CHAPTER 2: TOPICS OF DISCUSSION

- Indices and nominal versus real values
- What is the Food and Fiber Industry
- Changing complexion of production agriculture
  - Physical structure
  - Productivity
  - Profitability
  - Financial structure
- Sectors within the Food and Fiber Industry
  - Farm input suppliers
  - Food processors, wholesalers and retailers
  - Value added process
THE FOOD AND FIBER INDUSTRY... 
Consists of those business entities that are involved in one fashion or another with the supply of food and fiber to consumers.

FOOD & FIBER INDUSTRY
(1) FARM INPUT SUPPLY SECTOR  
(e.g., John Deere, Ralston-Purina) 
(2) FARM SECTOR 
(3) PROCESSION & MANUFACTURING SECTOR  
(e.g., Tyson Foods, Del Monte, Swift) 
(4) WHOLESALE & RETAIL SECTOR  
(e.g., Sysco, Kroger, HEB) 
(5) CONSUMER (us)
1 out of every 6 jobs is tied to the food and fiber industry

Responsible for roughly 12 to 15 percent of GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Farm Income ($ billion)</th>
<th>30% decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>85.9</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>78.7</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>58.5</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>70.9</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>87.1</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>57.0</td>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Crop Production ($ billion)</th>
<th>18% decline</th>
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</thead>
<tbody>
<tr>
<td>2004</td>
<td>124.5</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>114.4</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>118.9</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>150.9</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>182.5</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>164.2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Livestock Production ($ billion)</th>
<th>22% decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>124.4</td>
<td></td>
</tr>
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Some Key Measurement Topics

Output and Price Indices
Nominal and Real Expenditures

Indices

- Index – a percentage comparison from a fixed point of reference or benchmark.
- with an index, economists can more easily describe how much, say wheat output for example, has increased or decreased relative to the benchmark or base period.

CPI ⊗ Consumer Price Index
WPI ⊗ Wholesale Price Index

Index of prices received or paid by producers
### Output and Price Indices

<table>
<thead>
<tr>
<th>Year</th>
<th>Apple Production (1000 short tons)</th>
<th>Output Index</th>
<th>Price of apples ($/pound)</th>
<th>Price index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>3,957</td>
<td>0.819</td>
<td>$0.685</td>
<td>0.952</td>
</tr>
<tr>
<td>1990</td>
<td>4,828</td>
<td>1.000</td>
<td>$0.719</td>
<td>1.000</td>
</tr>
<tr>
<td>1997</td>
<td>5,162</td>
<td>1.069</td>
<td>$0.907</td>
<td>1.261</td>
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1990 is the base year

1.069 = 5,162 ÷ 4,828
Output 6.9% higher in 1997 than it was in 1990....

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Apple Production | Output Index | Price of apples | Price index
---|---|---|---
1985 | 3,957 | 0.819 | $0.685 | 0.952
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Output and Price Indices

1990 is the base year

1.069 = 5,162/4,828
Output 6.9% higher in 1997 than it was in 1990.

1.261 = 0.907/0.719
Price 26.1% higher in 1997 than it was in 1990.

Index Numbers of Prices Received, United States, December 1999, with Comparisons.

Selected Index Numbers for Prices Received and Paid, 1990-92=100, by Months, United States, 1998 and 1999.
REAL VERSUS NOMINAL VALUES

— Consider economic measures such as prices, interest rates, expenditures, disposable income.

— Nominal Values refer to values for which no adjustments to inflation have been made.

— Real Values refer to values for which adjustments to inflation have been made.

— A popular measure of inflation is the Consumer Price Index (there are other indices, however).

\[
\text{Nominal Value} = \text{Real Value} \\
\text{Price Index}
\]

Nominal and Real Expenditures for Food Eaten Away From Home

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal Expenditures (billion dollars)</th>
<th>CPI 1982-84=1.00</th>
<th>Real Expenditures (billion dollars)</th>
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<tr>
<td>1980</td>
<td>120.296</td>
<td>0.824</td>
<td>145.990</td>
</tr>
<tr>
<td>1985</td>
<td>168.831</td>
<td>1.076</td>
<td>156.906</td>
</tr>
<tr>
<td>1990</td>
<td>248.464</td>
<td>1.307</td>
<td>190.102</td>
</tr>
<tr>
<td>1995</td>
<td>302.419</td>
<td>1.569</td>
<td>198.437</td>
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1982-84 average is the base year for the CPI
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*1982-84 average is the base year for the CPI*

CPI was 56.9% higher in 1995 than it was in 1982-84 period

\[198.437 = \frac{302.419}{1.569}\]

The increasing CPI eroded the purchasing power of the dollar….
Characteristics of the Food and Fiber System

The Nation’s food and fiber system consists of various sectors that provide food and fiber products to their ultimate consumer.
Changing Complexion of Farming

Physical structure
- Fewer number of farms but larger-sized farms
- Increasing use of capital relative to labor
- Increasing productivity or output per unit of input

Financial structure and performance
- Nominal net farm income growth offset by inflation
- Declining debt use strengthens equity position
- Recovering real estate values after sharp declines during the financial crises in the mid-1980s

Important Facts
- Number of farms roughly 2.1 million at present
- Peak 1935—6.8 million farms
- Average size of the US farm between 400 and 500 acres today
- Since WWII, average farm size has doubled
**Fig. 2.2A** Trends in the number of Farms, 1990 to 2007

**Fig. 2.2B** Trends in the average size of farms, 1990 to 2007
Specialization, Diversification, Organization, and Contracting

- Share of the 50,000 largest farms (2%) account for roughly 50% of total sales
- 56% of US farms have sales < $10,000
- Concentration of production may be more of a critical issue than the decline in the number of farms; 10% of U.S. farms account for 75% of value of production
- The number of farms has been holding steady at 2.1 million for the past 10 years

Specialization, Diversification, Organization, and Contracting

- US farms tend to be specialized rather than diversified
- About half of US farms produce one commodity
- ¾ of farms with sales > $0.5 million produce no more than three commodities
- 60 percent of all farms are comprised of retired operators and operators who also work off the farm
- Average age of farm operator is in the mid 50s today, 48 in 1940
Specialization, Diversification, Organization, and Contracting

- Corporate farms versus family farms
- Family-owned farms are NOT losing their share of US agriculture to non-farm corporations
- US farms are most organized as individual operations; farms organized as partnerships are about 5 percent of US farms; farms organized as corporations are roughly 3 percent of US farms
- But partnerships and corporations account for roughly 40 percent of the value of production

Specialization, Diversification, Organization, and Contracting

- Over the past 40 years, farmers have become LESS dependent on terminal markets and spot pricing
- Roughly 10 percent of farms today rely on production and marketing contracts, and these farms account for 52 percent of agricultural production
- 90 percent of US farms today have no production and marketing contracts
A Note on Farm Inputs

- Land, Labor, Capital, Materials
- Capital refers to durable equipment and structures
- Labor—Hired and Self-Employed
- Materials—Energy, chemicals, and purchased services

A Note on Farm Inputs

- Total farm input, in the aggregate, has remained relatively stable since WWII
- Labor on the decline, materials on the rise
- Capital substituted for labor; use of capital inputs peaked around 1980 and then declined from 1981 to 1995; since 1996 capital has leveled off
Fig. 2.3A Index of total farm inputs used in agricultural production, 1948 to 2006 (1996=1.00)

Fig. 2.3B Index of capital, labor, and materials used in agricultural production, 1948 to 2006 (1996=1.00)
A Note on Productivity

- Productivity defined as output per unit of input
- Productivity has increased dramatically since WWII
- Output has been on the rise due primarily to development and use of technology and biotechnology (e.g. BST)
- Growth rates in livestock and crop output have been about the same; average growth rate is 2 percent per year

A Note on Productivity

- US farmers have adopted widely genetically-engineered (GE) crops since their introduction in 1996
- Examples—soybeans and cotton genetically-engineered with herbicide-tolerant traits; cotton and corn with insect-resistant traits
Figure 2.4. Index of agricultural productivity, 1948 to 2006 (1996=1.00)

Figure 2.5 A Index of total output from the farm sector, 1948 to 2006 (1996=1.00)
Figure 2.5 B Index of output associated with livestock products, 1948 to 2006 (1996=1.00)

Figure 2.5 C Index of output associated with crops, 1948 to 2006 (1996=1.00)
Farm Profitability

\[ \text{Gross farm income} = \text{Cash receipts from farm marketings} + \text{Government payments} + \text{Other income from farm sources} - \text{Production expenses} \]

\[ \text{Nominal net farm income} = \text{Gross farm income} - \text{Production expenses} \]

\[ \text{Real net farm income} = \frac{\text{Nominal net farm income}}{\text{Broadly-based price deflator}} \]

Figure 2.6 A Gross farm income and production expenses, 1949 to 2007
Figure 2.6 B Nominal and Real Net Farm Income, 1949 to 2007

Financial Structure

Value of real estate assets
+ Value of nonreal estate assets
+ Value of financial assets
= Total assets
− Total liabilities or debt
= Equity or net worth

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**Figure 2.7 A** Real Estate Assets and Non-real Estate Assets 1960 to 2006

**Figure 2.7 B** Farm assets and liabilities, 1960 to 2007
Figure 2.7 C Equity associated with the farm sector, 1960 to 2007

Figure 2.7 D Debt-to-asset ratio associated with the farm sector, 1960 to 2007
A Note on Profitability

- Nominal net farm income was about $57 billion in 2009; over the period 2004 to 2009, range $58.5 billion (2006) to 87.1 billion (2008)

- Since the 1930s, the worst year in terms of lowest real net farm income was 1983

- In 2007, farm assets were roughly $2.2 trillion; farm liabilities were on the order of $200 billion; thus equity in the farm sector was $2 trillion, largely due to real estate assets in 2007.
A Note on Profitability

- Debt-to-asset ratio peaked at 22 percent in 1985; currently this ratio is about 10 percent
- Debt-to-equity ratio peaked at 28 percent in 1985; currently this ratio is about 10 percent

Relative Importance of Farm Input Expenditures
### TABLE 2.4 Value Added for a Loaf of Bread

<table>
<thead>
<tr>
<th>Product</th>
<th>Type of Firm</th>
<th>Product Sold</th>
<th>Paid</th>
<th>Received</th>
<th>Value Added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Farm</td>
<td>Wheat</td>
<td>—</td>
<td>$.08</td>
<td>$.08</td>
</tr>
<tr>
<td>Milling</td>
<td>Miller</td>
<td>Flour</td>
<td>$.08</td>
<td>$.50</td>
<td>$.42</td>
</tr>
<tr>
<td>Baking</td>
<td>Bakery</td>
<td>Bread in bulk</td>
<td>$.50</td>
<td>$.72</td>
<td>$.22</td>
</tr>
<tr>
<td>Marketing</td>
<td>Store</td>
<td>Distributed bread</td>
<td>$.72</td>
<td>$1.02</td>
<td>$.30</td>
</tr>
</tbody>
</table>

**Total Value Added:** $1.02
Figure 2.9 Share of the food dollar for food eaten at home and for food eaten away from home.

Source: USDA Economic Research Service

Figure 2.10 Percentage of disposable personal income spent on food, 1929 to 2007
Figure 2.11 Illustration of Engel’s Law using annual data from 1929 to 2007

Figure 2.14 The marketing bill share and the farm value share of consumer food expenditures, 1950 to 2006
Only 20 cents of each dollar spent on food products goes to farmers and ranchers…