

CHAPTER 6. MARK-UPS FOR PRICE DETERMINATION

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CHAPTER 6. MARK-UPS FOR PRICE DETERMINATION

6.1 OVERVIEW

The following figure illustrates the representative prices and mark-ups for a typical^a V-axis clothes washer being sold in the U.S. marketplace:

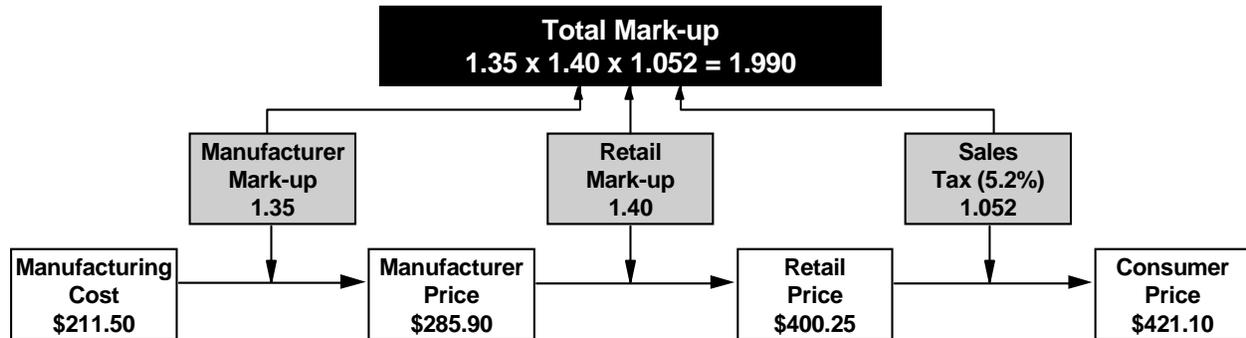


Figure 6.1 Average Costs and Mark-ups for the Baseline Clothes Washer

To perform LCC analysis, the Department used a 2-step mark-up approach where: (a) the manufacturing costs (i.e., full production costs) are marked up to the manufacturer price using a manufacturer mark-up; and (b) the manufacturer price is marked up by a retail mark-up to arrive at the retail price. The price paid by the consumer includes the sales tax in addition to the retail price. This sales tax is accounted for by using a sales tax mark-up over the retail price of the clothes washer.

The Department used a fixed retail mark-up of 1.40, and a fixed mark-up of 1.052 to cover the sales tax. The manufacturer mark-up over full production costs was found to be 1.35 for the baseline unit.

^aIn this description a typical unit refers to a high production volume model with high market share (industry average); not necessarily a minimally complying unit under NAECA, or a unit with an MEF value of 0.817 (AHAM baseline). Currently no data exists that would allow the Department to associate sales information on the basis of the MEF descriptor to be used in the present rulemaking. In the absence of specific price information for a baseline (0.817 MEF) clothes washer, typical values are used as default values for the baseline model. Since the life-cycle-cost (LCC) analysis uses differential costs only, the absolute value of the baseline unit cost has no impact on LCC and payback analysis. The absolute value of the baseline unit cost is important, however, if price survey information is used to compare prices derived from a mark-up over cost with prices observed in the market.

Based on the information above, the total mark-up from full production costs to consumer price is 1.990.

Section 6.2 of this document presents a discussion on retail mark-ups, presenting current and historical retail mark-ups for clothes washers. Section 6.3 presents a brief discussion on sales tax and its effect on consumer price. Section 6.4 outlines the Department's methodology for estimating manufacturer mark-ups.

6.2 RETAIL MARK-UPS

The objective of this section is to estimate the manufacturer price-to-retail price mark-up for clothes washers from the available sources of price information.

6.2.1 Background

One measure of the effect of appliance efficiency standards on consumers is the change (increase) in the purchase price of the appliance. A more stringent standard usually results in increased manufacturing costs to the manufacturers. These increased costs (and associated margins) are passed-through from the manufacturers to the retailers and eventually to the consumer in the form of higher purchase prices.

It is important to identify what proportion of the standards-induced costs will be reflected in retail prices, as this mechanism is important for the rulemaking in two ways: a lower margin over incremental manufacturing costs passed-through justifies a less stringent standard from a manufacturer impact standpoint; and has the opposite effect of lowering consumer LCC which justifies a more stringent standard from a consumer perspective.

Retailers buy appliances (clothes washers in this case) from manufacturers and sell them to consumers at higher prices to cover their operation costs and profit margins. The amount by which the manufacturer price (price paid by the retailer to the manufacturer) is marked up by the retailer to arrive at the retail price is referred to as the retail mark-up.

In this section we estimate the manufacturer price-to-retail price mark-up for clothes washers (i.e., the retail mark-up) based on available historical market information. Sources of information for the retail price of clothes washers include:

- (1) Consumer Expenditure Surveys, conducted by the Bureau of Labor Statistics in conjunction with the Bureau of Census¹
- (2) Dealerscope Merchandising's Annual Statistical Surveys²
- (3) ELCAP price database³

Sources of information for the manufacturer price of clothes washers include:

- (1) Current Industrial Reports, U.S. Department of Commerce⁴
- (2) Association of Home Appliance Manufacturers's Fact Book, 1997⁵

Sections 6.2.2 and 6.2.3 present the retail and manufacturer price data, respectively, along with short descriptions of the data collection procedures and the characteristics of each of these data sets. These data sets are then used to arrive at the retail mark-ups which are reported and compared in Section 6.2.4. Retail prices from each data source are divided by manufacturer prices from each of two sources for manufacturer price, thereby resulting in six different sets of estimates for retail mark-ups. Section 6.2.5 presents an analysis of financial statements (SEC 10-K reports) of a few appliance retailers to get an understanding of gross margins in the appliance retail business.

6.2.2 Retail Price Information

6.2.2.1 Consumer Expenditure Surveys (CES)

Consumer Expenditure Surveys (CES) provide information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit (families and single consumers) characteristics. The survey consists of two components: a quarterly Interview Survey and a weekly Diary Survey, each with its own questionnaire and sample. Data collection is carried out by the Bureau of Census under contract with the Bureau of Labor Statistics (BLS).

The data are collected in independent Quarterly Interview and Weekly Diary surveys of approximately 5,000 sample households. Each survey has its own independent sample, and each collects data on household income and socioeconomic characteristics. The Interview survey includes monthly out-of-pocket expenditures, such as housing, apparel, transportation, major home appliances, health care, insurance, and entertainment. The Diary survey includes weekly expenditures of frequently purchased items, such as food and beverages, tobacco, personal care products, and non-prescription drugs and supplies.

Table 6.1 shows the unweighted average purchase price of clothes washers as reported in the consumer expenditure surveys. These values represent the price to consumers net of a trade-in and represent purchases by individuals. These values are reported for the period of time 1986 through 1994. Table 6.1 also shows the retail price of these washers. The retail prices were estimated by subtracting the sales tax from the purchase price paid by consumers (based on sales tax rates and shipments of clothes washers in all the 50 states, a shipment weighted average sales tax of 5.2% was calculated).

Table 6.1 Retail Prices of Clothes Washers from 1986 through 1994 obtained from the Consumer Expenditure Surveys

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
Purchase Price (\$)	431.98	432.29	437.60	442.23	444.21	444.05	435.21	419.43	435.06
Retail Price (\$)	410.63	410.92	415.97	420.37	422.25	422.10	413.70	398.70	413.56

6.2.2.2 Dealerscope Merchandising Statistical and Marketing Reports

Dealerscope is the monthly trade publication for retailers of consumer electronics, major appliances, and computers. The magazine covers product news, industry trends, and new technologies, along with reports on the marketing, branding, merchandising, and retail strategies of vendors and dealers.

Dealerscope reports contain one-year and five-year unit shipments industry-wide and the retail value of these shipments. In these reports the data is based on information provided by leading manufacturers. Companies are asked to indicate how much the overall total shipments and average retail prices have changed for the industry, and for the product category. Manufacturers are not asked for the annual changes in their own companies's shipments or in retail prices of their own brand of merchandise.

Table 6.2 provides the retail price of clothes washers estimated from the statistical reviews. The estimated retail value of clothes washers shipped from factories is divided by the clothes washer units shipped industry wide to arrive at the per unit retail price.

Table 6.2 Retail Prices of Clothes Washers from 1986 through 1995 estimated from Dealerscope Merchandising's Annual Statistical Reviews

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Retail Price (\$)	439.3	440.4	440.4	406.1	410.2	415.0	382.8	382.7	394.2	394.2

6.2.2.3 ELCAP Clothes Washer Sales Information

The ELCAP^a service collects sales data (retail prices) on clothes washers from a number of retailers—consumer electronics superstores, appliance stores, and mass merchants. Table 6.3 presents shipment weighted retail price for the years 1994 through 1997. (The 1997 retail price is based on sales data through August 1997.)

**Table 6.3 Shipment Weighted Retail Prices of Clothes Washers from 1994 through 1997
Based on ELCAP Retail Sales Data**

Year	1994	1995	1996	1997
Retail Price (\$)	393.00	371.92	390.07	388.21

6.2.3 Manufacturer Price Information

6.2.3.1 Current Industrial Reports (CIR)

The CIR program has been providing monthly, quarterly, and annual measures of industrial activity for many years. The primary objective of the CIR program is to produce timely, accurate data on production and shipments of selected products. The data are used to satisfy economic policy needs and for market analysis, forecasting, and decision making in the private sector. The CIRs include statistics for the United States on the quantity and value of shipments along with comparative data on exports, imports, and domestic output.

The CIR program uses a unified data collection, processing, and publication system. The census bureau updates the survey panels for most reports annually and reconciles the estimates to the broader-based annual survey of manufactures and the census of manufactures. The census of manufactures provides a complete list of all producers of the products covered by the CIR program and serves as the primary source for CIR sampling. The CIR program includes a group of mandatory and voluntary surveys. Typically, the monthly and quarterly surveys are conducted on a voluntary basis. Those companies that choose not to respond to the voluntary surveys are required to submit a mandatory annual counterpart corresponding to the more frequent survey.

The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

^a ELCAP service was discontinued at the end of 1997. Clothes washer retail sales are currently being tracked by INTELLECT ASW.

Table 6.4 provides the estimated manufacturer price of clothes washers. The value of the clothes washers shipped from factories is divided by the quantity of shipments to arrive at the per unit manufacturer price.

Table 6.4 Manufacturer Prices of Clothes Washers from 1986 through 1996 Estimated from Current Industrial Reports

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Mfgr. Price (\$)	272.6	269.9	262.0	277.3	278.1	275.9	277.6	283.8	279.0	273.2	275.2

6.2.3.2 AHAM Fact Book

The AHAM Fact Book is a comprehensive collection of facts defining the U.S. major home appliance industry, its market and its products. The Association lists both:

- the total manufacturers' sales of clothes washers (excludes freight charges or extended warranty costs), and
- the industry unit shipments (domestic and exports) of clothes washers.

The above stated information can be used to arrive at an average per-unit manufacturer price for clothes washers, presented in Table 6.5.

Table 6.5 Manufacturer Prices of Clothes Washers from 1986 Through 1996 Estimated Using Data from the Aham Fact Book

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Manuf. Price (\$)	265.7	263.9	269.1	277.7	286.7	287.8	291.3	292.4	299.4	302.9	287.4

6.2.4 Retail Mark-ups from Manufacturer and Retail Price Information

Table 6.6 shows average retail mark-ups over the 9-year period, 1986 through 1994, for clothes washers sold in the U.S. The retail mark-ups in this table are obtained using manufacturer and retail price information obtained from governmental sources—retail price information from the Consumer Expenditure Surveys conducted by the Bureau of Labor Statistics, and manufacturer price information from the Current Industrial Reports prepared by the Bureau of Census.

Table 6.6 Retail Mark-ups for Clothes Washers from 1986 Through 1994 Using Retail Prices from the Consumer Expenditure Surveys, and Manufacturer Prices from the Current Industrial Reports

Year	Retail Price (CES)	Manuf. Price (CIR)	Retail Markup
1986	410.6	272.6	1.51
1987	410.9	266.9	1.54
1988	416.0	262.0	1.59
1989	420.4	277.3	1.52
1990	422.3	278.1	1.52
1991	422.1	275.9	1.53
1992	413.7	277.6	1.49
1993	398.7	283.8	1.40
1994	413.6	279.0	1.48

Table 6.7 gives the retail mark-ups estimated using price information from different data sources explained earlier in the text, and the same information is presented graphically in Figure 6.2. For the period 1986 through 1996, the average retail mark-up varies from a minimum of 1.33 (in 1995) to a maximum of 1.62 (in 1988).

Table 6.7 Retail Mark-ups Estimated from Different Data Sources

Year	Retail Mark-up (Dealerscope) AHAM)	Retail Mark-up (Dealerscope) (CIR)	Retail Mark-up (CES) (AHAM)	Retail Mark-up (CES) (CIS)	Retail Mark-up (ELCAP) (AHAM)	Retail Mark-Up (ELCAP (CIR)	Average Retail Mark-up
1986	1.65	1.61	1.55	1.51			1.58
1987	1.67	1.65	1.56	1.54			1.61
1988	1.64	1.68	1.55	1.59			1.62
1989	1.46	1.46	1.51	1.52			1.49
1990	1.43	1.47	1.47	1.52			1.47
1991	1.44	1.50	1.47	1.53			1.49
1992	1.31	1.38	1.42	1.49			1.40
1993	1.31	1.35	1.36	1.40			1.36
1994	1.32	1.41	1.38	1.48	1.31	1.41	1.39
1995	1.30	1.44			1.23	1.36	1.33
1996					1.36	1.41	1.39

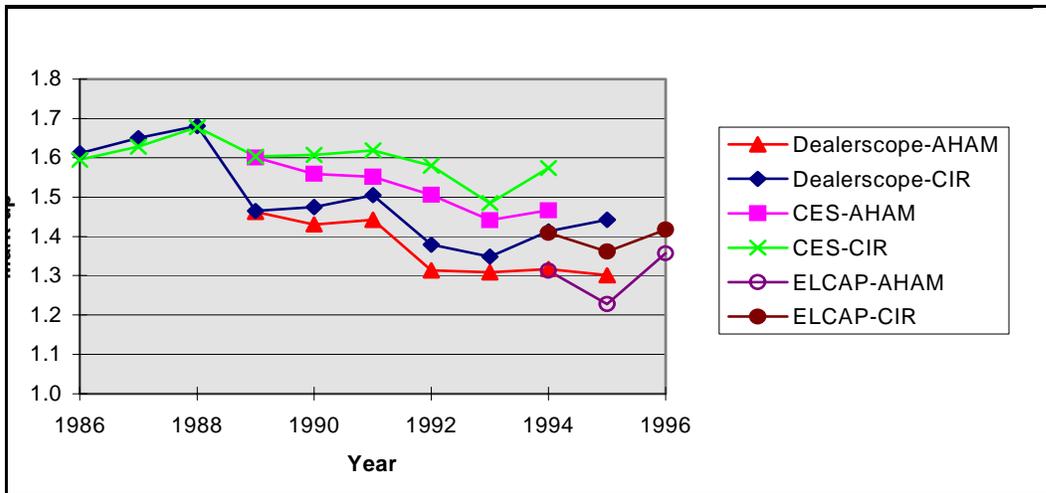


Figure 6.2 Retail Mark-ups Estimated from Different Data Sources

6.2.5 Retail Mark-ups Estimated from Sec's Financial Statements

Information relating to the gross margins (or gross profit) of appliance retailers can be obtained from their SEC 10-K financial statements. Table 6.8 presents gross margins for some

appliance retail companies (Best Buy, Circuit City Stores, Lowe's, and Sun T.V. and Appliances). Most of these retailers sell electronics and home office equipment along with household appliances. The margins in Table 6.8 represent the average of the margins that retailers obtained from sales in all the above mentioned categories. On average, appliance sales are more profitable (i.e., obtain higher margins) than sales of personal computers, T.V.'s and other electronics due to the intensely competitive and highly promotional pricing environment in the electronics retail environment.^a As a consequence, some retailers are trying to further increase their margins by expanding the appliance part of their business and by putting greater emphasis on the sale of extended service contracts.^b

Table 6.8 Gross Margins for Retailers of Electronics, Home Office Equipment and Major Appliances

Company	Gross margin (Avg.: 1990-1996)	% Revenue from Appliances	Retail mark-up*
Retailer A	25.2%	12.0	1.34
Retailer B	26.3%	15.0	1.36
Retailer C	16.2%	9.0	1.19
Retailer D	25.7%	17.5	1.35

Typically in the retail industry, gross profits, as reported in SEC 10-K statements, are obtained by subtracting the "cost of sales" from the "net sales." Dividing gross profit by the net sales gives the gross margin. Gross margin represents the mark-up that retailers receive over the total of the:

- price that the retailers pay to the manufacturers for buying the goods,
- costs involved in the process of buying the goods from manufacturers (these might include some transportation costs, administration and labor costs), and
- costs of maintaining and operating warehouses where the goods are stocked after they are bought from manufacturers.

From the above description of gross margins, it can be seen that the retail mark-ups (defined earlier in this write-up as the ratio of retail price to manufacturer price) will be, in general, higher than what the gross margins indicate. This is because in addition to profits and SG&A, the retail mark-ups will also have to cover the costs incurred by retailers for buying and warehousing activities. The buying and warehousing costs as a percentage of the net sales or revenues are not available.

^a Source: Standard and Poor's Stock Reports on Circuit City Stores and Best Buy.

^b Source: Standard and Poor's Stock Reports on Best Buy.

6.3 SALES TAX

Consumers pay sales tax in addition to the retail price at the time of purchasing an appliance. This additional margin for sales tax needs to be reflected in the mark-up from manufacturer price to consumer price.

For the year 1995, the shipment weighted sales tax on clothes washers was calculated to be 5.2%. This information is based on individual sales tax rates for 50 states and weighted by the clothes washer shipments (source: AHAM) in each of these states. Hence, a mark-up of 1.052 is used to cover the sales tax.

In the year 1994, for which retail price is available from all the three sources, namely, CES,¹ Dealerscope² and ELCAP,³ the average clothes washer retail price is \$400.25. Looking at Tables 6.2 and 6.3, there seems to be no discernible change in clothes washer retail prices since 1994. Hence (in the absence of price information specific to clothes washers with an MEF value of 0.817), the Department used **\$400.25** as the baseline retail price for the clothes washer rulemaking analysis. Adding a 5.2% sales tax results in a baseline consumer price of **\$421.10**.

Looking at Table 6.7, the retail mark-up, on average, in the past three years has been around 1.40. Adding a sales tax of 5.2% on top of the retail price results in a manufacturer price-to-consumer price mark-up of 1.473. This mark-up of 1.473 is in agreement with the mark-up of 1.475 used in the 1991 report to AHAM entitled “Financial Impact of DOE Top Loading Horizontal Axis Standards on U.S. Washing Machine Manufacturers.”⁶ Hence, the Department of Energy used a retail mark-up of **1.40**, and a sales tax mark-up of **1.052** to arrive at the consumer price for the clothes washer rulemaking analysis.

6.4 MANUFACTURER MARK-UPS

The objective of this section is to outline a methodology for estimating the mark-up from manufacturing cost to manufacturer price for the clothes washer rulemaking analysis.

6.4.1 Background

In order to meet the new appliance efficiency standards, manufacturers may have to introduce design changes in their product lines. These design changes usually result in increased manufacturing costs. The increased manufacturing costs are “passed-through” from manufacturers to retailers and eventually to consumers in the form of higher purchase prices.

In this section the manufacturing cost to manufacturer price mark-up is estimated. This is referred to as the manufacturer mark-up. The manufacturer mark-up has an important bearing on the manufacturers’ profitability, as a higher mark-up suggests that manufacturers can pass-through the variable costs and some of the product conversion costs (the fixed costs) to retailers and

eventually to consumers; whereas a lower mark-up implies that manufacturers will not be able to fully recover the necessary investment in plant and equipment.

6.4.2 Manufacturer Price and Mark-up for the Baseline Standard Clothes Washer

The average retail price of a clothes washer in 1994 was \$400.25 (as discussed in Section 6.3). Using a retail mark-up of 1.40 (also discussed in Section 6.3), the baseline manufacturer price would be \$285.90.

Manufacturing cost estimates for the baseline clothes washer can be estimated from the baseline manufacturer price (\$285.90) and the industry cost structure developed in Section 3.10. This is shown in Table 6.9. The break-up of the price is based on the assumption that in order to earn a satisfactory return, revenues from the sale of goods (and hence the manufacturer price) must be large enough both (1) to recover costs and (2) to earn a profit that provides a satisfactory return on investment.

Table 6.9 Manufacturing Cost of a Baseline Clothes Washer Estimated from the Industry Cost Structure

Per Unit	Cost (\$)
Material	148.7
Labor	29.3
Overhead	33.5
Full Production Cost	211.5

The full production cost of a baseline clothes washer is estimated to be **\$211.50**. The full production cost (also called the inventory cost) and the non-production cost together constitute the **full cost** of a product. Full production cost is the sum of the direct material cost, the direct labor cost, and the overhead cost which includes depreciation (~3.5% of revenues). The non-production costs include selling costs, general and administrative costs, research and development costs, and interest costs. The full cost of a product and its components are shown in Chapter 5, Figure 5.1.

Baseline manufacturer mark-up is defined as the increase in price over the full production cost of a baseline clothes washer, and is calculated as:

$$\text{Baseline Manufacturer Mark-up} = \frac{\text{Manufacturer Price}}{\text{Full Production Cost}}$$

A baseline mark-up is applied over the full production cost to arrive at the manufacturer price at which the firm can recover all costs, both production and non-production, and earn a profit. In general, the manufacturer mark-up should ensure that the manufacturer price of the product is high enough (1) to recover the full cost of the product and (2) to yield a satisfactory profit. Such a price is called a *normal price*.^a

A baseline manufacturer mark-up of **1.35** over full production cost is calculated from the cost information in Table 6.9.

6.4.3 Manufacturer Price and Mark-ups for Different Efficiency Levels

6.4.3.1 Pre-ANOPR Analysis

For the ANOPR analysis the Department used an average manufacturer mark-up of 1.35 as an upper bound in conducting the LCC analysis. The Department used a mark-up of 1.00 as a lower bound. This lower bound represents pass-through of incremental full product costs, including depreciation of new capital expenditures. There is, however, no recuperation of incremental non-production costs (which include R&D and marketing expenses).

In order to characterize the uncertainty in manufacturer mark-ups, the Department used a triangular distribution characterized by a maximum manufacturer mark-up of 1.35, a minimum manufacturer mark-up of 1.00, and a most likely mark-up of 1.18 (the average). Adding a fixed mark-up to retail price (of 1.40) and then to consumer price (mark-up of 1.052), as discussed in Section 6.3, the total mark-up from manufacturing cost to consumer price was bound by the following values:

- minimum value of $1.00 \times 1.40 \times 1.052 = 1.473$
- maximum value of $1.35 \times 1.40 \times 1.052 = 1.990$

The Department characterized the total mark-up using a triangular distribution with minimum, maximum, and most likely values of 1.473, 1.990, and 1.732, respectively.

6.4.3.2 NOPR Analysis

NOPR analyses used a consistent set of assumptions for prices across all analyses sections (manufacturer impact, national benefits, and consumer impacts). Manufacturer and retail price are

^a Some people question whether full costs are widely used as a basis for pricing. In a survey of large industrial companies, 85% reported that they do use full cost pricing. (Source: V. Govindarajan and Robert N. Anthony, "How Firms Use Cost Data in Pricing Decisions," *Management Accounting*, July 1993, pp. 30-36.)

related by a fixed mark-up of 1.40, as discussed in Section 6.3 of this document, and a sales tax mark-up of 1.052 is applied to arrive at the consumer price.

For the detailed economic analyses conducted for the NOPR, manufacturer mark-ups were determined by conducting financial analysis. The Government Regulatory Impact Model (GRIM) was used to carry out the cash flow analysis. The results of this analysis are presented in Chapter 11 of this TSD. The GRIM is a standard annual cash flow analysis which uses price, quantity, and cost information to assess the impact of regulatory conditions on manufacturer income and cash flow. The model calculates the actual cash flows, by year, and then determines the present value of those cash flows, both without regulations and with regulations.

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