

## **Retailer: A Retail Pricing Simulation Exercise**

*Retailer* is an exercise designed to simulate the pricing decisions faced by the management of a large chain of retail clothing stores. The simulation focuses on two important aspects of the pricing decision: *timing* and *magnitude* of price reductions. The retailer must decide when to take a price cut, if at all. If a price cut is taken, the magnitude of the cut must also be decided. These decisions are interrelated and further complicated because price reductions cannot be rescinded.

To place this problem in more perspective, an overview of the fashion retail industry is given next. Then a description of the production and distribution process is given, followed by a brief discussion of the technology and issues involved in pricing and markdowns. The implication of a markdown strategy for overall corporate earnings is illustrated for a specific company.

In order to develop a good pricing strategy for playing *Retailer*, historical data is provided in the spreadsheet `RETAIL.xls`. Specific instructions and suggestions for preparing to play *Retailer* are described in the final section.

*The Fashion Retail Industry*

The fashion retail industry is highly fragmented. Companies range in size from small boutiques operated as sole proprietorships to multinational specialty retailers such as Benetton S.P.A., The Limited, and GAP Inc. Other important outlets include national department store chains, such as Macy's and Nordstrom's in the U.S. and Marks and Spencer in Europe, and the rapidly growing mail order segment (Spiegel, J. Crew, etc.).

While many retailers only serve as intermediaries between producers and consumers, there is an increasing trend in the industry toward *private label* merchandise, which is manufactured exclusively for a particular retailer. Because it is exclusive, private label merchandise gives a store greater pricing power. It also helps differentiate a store's merchandise mix. Specialty retailers (Benetton, The Limited, etc.) have always manufactured (or subcontracted the manufacture of) their own exclusive designs. Recently, department stores such as Macy's are following this pattern by introducing their own private label lines.

While there is a tremendous variety in the range of merchandise sold by fashion retailers, from an operations standpoint the merchandise can be broken down into two main categories:

- Staple Items

Also known as *basic goods*, these are items which consumers purchase regularly and do not become obsolete quickly. Socks, underwear, tee shirts, and core denim garments like five-pocket jeans<sup>1</sup> are considered staples. Also included in this category are "classic" garments, i.e., black gabardine skirts, khaki pants, white button-down Oxford shirts, and other items that are relatively immune to shifting fashion trends. Staple items are characterized by relatively stable and predictable demand.

- Fashion Items

These are items with a strong fashion component that quickly become obsolete or outdated. Fashion items are targeted for specific seasons (fall, spring, cruise, holiday, etc.) and in many cases are marketed over a series of "mini-seasons" lasting as short as eight weeks. These items are used to enliven the presentation within a store, and are frequently featured in its window display. In many ways, they also define the "style" of a store and help position it relative to its competitors.

A range of garment types are found in the fashion category. Demand for fashion items is highly unpredictable and erratic; an item can be a "hit" and sell out in a matter of weeks, or consumers might utterly reject the style, resulting in only a fraction of the total stock selling during its targeted season.

Of course, the merchandise portfolio of a store can be broken down in many different ways. For example, some stores categorize merchandise by fabric type (knits vs. wovens) or department (sportswear, accessories, etc.). However, the above classification turns out to be most useful in understanding the relationship between production, distribution, and pricing.

---

<sup>1</sup> "Five-pocket jeans" refer to standard denim pants, each with two front pockets, two back pockets, and an inside coin pocket. This style was originally popularized by Levi Strauss and Co.

### *Production and Distribution*

Garment production involves four major stages. First, and perhaps most important, is the design of the garments themselves. This is a highly creative process that, in most cases, begins one year in advance of the target season. Basic silhouettes, colors, and fabrics are chosen at this stage. Designs of individual garments or *styles* are often based on a particular theme (e.g., the “Victorian look” or the “Western look”) to form an entire *line* of clothes. The line projects a unified image and also helps ensure that garments coordinate well with each other.

Once designs are finalized, production quantities are determined. These quantities are based on very rough forecasts of the likely sales of individual styles. Given the vagaries of fashion trends and the long lead times involved, these forecasts are typically highly inaccurate.

Materials are then procured for production. Fabric is ordered from textile mills. Mills range from large national firms such as Burlington, Cone Mills, and Galey and Lord, to small specialty mills that produce silks and woollens. The lead time for fabric procurement can range from 1–2 weeks for standard in-stock fabrics to several months for special-order fabrics (e.g., fabrics with custom colors or weaves). Buttons, zippers, and other accessories must also be ordered at this stage.

While materials are being ordered, production time is arranged either at a firm’s own facilities or through subcontractors. Firms that specialize in particular fabric types, such as Italy’s Benetton, with its core line of natural fiber knitwear, or Levi Strauss and Co. with its signature denim jeans, are more likely to own their own facilities; those without strong materials orientation often use subcontractors.

Subcontractors provide two key advantages to retailers: (1) flexible production capacity and (2) production expertise in particular fabric types. Both can be significant advantages when faced with fast moving fashion trends. For example, Ireland is well regarded as a source for high quality woolen knits, while Hong Kong is the preferred source for silk garments, since it is close to the sources of raw materials and has the machinery and skilled labor necessary to work with this delicate fiber. Denim and gabardine are relatively easy fabrics with which to work and garments made from these fabrics can be produced in a variety of locations, for example Indonesia, Puerto Rico, or the U.S. As a result, it is not uncommon for a retailer to have production contracts in dozens of countries in any given season. Lead times can range from under four weeks for an in-house domestic shop producing a simple garment to several months for an overseas contractor who requires advance production agreements.

Finally, once garments are cut and assembled, they are shipped to distribution centers and then from distribution centers to individual stores. The distribution process can be quick (1–2 weeks) for a domestic supplier, but in the case of overseas suppliers it may take 4–6 weeks if garments are transported in container ships. Overall, the total lead time for production is typically 6–12 weeks for a domestic contractor producing from standard fabric stock, 3–4 months for an overseas contractor using stock fabrics, and can exceed six months for an overseas contractor using a special-order fabric.

For staple items, periodic production runs can be scheduled to ensure a steady flow of merchandise from production facilities to stores. The management of this process is carried out using many of the traditional tools of inventory control. Indeed, the primary concern with

staple items is reducing lead time and costs for reordering. This is accomplished through better communication via Electronic Data Interchange (EDI)<sup>2</sup> and better materials handling technology.<sup>3</sup> Fashion items, however, are usually produced in a *single production run* because the fabrics and patterns change significantly from one season to the next and the lead times involved in production are usually too long to permit restocking within a tight 8–15 week sales season.

#### *Pricing, Markdowns, and Leftovers*

With perfect forecasts, merchandise is available in the exact quantities demanded by consumers and a store sells out its entire stock at full price. In practice, this is rarely the case. More often, a store may find itself short of stock on “hit” items, while selling only a fraction of its initial stock if a style proves unpopular. Items that remain unsold at the end of the selling season are typically sold in factory outlets (if available) or sold to discounters (“jobbers”). In the latter case, labels are often removed to prevent devaluation of the company or designer’s image.

Without the option to restock fashion items during a sales season, merchandise managers are left with few alternatives to match supply and demand for individual styles. One option is to transfer merchandise from stores where sales are weak to those where sales are strong. The second option is to change the price, usually by marking down styles that are not selling. The main decisions in taking a markdown are its timing and magnitude (i.e., the amount of the reduction from original price). For most retailers, the process of making markdown decisions is more of an art than a science. It is based mainly on the judgment of experienced merchandise managers.

#### *POS Data and Markdown Control*

A major technological trend in the retail industry is the development of point-of-sale (POS) technology. Essentially, a POS system links computerized cash registers (which are often equipped with laser scanners for automated reading of bar-coded tags) and scanners at distribution centers with a central computer in a retailer’s home-office. Local computers (usually PC-based) in the individual retail locations and distribution centers collect data on sales and inventories and are polled periodically by the central computer to update the status of each style in a store’s line. Through a POS system, senior managers have a “real-time” view of the sales activities throughout their entire distribution chain.

Currently, most POS data is used only to identify (“flag”) particular styles that are not performing up to expectations. For example, many retailers use an index of weekly sell-through percentage, defined as the ratio of a given week’s sales to the in-store inventory at the start of that week. Each week items are sorted by sell-through percentages. These lists are used by merchandise managers to make markdown decisions. To date, however, very little analysis of POS data is performed beyond this simple exception reporting.

---

<sup>2</sup> EDI refers to a collection of technologies for computer-to-computer transmission of standard trading documents such as purchase orders and invoices. The technology is based on the ANSI X.12 standard, a detailed set of standards for protocols and message formats.

<sup>3</sup> The term “quick response” is often used in the industry to refer to lead-time reduction techniques.

### Financial Implications

To understand the financial impact of a markdown policy it is useful to examine a specific company's earnings. Gap Inc. provides a good example. Gap Inc. has several subsidiaries: GAP Stores, GAP Kids, and Banana Republic. Each sells casual clothes and denim.

In the New York Times article in Figure 1, a sharp earnings increase for Gap Inc. is partially attributed to its markdown strategy.<sup>4</sup> Financial information for GAP Inc. is shown in Figures 2–4. Figure 3 shows that in 1992, the GAP had almost \$3 billion in sales, producing a net income of approximately \$210 million. With 144 million shares of stock outstanding in 1992, this represented earnings per share of \$1.47.

Suppose that the GAP could increase revenues 2% by changing its markdown strategy. This would represent a \$59 million increase in sales. Since the cost of goods sold is not affected by the pricing strategy, pretax income would also increase by \$59 million. This represents a 17% increase in pretax income, and thus provides a 17% increase in net income and earnings per share. Likewise, a 2% decrease in revenue would decrease net income by 17%. *Relatively small changes in revenue can have a substantial impact on a company's bottom line.*

(\$ Millions)	1989	1990	1991	1992	1993E
Net Sales	\$1,587.0	\$1,934.0	\$2,518.0	\$2,960.0	\$3,315.2
Cost of Goods Sold	1,046.2	1,241.2	1,568.0	1,955.6	2,182.3
S,G & A	364.1	454.2	575.7	661.3	743.8
Interest Expense	2.8	1.4	3.5	3.8	6.0
Pretax Income	162.7	237.1	370.8	339.8	383.0
Taxes	65.1	92.4	140.9	129.1	145.5
Net Income	97.6	144.7	229.9	210.7	237.5
EPS	\$0.69	\$1.02	\$1.62	\$1.47	\$1.65
Shares Out (mil)	141.0	141.6	142.0	143.7	144.2
Sales % Change	26.8%	21.9%	30.3%	17.7%	16.0%
Comp-Stores	15.0	14.0	13.0	5.0	5.0
% OF SALES					
Cost of Goods Sold	65.9	64.2	62.3	66.1%	65.8%
S,G & A	22.9	23.5	22.9	22.3	22.4
Interest Expense	0.2	0.1	0.1	0.1	0.2
Pretax Income	10.3	12.3	14.7	11.5	11.6
Tax Rate	40.0	39.0	38.0	38.0	38.0
SOURCE: Company reports & C. J. Lawrence estimates.					

**Figure 3.** The GAP – Operating Statement Information

<sup>4</sup> The article does not contain enough information to determine whether Gap Inc.'s markdown strategy changed, or whether items were simply selling faster so that fewer markdowns were required.

## Gap's 3d-Quarter Earnings Climbed 27.3%

By ANDREA ADELSON

Gap Inc. said yesterday that its third-quarter income rose 27.3 percent because of leaner inventories, fewer markdowns and the addition of fashion merchandise for women.

The results were a record for the San Francisco-based company and exceeded expectations of some industry analysts. Gap shares rose \$3.125, to \$39.50, on the New York Stock Exchange.

The Gap's results also marked a turnaround following four consecutive quarters where the company's earnings have declined compared with the previous year's periods. The specialty retailer that made jeans and T-shirts a fashion statement has struggled over the last 12 months as once-rapid sales growth has slowed and profit margins have eroded.

"This was a welcome change," said Robert F. Buchanan, a retail analyst for Alex. Brown. He noted, however, that the period a year ago, when the company's earnings had declined 14 percent and the yearlong slide began, "was easy to beat."

In this year's third quarter, sales increased 9 percent from the period a year earlier. However, sales at stores open at least one year, which analysts say is a better measure of sales

strength, declined 1 percent. The company has 1,385 stores currently, a 7 percent increase over the 1992 period.

### Inventories Cut by 15%

The company overcame sluggish sales volume by cutting inventories 15 percent and adding more fashionable merchandise for women, such as long knit skirts and ribbed vests, alongside its standard stock of jeans and sweatshirts.

"It's very current, younger, not quite as preppy-basic as a year ago," said Alice Ruth, a retail analyst for Montgomery Securities. She said sales of the new merchandise had been brisk with little leftover to be marked down. Price markdowns hurt profits in earlier periods.

With fewer clearance items and lower inventory, which meant the company had lower interest expense to finance the cost of goods, the company's gross profit margins rose in the quarter by 2.5 percentage points, to 37.8 percent, compared with a 4.5 percent decline in the period a year ago, the analysts said.

"This strategy should continue into the fourth quarter," said Thomas H. Tashjian, a retail analyst with First Manhattan. Holiday shoppers "will be hard pressed to find fleece or denim" at a Gap store, he predicted.

**Figure 1.** New York Times Article, November 12, 1993

(\$ Millions)	1989	1990	1991	1992	1993E
SALES					
Gap Stores	\$1,307	\$1,554	\$1,944	\$2,185	\$2,335
Gap Kids	\$70	\$140	\$264	\$375	\$500
Banana Republic	\$210	\$240	\$310	\$400	\$480
Total Sales	\$1,587	\$1,934	\$2,518	\$2,960	\$3,315
% Change		21.9%	30.2%	17.6%	12.0%
OPERATING INCOME					
Gap Stores	\$174	\$223	\$315	\$278	\$301
% of Sales	13.3%	14.4%	16.2%	12.7%	12.9%
Gap Kids	\$6	\$12	\$29	\$34	\$45
% of Sales	8.6%	8.6%	11.0%	9.1%	9.0%
Banana Republic	(\$5)	\$5	\$31	\$32	\$43
% of Sales	-2.4%	2.1%	10.0%	8.0%	9.0%
Total Op. Income	\$175	\$240	\$375	\$344	\$389
% of Sales	11.0%	12.4%	14.9%	11.6%	11.7%
CONTRIBUTION TO SALES					
Gap Stores	82.4%	80.4%	77.2%	73.8%	70.4%
Gap Kids	4.4%	7.2%	10.5%	12.7%	15.1%
Banana Republic	13.2%	12.4%	12.3%	13.5%	14.5%
CONTRIBUTION TO PROFITS					
Gap Stores	99.4%	92.9%	84.0%	80.8%	77.4%
Gap Kids	3.4%	5.0%	7.7%	9.9%	11.6%
Banana Republic	-2.9%	2.1%	8.3%	9.3%	11.1%

**Figure 2.** The GAP - Estimated sales and income by division

### *Preparation for Retailer*

In the retailer simulation exercise, the player plays the role of upper management at a large chain of retail stores. The stores start with an initial stock of 2,000 units of a fashion item initially priced at \$60. *There are high hopes that the item will fly off the shelves, but only some items do.* The selling season for the item is 15 weeks. Production and distribution costs for the item have been paid, so that cost is sunk. *The goal is to maximize the revenue* from the 2,000 units during the selling season. Management has decided to allow four price levels: full price (\$60), 10% off (\$54), 20% off (\$48), or 40% off (\$36). Based on observed sales for the current item (and historical data from roughly similar fashion items), in any given week management can leave the price the same, or cut the price. Once the price is cut company policy does *not* allow the price to be raised. If the price has been cut to 40% off, further markdowns are not possible in later weeks.

In the first week the price is set to \$60. Thus, there are 14 remaining weeks for price cut decisions. All unsold inventory at the end of 15 weeks is sold for a salvage value of \$25 per unit.

In order to make more informed markdown decisions, historical data for fifteen different

	1989	1990	1991	1992	1993E
TOTAL					
Number of Stores	960	1,092	1,216	1,307	1,416
Average Store Size	4,226	4,361	4,637	4,980	5,390
Beginning Year Square Feet	3,843	4,067	4,762	5,638	6,509
Year-end Square Feet	4,057	4,762	5,638	6,509	7,632
% Change	5.6%	17.4%	18.4%	15.4%	17.3%
Average Square Feet	3,950	4,415	5,200	6,074	7,071
% Change	5.8%	11.8%	17.8%	16.8%	16.4%
Total Sales (millions)	\$1,587	\$1,934	\$2,518	\$2,960	\$3,315
% Change	27.9%	21.9%	30.2%	17.6%	12.0%
Sales/Average Square Foot	\$402	\$438	\$484	\$487	\$469
% Change	20.9%	9.0%	10.5%	0.6%	-3.8%
Operating Income	\$175	\$240	\$375	\$344	\$389
Operating Margin	11.0%	12.4%	14.9%	11.6%	11.7%
Comparable Store Sales	15.0%	14.0%	13.0%	5.0%	3.0%
SOURCE: Company reports & C.J. Lawrence estimates.					

**Figure 4.** The GAP – Estimated Store Profile

items is available in the spreadsheet *RETAIL.xls*. These are all fashion items, and some turned out to be very popular items (i.e., strong sellers) while some did not sell so well.<sup>5</sup> Although the items are different, their responsiveness to price cuts are quite similar. The historical data in *RETAIL.xls* has been “deseasonalized.” That is, the data has been normalized to remove the predictable effects of seasons and holidays on sales figures. These effects are also removed from the *Retailer* simulation exercise.<sup>6</sup> Nevertheless, the unpredictable component of sales is quite significant. Even at the same price, sales can vary considerably from week to week because of weather, competitors, and a host of other factors. The historical data in *RETAIL.xls* has also been normalized, so that the initial prices of all items are scaled to \$60 and the initial quantities are scaled to 2,000 units.

Before playing *Retailer*, you should carefully analyze the historical data and try to develop a sensible markdown strategy. You should work out any desired formulas in advance, so that necessary calculations can be done simply and quickly in class. In analyzing the historical data, you might want to attempt to answer the following questions.

- What is the average effect on sales of each size price cut? For example, for a price cut from \$60 to \$54, what is the average increase in weekly

<sup>5</sup> In other words, weekly demand for each item (at a given price) is sampled from a distribution with a mean that is different for each item. This “true mean” is unknown at the beginning of each selling season, but can be estimated with greater accuracy as additional weeks of sales are observed.

<sup>6</sup> In statistical terms, sales from one week to the next are independent. Sales are also identically distributed if the price is not changed.



sales?

- How variable are sales from one item to the next?

In developing a strategy, you might want to consider:

- If demand was not variable, what would be the optimal price cut strategy?  
For example, suppose the demand at a price of \$60 was a constant 80 items per week. Using your estimated demand sensitivities, to what level would you cut the price and when would you cut the price?
- How might your strategy be altered to account for uncertainty in demand?
- How would your strategy have performed on the historical data?