In addition, industries for which the rate of economic value added was lower also had lower returns during this time period.

Equity Risk Premium

From 1980 to 1997, the difference between ROE and ROI increased by almost 100% (Figure 55). The difference, which increased from 4.78% to almost 9.31%, indicates greater usage levels of debt financing, especially in the Grain Mill Products, Grocery/Convenience Stores, Beverages, Fruits and Vegetables-Preserved, and Food and Kindred Products Industries. The industries that indicated higher debt usage were also those with high levels of tangible fixed assets. In particular, the premium between ROE and ROI had a higher rate of growth during the mid-1980s when food companies, especially those in grain-based industries, expanded production capacity in corn, wheat, and soybean processing using debt financing. These industries were also some of the most profitable, which suggests that expansion of assets was a key success factor for firms in these industries. But it also leaves these firms susceptible to variation in interest rates. When interest rates decline, these industries enjoy low leverage costs.

Figure 54. Standard Deviation and Return on Investment, by Industry over 1980-1997

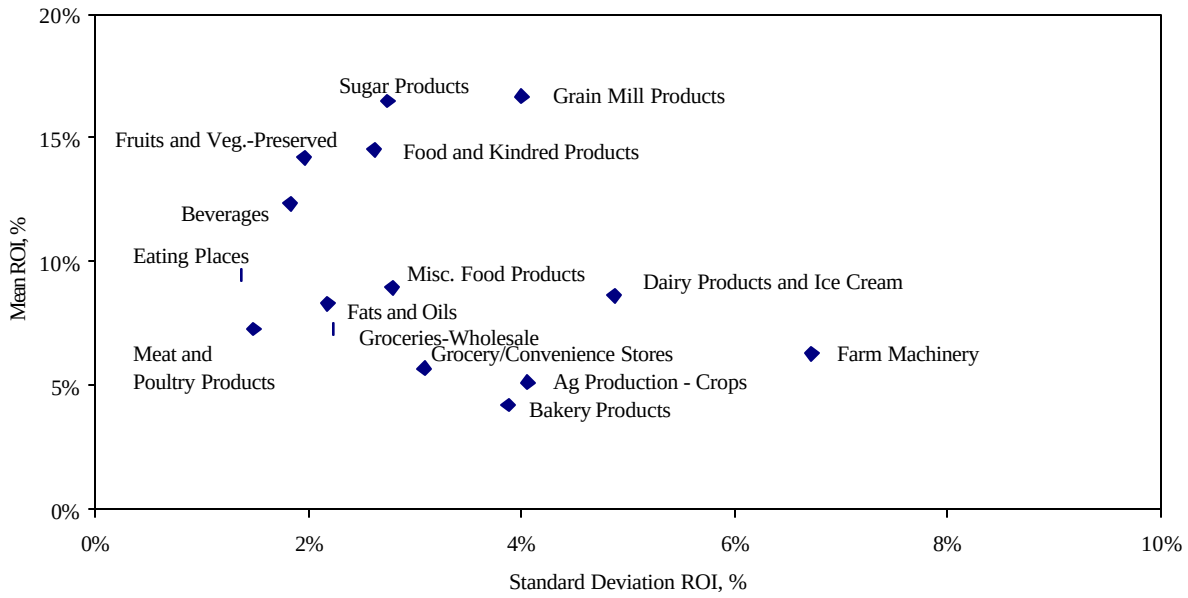
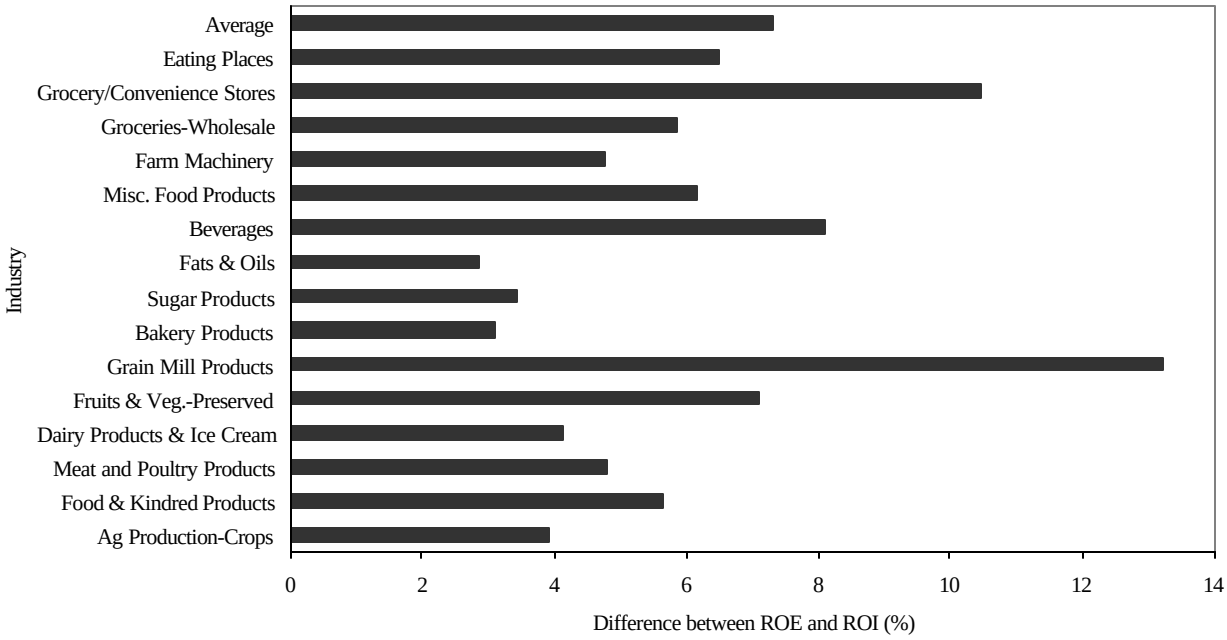


Figure 55. Aggregated Weighted Average Equity Risk Premium, 1980-1997



Summary

This reports describes results from measuring profitability of investor-owned firms using ROE, ROI, EVA, and MVA. In addition, risk measures were calculated including coefficient of variation, equity risk premium, and variance analysis. The results do not support a conclusion that industries with above-average profitability have greater risk as measured by variability. Thus, broad statements regarding risk of a particular industry over a short time period likely should be focused at the individual firm level. In the long run, above-average profitability will cause capital to flow into an industry, whereas below-average profitability will cause capital to exit an industry.

REFERENCES

Freberg, C. "Profitability, Risk, and Strategy in Food and Agribusiness Industries and Firms." Unpublished MS thesis, Department of Agricultural Economics, Kansas State University, Manhattan, Kansas, 2000.

Freberg, C., M.A. Boland, and D. Barton. "Summary of Data and Company Information for 220 Investor-Owned Firms and Cooperatives." Staff Paper 00-08, Department of Agricultural Economics, Kansas State University, Manhattan, Kansas, 2000.

Standard and Poors, "Standard & Poors Research Insight® COMPUSTAT®, North America.

Stern Stewart Management Services, "FINANSEER® Analysis Software."

Appendix A

Probabilities Associated with Null Hypothesis that a ROE of an Industry Is Greater than ROE of Another Industry. Shaded cells indicate tests where the null hypothesis cannot be rejected at the 95% Confidence Level ($p < 0.05$)

ROE	ROE1 >ROE2														
	100	200	201	202	203	204	205	206	207	208	209	283	352	514	541
100															
200	0.00														
201	0.01	0.00													
202	0.00	0.11	0.01												
203	0.00	0.04	0.00	0.04											
204	0.00	0.00	0.00	0.00	0.00										
205	0.02	0.00	0.40	0.00	0.00	0.00									
206	0.00	0.31	0.00	0.07	0.05	0.00	0.00								
207	0.04	0.00	0.06	0.01	0.00	0.00	0.16	0.00							
208	0.00	0.19	0.00	0.08	0.04	0.00	0.00	0.48	0.00						
209	0.00	0.00	0.01	0.28	0.00	0.00	0.08	0.00	0.01	0.00					
283	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00				
352	0.26	0.00	0.03	0.02	0.00	0.00	0.06	0.00	0.05	0.00	0.01	0.00			
514	0.00	0.00	0.02	0.08	0.00	0.00	0.10	0.00	0.00	0.00	0.17	0.00	0.01		
541	0.01	0.05	0.19	0.34	0.00	0.00	0.24	0.02	0.11	0.03	0.44	0.00	0.01	0.41	
581	0.00	0.16	0.00	0.11	0.03	0.00	0.00	0.08	0.00	0.09	0.01	0.00	0.00	0.00	0.13

Industries:
100: Ag. Production-Crops
200: Food and Kindred Products
201: Meat and Poultry Products
202: Dairy Products and Ice Cream
203: Fruits and Veg.-Preserved
204: Grain Mill Products
205: Bakery Products
206: Sugar Products
207: Fats and Oils
208: Beverages
209: Misc. Food Products
352: Farm Machinery
514: Groceries-Wholesale
541: Grocery/Convenience Stores
581: Eating Places

Appendix B

Probabilities Associated with Null Hypothesis that a ROI of an Industry Is Greater than ROI of Another Industry. Shaded cells indicate tests where the null hypothesis cannot be rejected at the 95% Confidence Level ($p < 0.05$)

ROI1 > ROI2	100	200	201	202	203	204	205	206	207	208	209	283	352	514	541
100															
200	0.00														
201	0.01	0.00													
202	0.00	0.04	0.00												
203	0.00	0.36	0.00	0.02											
204	0.00	0.01	0.00	0.00	0.00										
205	0.06	0.00	0.34	0.00	0.00	0.00									
206	0.00	0.00	0.00	0.00	0.00	0.31	0.00								
207	0.00	0.00	0.13	0.04	0.00	0.00	0.20	0.00							
208	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00						
209	0.00	0.00	0.02	0.06	0.00	0.00	0.03	0.00	0.22	0.01					
283	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
352	0.19	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00			
514	0.01	0.00	0.13	0.01	0.00	0.00	0.11	0.00	0.41	0.00	0.06	0.00	0.01		
541	0.35	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.13	0.00	
581	0.00	0.00	0.00	0.19	0.00	0.00	0.01	0.00	0.03	0.01	0.14	0.00	0.00	0.00	0.00

Industries:
100: Ag. Production-Crops
200: Food and Kindred Products
201: Meat and Poultry Products
202: Dairy Products and Ice Cream
203: Fruits and Veg.-Preserved
204: Grain Mill Products
205: Bakery Products
206: Sugar Products
207: Fats and Oils
208: Beverages
209: Misc. Food Products
352: Farm Machinery
514: Groceries-Wholesale
541: Grocery/Convenience Stores
581: Eating Places