

# PRICING STRATEGY

Setting Price Levels,  
Managing Price Discounts, &  
Establishing Price Structures



Tim J. Smith

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# Preface

**P***ricing Strategy* is a comprehensive text on pricing. It examines pricing decisions with an aim to maximize a firm's profits through creating and capturing customers. With each price decision opportunity, *Pricing Strategy* highlights the stakeholder's importance of the decision, the key tradeoffs to consider in selecting between opposing outcomes, and the influences which should guide their decision.

*Pricing Strategy* exists to directly address the major pricing decisions confronting today's executive. It provides a comprehensive approach to managing the pressing price decisions. And, it goes more to the point than an economics text that focus on industry level dynamics, a marketing texts that mention price as just one of several levers under management, an accounting text which provide the mechanics of price to profit relationships but lack the strategy and insight necessary for making price decisions, or a strategy text that focus on industry and competitive dynamics.

*Pricing Strategy* has been written as a practical guide for making pricing decisions for the general MBA student or working professional. Students concentrating on marketing, economics, finance, strategy, or operations will all find this text approachable.

This text is designed for use within any competitive industry: business and consumer markets, durable and consumable markets, tangible and intangible markets. As such, working executives would also find *Pricing Strategy* highly valuable in improving their decision making. Senior executives from marketing, accounting, operations, and sales departments will value this text due to its ability to succinctly define core concepts and techniques for managing prices. Similarly, specialized pricing practitioners who are primarily charged with managing prices will also find the text useful.

Readers who desire to understand a specific quantitative technique in pricing can use this text as a foundation. To equip readers to potentially compete within the field of pricing, specialized vocabulary is introduced throughout the text as necessary. Numerous case studies, examples, tables, and graphics have been prepared to further communicate the concepts contained within this text.

Pricing as a field spans many disciplines. *Pricing Strategy* leverages the best thinking in marketing, economics, competitive strategy, consumer behavior, and finance to deliver a comprehensive text on pricing. *Pricing Strategy* is primarily written to better communicate well documented existing knowledge. Some new ideas are presented in *Pricing Strategy* as developed from logical insights, executive discussions, and mathematical proofs.

One of the larger challenges of communicating best practices in pricing is the issue of balancing quantitative skill sets with qualitative concepts. Students require familiarity with specific mathematical concepts and formulas in order to perform basic tasks in pricing. Yet pricing is not a purely quantitative field. Much of pricing, and the influences to price positioning, price setting, and price management, are conceptual in nature. Pricing is not a static field. New approaches are being developed constantly. It is hoped that this book will provide a solid foundation to any student of pricing for them to build upon over their career.

# Acknowledgements

A book of this magnitude could not have been completed without the support of several individuals. I am deeply grateful for the support of many family members, friends, and professionals.

The development of this text is the result of a long journey which was informed by many outstanding individuals. I would like to draw attention to a few specific individuals for greatly influencing the path which has led me undertaking the writing of *Pricing Strategy*. Jeffrey a Cina of the University of Oregon who taught me how to conduct research while a graduate student in physical chemistry. Ann L. McGill of University of Chicago who introduced me to the complex world of marketing. Puneet Manchanda of Columbia University who introduced me to the value of using quantitative models for analyzing marketing decisions Harry L. Davis of the University of Chicago who led me to connect analytical decision to the challenge of organizational leadership. Eric Mitchell, founder of the Professional Pricing Society, for helping me connect the issues of sales and marketing with pricing. Enda O’Coineen of Kilcullen Capital Partners for demonstrating the successful path of entrepreneurship. And Bob Cermak and James T. Berger for encouraging me to undertake this specific entrepreneurial endeavor.

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This book has benefited from the contribution of many reviewers. I have deep appreciation for the effort of Michael Roche of South-Western in editing this text. Rebecca Wernis, a graduate of Whitney Young High School in the Chicago Public School system, who painstakingly reviewed the math in this text to ensure it would be accessible to any business executive. The Fall 2009 *Pricing Strategy* students at DePaul University for reviewing an early manuscript to ensure clarity and comprehension: Jeffrey Garbaciak, James Henderson, Kevin Knight, Dariusz Nowak, William Salatich, Matthew Sheffer, Cody Smith, and Kevin Spinti.

And I give my extreme gratitude to sculptor Yvette Kaiser Smith who provided unending support throughout this journey.

# Introduction

An executive charged with managing prices must address four fundamental issues: (1) What should the price be? (2) When should discounts be granted and how can discounts be managed? (3) Will the structure of prices generate the highest profits? (4) How will competition and industry dynamics influence pricing decisions? To address these fundamental pricing challenges, we have structured *Pricing Strategy* into four parts: Setting the Price, Managing Price Variances, Establishing Price Structures, and *Pricing Strategy*.

**Part 1:** Setting the Price explores quantitative methods for and qualitative influences to price setting. The three most commonly used quantitative methods for determining list prices are exchange value models, economic price optimization, and consumer perception based pricing. Each of these quantitative approaches to setting prices are founded on a common philosophical belief, that price should reflect value. As such, we explore the conceptual relationship between price and value directly through both qualitative models. Accepting that value is in the mind of the beholder, we then explore the many psychological and behavioral influences to the perception of value.

**Part 2:** Managing Price Variances examines price discounting decisions. We treat discounts as a form of price segmentation, historically known as price discrimination. We begin by examining the reasons why a firm would grant a discount once they have already identified an optimal price, followed by an examination of the profit, consumer behavior, and organizational challenges created by discounting. To address these challenges, we discuss industry leading accepted methods for monitoring and managing discount decisions. One of these methods for managing discount decisions, volume hurdles arising from a profit sensitivity analysis, was developed earlier in route to revealing economic price optimization.

**Part 3:** Establishing Price Structures examines six different price structures. There are numerous pricing structures and business executives continue to explore new pricing structures and variants of historic price structures continually. We have attempted to focus on the most common and effective price structures, though acknowledge that the field is continually evolving. Each price structure is examined with respect to consumer behavior, profit optimization, economic analysis, and key managerial tradeoffs in selecting one price structure over all others.

One of the oldest pricing structures is two-part pricing, where the purchase of one part of the offer enables the purchase of the second part of the offer. Two-part prices are common in utilities, membership structures, nightclubs, and many other industries.

Often times, firms will sell a base product which can be enhanced through the purchase of accessories or add-on modules. In add-ons and accessories, we examine the interplay in pricing the base product and potential add-on products.

Alternatively, firms can practice dynamic pricing, of which yield management is one form. Yield Management techniques have come to dominate pricing challenges in the airline and hotel industries.

PART

1

# Setting the Price

- Chapter 1** Boundaries of a Good Price
- Chapter 2** Profit's Sensitivity to Price
- Chapter 3** Consumer Perception Driven Pricing
- Chapter 4** Price to Value
- Chapter 5** Psychological Influences to Price Sensitivity



# Boundaries of a Good Price



- Who is involved in pricing decisions?
- Why is pricing so important to the health of the firm?
- Can firms influence their pricing power?
- What is the nature of a good price?
- How relevant are marginal costs and consumer surplus in setting a good price?
- How should the comparable alternatives on the market influence the pricing of a product?
- How can exchange value models be used to set prices?
- Stretch Question: How are exchange value models related to market segments?

**H**ow should executives price a new product? Should they price the product the same as competing products? Should they price it low to grab market share? Should they price it high to grab greater profits with each individual sale? Perhaps they should take an accounting position and simply add a reasonable mark-up to the marginal cost of production. If so, what is that reasonable mark-up?

Pricing questions are perhaps the most vexing decisions facing an executive. Few other strategic decisions will have a greater impact on the profitability of the firm, the demand customers will have for its products, and the latitude the firm will develop to maneuver its competitive position. Pricing questions span organizational boundaries because of their

strategic importance, crossing over into marketing, sales, finance, and operations. With each new functional executive contributing to a pricing decision, there will be a differing perspective which may only complicate the pricing challenge.

To address this challenging strategic decision and manage the competing organizational viewpoints, executives need a rational approach to setting prices. They need an approach to pricing which is grounded in the realities of the market environment, including issues of competition and customer preferences.

When thinking of prices, it is useful to consider the price as the value the firm captures in a mutually beneficial exchange with its customers. The reason for the firm's existence is to produce value for its customers in exchange for a price. All profits derive from producing value for customers in excess of the cost to produce that value. Customers gain this value from the benefits delivered through the product in excess of the price they pay for it.

We begin by demonstrating the impact of pricing and clarifying the challenge of pricing decisions. Exchange value models reveal the boundaries of a good price that a firm should use to market a new product. In developing an exchange value model, we will reveal the importance of using the customer's perspective of value in pricing decisions.

## Informing Price Decisions

### THE IMPORTANCE OF PRICE

The importance of setting the right price cannot be understated. Pricing directly affects the profits of the firm. Even for non-profit institutions, pricing decisions affect the resources of the firm and their ability to serve their constituents. For everyone involved, the costs of pricing errors are weighty. Whether the price is too high or too low, pricing errors destroy profits.

When goods and services are priced too high, many customers will refuse to purchase them. Not only will the firm cede market share to its competitors, but it will relegate itself as irrelevant to many potential customers. With few items sold, market traction is forfeited and investors sour on expectations of financial returns. The firm will eventually find itself dropping prices in an effort to regain market attention, though it may already be too late. Consumer sentiment may turn negative, potentially resulting in public relations challenges and regulatory ramifications.

When goods and services are priced too low, the firm will have forgone an important opportunity to earn profit in proportion to the value they are creating for customers. While prices are often set low in order to gain volume, often times firms discover that the volume is simply not there. Moreover, entering a market with an extremely low price will set incorrect price expectations for the product category. Firms attempting to recover from such a mistake will face a headwind of customer expectations for the products to be priced low. In the worst case scenario, costs are not covered and the firm becomes insolvent.

Repeatedly, the wrong price yields lost revenues, lost profits, lost customers, and ultimately a strategically lost firm. There are numerous examples of firms executing bad pricing decisions. From Motorola's choice to decrease the price of their revolutionary RAZR mobile handset in order to gain market share to Pilgrim's Pride's failure to increase chicken prices while chicken feed costs were skyrocketing, bad pricing decisions have had disastrous effects. In most cases, not only are profits harmed leading to potential bankruptcy, but employees are dismissed while customers switch to competitive offerings. With insufficient profits to provide adequate resources to compete, firms are unable to invest in productivity improvement, much less in developing the next generation of products customers will demand. In the end, lost firms all too often become irrelevant and die.

## CROSS FUNCTIONAL

Due to the high importance of pricing, executives will place a huge emphasis on getting pricing decisions right. Yet who should make pricing decisions?

From an organizational viewpoint, pricing decisions are a cross functional challenge fraught with discord. Finance, sales and marketing, and even operations executives will each be in a position to contribute to pricing decisions. Each of these functional executives will bring a valuable and unique vantage point and skill sets from which they can draw information. Unfortunately each functional executive is likely to be biased by the incentives by which their performance is measured.

Finance executives will likely be highly influenced by their accounting orientation in addressing pricing decisions. From an informational perspective, they should have a firm understanding of the costs to produce. With a strong grasp of break-even analysis and cost-plus pricing, finance executives tend to have a heightened understanding of the relationship between higher prices and higher profits, and in turn, higher shareholder value. Given their training and vantage point, it is common for finance executives to argue for higher prices and higher contribution margins. However, they are rarely in the best position to evaluate whether customers are willing to pay higher prices.

In contrast, sales and marketing executives are likely to make pricing decisions that are highly influenced by their customer orientation. From an informational perspective, sales and marketing executives are likely to be well informed of market share, competitive actions, and customer preferences. Given their training and experience in marketing, they are likely to understand both the potential and the limitations a firm has in shaping customer preferences and willingness to pay. Sales and marketing executives are often rewarded based on their ability to take market share, meet revenue targets, or capture specific customers. Given this incentive bias, sales and marketing executives are unfortunately often encouraged to lower prices in order to grab customers. In the process, they may be forgoing opportunities to capture higher profits.

Even operations executives can meaningfully contribute to pricing decisions. Issues related to economies of scale, scope, and learning are well within their scope of responsibility and will influence pricing decisions. Like other functional executives, operations executives make decisions influenced by their incentives and performance measurements. In this case, performance metrics tied to average cost efficiencies may encourage operations executives to seek lower prices in order to drive up volumes and improve capacity utilization.

In making pricing decisions, executives must leverage the benefits of the informational resources and skill sets of each functional executive, while countering the biases that each brings to pricing decisions. The needs for unit volume and market share must be tempered by the need for contribution margins, and information must be collected across functional boundaries in order to balance these needs. In order to make the right decision, many firms make pricing a chief executive level concern due to their breadth of responsibility. To aid their decision, many chief executives have developed a new organizational capability: the pricing professional.

Pricing professionals must bring a breadth of insight and skills to pricing decisions. They understand how customers perceive offerings and their willingness to pay for them. They also have a firm grip on issues related to marginal production costs as well as the fixed incremental costs related to serving specific markets. From a marketing perspective, they will have a strong understanding of competitive actions, market share, and industry dynamics. Often, they hold a deep understanding of economics and are able to both measure elasticity of demand and understand the relationship between price changes, volume changes, and profit improvements. By nature and need, pricing professionals mix hard quantitative analytical skills with softer qualitative skills to meaningfully inform pricing

decisions and enable action.

Pricing professionals often come from a finance, marketing, economics, or hard science background. Functionally, they typically report to either marketing or finance, depending on the nature of the pricing challenges they must address daily. For strategic pricing decisions, it is increasingly common for pricing professionals to address the chief executive directly.

## IMPACTING PROFITS

To demonstrate the importance of price, consider the standard profit equation of a firm

$$\pi = Q \cdot (P - V) - F \quad \text{Eq. 1.1}$$

where  $\pi$  is used to denote profit,  $Q$  denotes quantity sold,  $P$  denotes price,  $V$  denotes variable costs, and  $F$  denotes fixed costs,.

In order to make accurate pricing decisions, we will consistently consider the variable costs to be the true marginal costs to produce related to the decision at hand. Many times, when firms calculate variable costs they actually calculate average unit costs. Average unit costs are not variable costs as they include allocated overhead and other forms of fixed costs in their calculation. As such, average unit costs will decrease if volumes increase, and increase if volumes decrease. True marginal costs are the costs to produce one more unit of output, and are therefore much lower than average unit costs in almost all circumstances. While many executives will approximate marginal costs as average unit costs, the result is an overly conservative understanding of the true boundaries of profitable prices potentially leading to lost profit opportunities.

In the profit equation of the firm (Eq. 1.1), all fixed costs should be captured in the term  $F$ . Fixed costs include many forms of overhead such as infrastructure such as plant and equipment, allocated management, and in some situations can even include line staff when labor costs cannot be truly varied in proportion to output.

$Q$ , for quantity or volume sold in Eq. 1.1, can be measured in the millions for firms like Taiwan Semiconductor Manufacturing Corporations (TSMC) in producing silicon chips or McDonalds in producing hamburgers, or in the single digits for specialized industrial products. Similarly,  $P$ , for price in Eq. 1.1, can be measured in fractions of a unit of currency or in the millions.<sup>1</sup>

If an executive can apply pressure to improve the profitability of the firm by adjusting any of the variables in the profit equation Eq. 1.1: variable costs, fixed costs, quantity sold, or price, which has the largest impact? To answer this question, let us conduct a simple quantitative analysis.

Suppose the firm operates under the following conditions. Variable costs are \$10 for each unit of production and fixed costs are \$1,000,000 per quarter. Currently, prices average \$25 per unit and volumes are 80,000 units per quarter. Under these conditions, the firm earns \$200,000 in profit per quarter. See Exhibit 1-1 Profit Levers.

We can contrast this baseline performance with the outcome achieved by improving any one of the profit levers by 1% and holding all else constant. Investing in higher productivity to reduce variable costs by 1% will improve profits by a mere 4%. Likewise, reducing overhead or otherwise cutting fixed costs by 1% would yield 5% higher profits. If the firm were to invest in better marketing to drive volumes up by 1%, it would still only improve profits by 5%. In contrast, increasing prices by 1%, either through changes in list prices or reductions in discounts, improves profits by a whopping 10%.

In comparison to any other variable under management, price has a larger and more immediate impact to profit than any other lever. The results of this hypothetical firm are not unique. Researchers have examined the average profit equation of 1200 large publically traded firms from around the globe and have likewise demonstrated that price changes

have a larger impact on profit than any other variable under management control.<sup>2</sup>

However, the impact of price on the firm is a double-edged sword. Just as a small improvement in price delivers a large increase in profits, a small degradation in price is highly damaging to profits. As price has such a significant impact on profits, and because it directly influences customer behavior, it deserves all if not more of the executive attention it receives.

### Exhibit 1-1 Profit Levers

		Last Quarter	1% Improvement for Next Quarter...			
			in Variable Cost	in Fixed Cost	in Volume	in Price
Price	P	\$25.00				\$25.25
Volume	Q	\$80,000.00			\$80,800.00	
Variable Cost	V	\$10.00	\$9.90			
Fixed Cost	F	\$1,000,000.00		\$990,000.00		
Profitability	$\pi$	\$200,000.00	\$208,000.00	\$210,000.00	\$212,000.00	\$220,000.00
Change in Profitability			\$8,000.00	\$10,000.00	\$12,000.00	\$20,000.00
% Profit Improvement			4%	5%	6%	10%

## INFORMED AGGRESSION

As the executive level attention given to pricing indicates and the example profit lever analysis suggests, getting the price right has a significant impact on the firm. Yet, these observations only underscore the challenge. What is the right price?

Recalling that price is value the firm captures in a mutually beneficial exchange with its customers, we discover that the right price is often not a single number, but rather a range of potential points which benefits both the customer and the firm. While some points are more beneficial to the firm and others are more beneficial to its customers, any point within this range can mutually benefit both the firm and its customers. Moreover, the price that a firm gets in the exchange is somewhat under its own influence.

For example, consider a simple negotiation exercise concerning Kenyan Coffee that I have regularly conducted at DePaul University with both undergraduate and graduate students with similar results. Suppose the coffee roaster can deliver Kenyan Coffee at a marginal cost of \$3.20 per pound. Furthermore, suppose a retailer can resell the Kenyan Coffee and earn a profit as long as he buys it for less than \$7.50 per pound. Any price agreed upon by the sellers and buyers between \$3.20 and \$7.50 leaves both parties better off, and is therefore a good price. While lower prices favor the retailer at the expense of the roaster, higher prices favor the roaster at the expense of the retailer. However, any price within this range delivers a mutually beneficial exchange.

To arrive at the transaction price, sellers and buyers are asked to negotiate an agreement. In the basic experimental setup, all buyers are directed to purchase Kenyan Coffee for less than \$7.50. All sellers are directed to sell Kenyan Coffee for more than \$3.20, but half of the students are told some key selling points regarding Kenyan Coffee and the other half are not. Thus, there is a Zone of Potential Agreements, or ZOPA in the negotiations literature, between \$3.20 and \$7.50. See Exhibit 1-2 Kenyan Coffee Negotiation.

Invariably, sellers who have key selling points and discuss them during the negotiation strike a higher price than those who don't. In a typical experimental run, the average selling price of sellers without key selling points was \$3.82 while that of sellers with key selling points was \$5.33. The key selling points alone enable sellers to achieve a 40% higher transaction price on average. Clearly, price is a profit lever that can be influenced.

Moreover, it is influenced by information. Sellers who are informed of the value of their products and can communicate it to their customers are able to achieve higher transaction prices than those who are not.

Further investigations into the dynamics of these types of negotiations have demonstrated that the starting price greatly affects the negotiated price. Sellers who initiate the negotiation at a higher price routinely end up at higher settlement price. Likewise, sellers who initiate the negotiation at a lower price routinely end up at a lower settlement price.

From this more detailed investigation, we learn that negotiations favor aggressive opening bids. Initiating the negotiation at a more favorable price and then slowly ceding price concessions enables the negotiator to discover the boundary price of their negotiating counterpart, and thus settle upon a price that is more favorable.

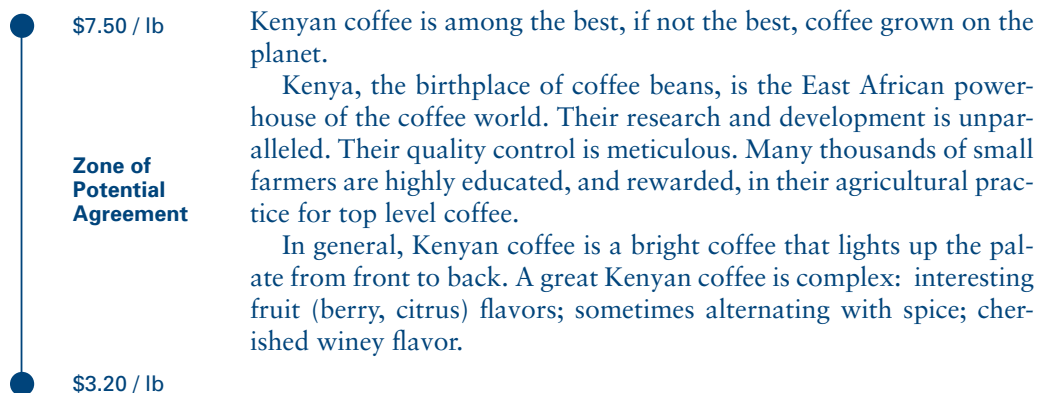
In yet a third investigation, Kenyan Coffee buyers and sellers were told the average selling price of Columbian Coffee. This time, negotiated Kenyan Coffee prices almost always converged to a price point similar to that of stated Columbian Coffee. Reference prices greatly influence transaction prices.

In their entirety, the Kenyan Coffee experiments reveal three very strong prescriptions for achieving good prices. One, the seller must be well informed of and aggressively communicate the value of their product if they hope to achieve a better price. Two, sellers must price aggressively and grant discounts from these prices reluctantly. And three, reference prices greatly influence transaction prices.

#### Exhibit 1-2 Kenyan Coffee Negotiation

	Brand Name	Reservation Price	Key Selling Points	Average Transaction Price
All Buyers	Yes	\$7.50	No	
Price Sellers	Yes	\$3.20	No	\$3.82
Quality Sellers	Yes	\$3.20	Yes	\$5.33

#### Kenyan Coffee KSPs (Key Selling Points)



#### ART & SCIENCE OF PRICING

Clearly, pricing is a quantitative field with a direct impact on profitability. However, as the negotiation experiments reveal, pricing is equally a qualitative field where the actions of the firm impact the price they can achieve. Good pricing requires a tight connection between quantitative and qualitative insights.

The **science of pricing** refers to the act of gathering information, conducting quantita-

tive analysis, and revealing an accurate understanding of the range of prices likely to yield positive results. Pricing data, like any other set of information that influences executive decisions, is rarely perfectly clear. Not only will there be uncertainties in the underlying data, but the appropriate price structure, price point, and price discount will vary over time, geography, and customer situation. The time and budget required to remove all uncertainty is beyond the patience and resources of most every firm. Hence, prices must be set with some uncertainty. Despite the uncertainty, quantitative approaches can be used to improve the pricing decision, prevent grievous errors, and uncover new opportunities.

As the negotiation experiments demonstrate, the firm can take actions to influence its pricing power in ways that may be difficult to analyze using quantitative methods. These actions can either be value destroying (such as failing to communicate the value of the offering) or value creating (such as uncovering new applications for the offering that improve its value to customers).

It is important to remember that customers are not a monolithic group in making pricing policy. Some customers will value the product more than others. As such the firm can price their products higher for some customers than others. Understanding variations in customer demands uncovers pricing opportunities.

The **art of pricing** refers to the ability to influence consumer price acceptance, adapt pricing structures to shift the competitive playing field, and align pricing strategy to the competitive strategy, marketing strategy, and industrial policy. It requires an understanding of consumer behavior and the influence of features embedded within the product, the perception of value, the expectations of customers, and the price structure itself. It also requires that pricing strategy supports the firm's marketing strategy in light of the overall competitive and industrial environment of the market.

By taking a more creative approach, firms are better able to price in proportion to the value customers perceive. Doing so will combine both quantitative and qualitative approaches. In many cases, quantitative approaches will be found to be highly informative but lacking in their ability to reveal nuances of customer behavior and therefore opportunities to improve pricing. Qualitative insights enable executives to fill these gaps. In doing so, executives are able to better align pricing strategy with other strategic decisions. Hence, pricing is both an art and science.



This is a caption for the photo as described and shown above. By taking a more creative approach, firms are better able to price.

## Exchange Value Models

Accepting that the right price lies within some range shifts the challenge of pricing to identifying the boundaries of a good price. **Exchange value models** quantify the price boundaries.<sup>3</sup> Knowing the boundaries of a good price narrows pricing discussions to a reasonable range of potential price points.

Using exchange value models to manage pricing decisions shifts pricing challenges from the position of managing internal corporate politics or copying historic practices which may have little bearing on the challenge at hand, to one of focusing on the value created and the firm's ability to capture their fair share of that value.

Two sets of boundaries are uncovered from exchange value models. The extreme boundaries define the range of acceptable prices outside of which no rational buyer or seller would ever transact. The narrower boundaries which lie within these extremes define the range of prices which are most likely to encourage customer transactions and leave the firm in the most favorable position. While buyers and sellers will sometimes transact outside of these narrower boundaries, it is not usually in their best interest to do so.

To illustrate the boundaries of a good price, we will examine the release of the Cypher drug eluting stent by Cordis, a Johnson & Johnson Company, in April 2003.<sup>4</sup> Stents are used to reopen clogged arteries leading to the heart after plaque has narrowed the passage and restricted blood flow. Prior to its release, the best alternative was a standard metallic stent made by a number of competitors. In mechanical construction, the Cypher drug eluting stent was similar. In laboratory tests, the addition of a pharmaceutical formulary coating the standard metallic stent was demonstrated to improve the patient's body's ability to accept the stent within its artery. With the unique addition of a patented and FDA approved formulary, the Cypher drug eluting stent was a revolutionary new product when launched. No other product of its kind had been marketed. As such, Cordis executives could not simply copy a competitor's practices in pricing the Cypher drug eluting stent. Rather, pricing would be a particularly daunting challenge for these executives.

To price a revolutionary product like the Cypher drug eluting stent, executives can construct an exchange value model. Exchange value models inform executives of the relative value their product delivers to customers, and therefore enables executives to price in proportion to its perceived value. For revolutionary products, exchange value models are a commonly used best-practice approach to identifying launch prices. Once an exchange value model has been used to set prices, it can then be repurposed as a sales tool to support the communication of value. As such, exchange value models are an important quantitative tool for setting prices and influencing price acceptance.

### EXTREME BOUNDARIES

At the extremes, the price should lie between the marginal cost to produce and the full consumer utility. Any transaction outside of these extremes would leave the seller or buyer worse off after the transaction than before, and therefore cannot be expected to occur between rational buyers and sellers.

#### Marginal Costs Define the Extreme Lower Boundary

**Marginal costs** are the seller's bottom line. Any price below marginal costs leaves the seller worse off than they would have been without the transaction. Any price above it leaves the seller better off. At times, sellers may choose to price very near marginal costs for tactical price purposes yet, in general, sellers will seek to profit from their transactions. Failure to profit from transactions removes any motivation to participate in the trade; hence executives cannot be expected to price at this level.

Estimates vary widely on the marginal cost to produce the Cypher drug eluting stent



and it is difficult to prick the corporate veil to identify the true marginal costs. Some reports indicate that standard metal stents had an average unit cost of near \$150 at the time of launching Cypher. Coating a stent with pharmaceuticals is not an expensive challenge and manufacturing the pharmaceuticals should add only a few dollars per stent. That said, some estimates indicate that the Cypher drug eluting stent had a fully loaded average unit cost of \$375 at the time of its launch. While fully loaded average unit costs are likely to be much higher than marginal costs, we will accept this figure as a gross approximation of the true marginal costs of production for the sake of demonstrating an exchange value model.

Regardless of how low the true marginal costs are, Cordis could not price Cypher anywhere near this level. It would not be a fair exchange to expect Cordis to price the drug eluting stent near marginal cost. Developing Cypher required a tremendous amount of research and development – a risky investment made with the expectation of lofty rewards. Not only should the firm desire prices to cover the investment costs to develop Cypher, but they should also seek to gain profits. These profits are necessary not only to reward investors, but also to reinvest in further research and development that will lead to the creation of new products which will be valued by consumers in the future. Furthermore, even after being first to market with a drug eluting stent, Cordis faces a business risk that a competitive research and development will develop new solutions for coronary heart disease long before the patent on Cypher has expired. Rather than using marginal costs as a guide to settling pricing decisions, the executives of Cypher are better off using them as a guide of where prices should not fall below.

Marginal costs are simply a lower boundary on prices. They provide little guidance to what the price should be outside of stating that the price should not be below this level. Importantly, internal cost accounting considerations of marginal costs fail to incorporate the value the product delivers to customers as a guide. Without connecting the price to the value the product delivers, sellers have little insight into their pricing potential. Failing to understand value from the customer's perspective may tempt executives to price very high in order to recover sunk costs or opportunistically profit from uninformed customers, yet doing so will quickly make the firm irrelevant to the market as customers refuse to purchase. Or, equally pernicious and far more prevalent, the failure to understand the customer's perspective of value leaves the seller to cleave to their marginal costs and price a new product too low; denying the firm their well deserved reward for the hard work it takes to develop a new product and deliver its value to customers. As we saw in the negotiation experiment, marginal costs are simply one of two extreme boundaries.

### Consumer Utility Defines the Extreme Upper Boundary

If marginal costs are the seller's bottom line, customer utility is the buyer's bottom line. The **customer utility** is the value a customer gains from having the product. Any customer would be worse off after the transaction than before if they paid more for the product than they gained in utility. Any customer will be better off if they paid less for the product than they gained in utility. The value buyers place on a product is the utility they derive from the product. The **consumer surplus** is the difference between the overall customer utility and the transaction price. As long as the consumer surplus is positive, customers will purchase.

Customers gain utility from a product directly from the benefits that the product delivers. These benefits have been categorized into four fundamental types. **Form** utility derives directly from the intrinsic properties of the product itself, such as the value customers have on extending their life with a stent, the customer's joy in drinking a tasty beverage, or the production value of a turbine to an electricity merchant generator. **Place** utility derives from the ability to gain the product from a desired location, such as having the stent available at a nearby hospital, drinking the tasty beverage at a local cafe, or receiving the

turbine at the merchant generator's power plant. **Time** utility derives from the ability to gain the product at a convenient moment, such as receiving the stent when coronary heart disease has been detected, drinking the tasty beverage when thirsty, or gaining the turbine at the right time in the construction process of the merchant generator's power plant. **Ownership** utility is the utility gained from possessing rights to the value of the product even if the possession is never actually taken, such as the value of insurance coverage that would pay for the implant of the stent when and if needed, the value of holding a tasty beverage which can either be drunk or resold, or the value of holding rights to a turbine to be delivered in the future.

While customers derive utility from an improved stent from all of the four fundamental types, in pricing Cypher from the manufacturer's position, Cordis should focus on the form utility. The most significant value created in producing Cypher is that which is most closely related to the value customers' gain in extending their life. Yet, what is the value of extending life?

Life is exactly what is at stake with coronary heart disease. Coronary heart disease increases the strain on the heart and deprives the heart of the oxygen and blood flow it needs to function properly. Without corrective action, patients suffering from coronary heart disease will have a much reduced life span, an increased likelihood of a heart attack, and potentially sudden death.

Economists have attempted to quantify the value of a life. In a somewhat accepted although ethically questionable practice, economists often value a life as the present value of the future lifetime earnings. Not only does this approach fail to adequately consider potential career changes during a person's lifetime, but it is more importantly a woefully inaccurate calculation of the value individuals will place on their life. It doesn't begin to capture the value people will pay to spend one more day with their spouse, seeing their children and grandchildren mature, attend their weddings and baby showers, or being able to accomplish one more lifetime goal. Put in these terms, we quickly understand why many philosophers will argue that all life is equally valuable and perhaps immeasurable.

$$\% \Delta Q \equiv \frac{Q_f - Q_i}{Q_i} \quad \text{Eq. 2.5a}$$

$$\% \Delta P \equiv \frac{P_f - P_i}{P_i} \quad \text{Eq. 2.5b}$$

$$\% CM_i \equiv \frac{P_i - V_i}{P_i} \quad \text{Eq. 2.5c}$$

As with many decisions in pricing, we must accept the limitations to perfectly quantify everything and work with the best estimates and commonly accepted practices. As such, let us estimate the value people place on their life as the present value of future earnings. And, while the wages and duration of future productivity will vary between individuals, let us estimate that on average the present value of lifetime earnings of coronary heart disease patients is \$500,000 on average.

No doubt, many readers will argue that is a ridiculously low valued for a person's life. However, if the customer utility of a stent is near \$500,000, should Cordis launch Cypher near this level? Quickly we realize that such a price would be absurd. If Cordis did price Cypher anywhere near this level, most customers would find it unattainable. Moreover, customer sentiment would likely sour on Cordis, leading to retaliation, claims of unfair pricing practices, and protests that Cordis was charging too much or that Cordis was only serving the rich elite. In such an environment, governments might force Cordis to forgo their patents and allow other firms to produce copy-cat products. Clearly, pricing near the customer's utility is not a very informed approach to pricing.

Customer utility is simply an upper boundary on prices. They provide little guidance

to what the price should be outside of stating that the price should be below this level. Customer utility is the mirror image of marginal costs. Just as firms should avoid pricing near marginal costs, customers should avoid accepting prices near customer utility. As we saw with the negotiation experiment, customer utility is simply the other one of two extreme boundaries. .

### Marginal Costs and Customer Utility Are the Extremes

At this point, we have examined two of the most discussed issues related to pricing in any introductory economics textbook. What they reveal is that marginal costs are the sellers' bottom line and hence the lower extreme boundary on the potential price, and that customer utility is the buyer's bottom line and hence the upper extreme boundary on the potential price. Neither reveals the right price, but combined they reveal the hard boundaries of potential price one might, in their wildest dreams, imagine launching Cypher.

Unfortunately, the range of prices between these boundaries is quite wide. Conservatively estimating marginal costs at \$375 and customer utility at \$500,000 leaves a range of potential prices too wide for any meaningful decision making. The two extreme boundaries are separated by more than a factor of a thousand. Even for physicists, stating that some physical value lies somewhere within a factor of a thousand is of little use in all but the most advanced astronomy or particle physics research questions. From these boundaries, Cordis executives would be unsure if the launch price of Cypher should be \$400, \$4,000, \$40,000, or \$400,000.

Executives need a tighter set of boundaries than those provided by marginal costs and customer utility for pricing decisions. Even reducing the dispersion of potential prices to a single factor of ten would be far more useful than that developed by considering the extreme boundaries alone. For a revolutionary product, executives may reluctantly accept a somewhat broad range of a factor of ten but will give no credence to a method which leaves three orders of magnitude in uncertainty. For more revolutionary products, they are likely to demand pricing guidance that narrows the range to within a few percentage points.

### NARROWER BOUNDARIES

Executives looking for guidance in pricing decisions clearly need a narrower and more relevant set of boundaries than those identified by considering marginal costs and customer utility. To identify these boundaries, we need to think strategically about prices.

As the discussion on customer utility reveals, products are valued because they enable a customer to do something. Customers value products because they enable them to accomplish a goal. Prior to the launch of a new product, customers have usually found alternative ways to accomplish the same or similar goals. No product enters a complete vacuum. Life doesn't start with the introduction of a new product, but it may get better. After the launch of a new product, customers can accomplish their goals easier.

Rather than painstakingly quantifying the full and accurate value of accomplishing a goal, the more relevant question is what is the value of accomplishing that goal in the presence of the new product compared to its absence? That is, what are the alternative means to accomplishing a goal? What is the price of these alternatives? How much more value is created by accomplishing that goal with the new product? What other goals can be accomplished with the new product that were difficult to accomplish before?

Strategically, prices should reflect the value to customers of accomplishing their goals in comparison to alternative means. Higher prices reflect the ability of a product to fulfill a need better than the alternatives. Lower prices reflect the ability of a product to fulfill a subset of the needs as well as the alternatives. This is the nature of strategic pricing: to price in proportion to the value delivered in light of the comparable alternatives.

The narrower price boundaries are defined by the comparable alternatives and differential value.

### Comparable Alternatives

**Comparable alternatives** are any solution customers may have to accomplishing the same or similar set of goals. They may be directly **competitive offers** or indirect **substitute** solutions to the challenges facing customers. Competing alternatives can usually be identified within the marketplace and will have an existing transaction price. As such, they can inform the pricing decision.

For Cordis, the nearest comparable offer to the Cypher drug eluting stent was the standard metal stent. The standard metal stent was not a perfect solution to coronary heart disease. Roughly 25% of the patients who received the standard metal stent suffered from the complication of restenosis, or relogging of the artery. Clinical trials demonstrated that Cypher reduced the probability of restenosis to around 5%. The Cypher drug eluting stent is a superior alternative to the existing products on the market at the time of its release.

Comparable alternatives are sometimes more challenging to identify, but they will always exist. For revolutionary products, the comparable alternative is usually a substitute offer. For instance, prior to the introduction of the internet in the 1990s, there were postal services, billboards, yellow pages, telephones, newspaper, magazines, radios, and broadcast television. Prior to the introduction of the desktop computer in the 1980s, there were typewriters, calculators, and cellulose slides. And, prior to the railroad of the 1800's, people walked, rode horses, and sat in stage coaches. .

There are more distant comparable alternatives to Cypher. Before the development of the metal stent, patients suffering from coronary heart disease would often be treated with cardiac bypass surgery. Cardiac bypass surgery is only one of the substitute solutions on the market. Other substitute solutions might include pharmaceuticals, bed rest, and the directive to change one's eating habits and exercise regimens.

In formulating pricing guidance, it is best to use the most closely comparable offer on the market. Customers are more likely to evaluate their willingness to pay in relationship with a closely comparable solution than they are with some distant alternative. As such, executives should use the closest competing or substitute solution when identifying potential price points.

At the time of launching Cypher, the standard metal stent was the most common, effective, and cost efficient approach to addressing coronary heart disease. Therefore, the standard metal stent will be the basis for creating our narrower price boundaries. The standard metal stent is clearly an inferior alternative to Cypher since it is associated with a higher rate of restenosis.

Inferior alternatives are any competing alternatives that deliver similar benefits to the one under consideration with less overall consumer utility. Inferior alternatives define the narrow lower bound for pricing decisions.

This narrow lower boundary is a soft lower boundary. In general, executives should price products higher than their next nearest inferior comparable offer since their new product will deliver more value. In some cases, executives may price below this boundary if they expect to tap into a new market which was inaccessible with existing offers at their current prices. When they do so, they must still price above the hard lower boundary set by marginal costs. In general though, pricing below an inferior competing offer implies the firm is forgoing some profit potential.

Cordis produced a standard metal stent priced at roughly \$1,050 prior to their launch of Cypher.<sup>5</sup> Using this data point to guide a pricing decision and the fact that the Cypher drug eluting stent is superior to a standard metal stent implies that Cypher should be priced at or above this level. But how much higher? To determine how much higher to

price Cypher than the standard metal stent, we need to determine the value of its superiority.

### Differential Value

**Differential value** is the change in customer utility that a product delivers in comparison to the alternative. If the new product is superior to its comparable alternatives, the differential value is positive. If the new product is inferior to its comparable alternatives, the differential value is negative.

The economic **exchange value** of a product is the price of the nearest comparable alternative adjusted for the differential value of the product. It is the price that customers would pay for its nearest comparable offer plus the value of the increased (or decreased) benefits of the improved (or degraded) new product.

$$\text{Exchange Value} = \text{Price of Comparable Alternative} + \text{Differential Value} \quad \text{Eq. 1.2}$$

For a given product, rational customers should be willing to pay any price up to that determined by the exchange value. Hence, the exchange value is the upper narrow boundary on price.

A new product priced at the exchange value would, on average, leave customers indifferent between the new product and the nearest comparable alternative. Some customers may value the new product more and thus be willing to pay more, while others will value it less. Thus, the exchange value is a soft upper bound on the narrower range of potential prices. Executives may price higher than the exchange value but usually find it more beneficial to price slightly lower. Any price below the exchange value will, on average, leave customers better off with the new product than they would be with its comparable alternatives, and definitely better off than they would be without the product at all, and therefore would be a good price.

To quantify the differential value, we must create a model. As with any model developed within the timescale of human existence, it will be incomplete. Yet the model will provide executives with better quality information than they would achieve in its absence, and therefore it will be highly useful for providing pricing guidance.

To construct a model of the differential value of a new product to its comparable alternative, executives should attempt to quantify the value of the change in benefits. One of the more useful approaches is to conduct an “as is” and “to be” description of the situation. The “as is” description elucidates the current means a customer will address a goal with the current comparable alternatives, the value of that approach and its short comings. The “to be” description elucidates the future means a customer will address a goal with the new product, the value of that approach and its short comings.

The specific quantitative model that will describe the benefits will change depending on the nature of the benefits. In creating the model, the pricing professional will demonstrate some artistic license in their quantitative analysis. No single model captures the value of every type of benefit. Time savings, labor savings, asset utilization improvements, revenue capture improvements, risk reductions, enjoyment improvements, health improvements, and many other types of benefits can be quantitatively modeled to some degree. The best quantitative model that describes the value of the benefits and the change in value is will depend upon the nature of the pricing challenge at hand.<sup>6</sup>

Cypher clearly delivers more benefits than standard metal stents to cardiac care patients; therefore we should expect the differential value to be positive. In comparison to the standard metal stent, the major increase in benefits comes from the reduction in the rate of restenosis. As a starting point for providing pricing guidance, we will model the differential value created by reducing the rate of restenosis.

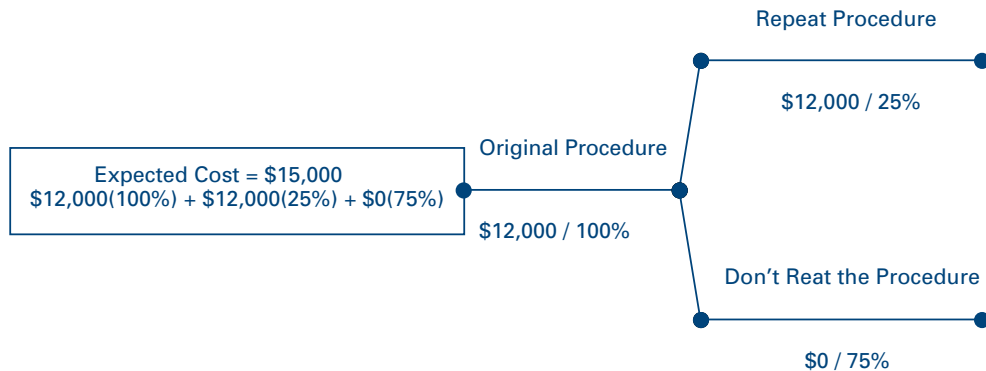
Stents are not used in isolation but rather as a component of a larger procedure. To

implant a stent and relieve some of the challenges created by coronary heart disease, patients must undergo surgery. The price of the operation, including hospital operating room costs, doctors, nurses, after surgery hospital monitoring, and other components can be estimated at \$12,000.<sup>7</sup>

Of the total operation price, the standard metal stent is only a \$1,050 component. If 25% of the time a standard metal stent is implanted the procedure fails, we can expect that the cost of failure to be equal to, if not greater than, the cost of the original stent implantation. When restenosis occurs, doctors must address the issue with pharmaceuticals, angioplasty, a second implant, and perhaps even cardiac bypass surgery. We can use these insights to estimate the differential value of a drug eluting stent such as Cypher.

To construct a model of the differential value, let us first calculate the expected total costs of using a standard metal stent using a probability tree. According to the data collected, we know that patients undergoing a metal stent implantation must pay the initial \$12,000 surgery price 100% of the time. 25% of the time, we believe they must pay a similar \$12,000 price to rectify the challenge of restenosis. 75% of the time no further action is required and the patient can return to their normal life. Using these insights, we can calculate the expected total cost of using a standard metal stent to be \$15,000. See Exhibit 1-3 Expected Total Costs for Standard Metal Stent Implantation.

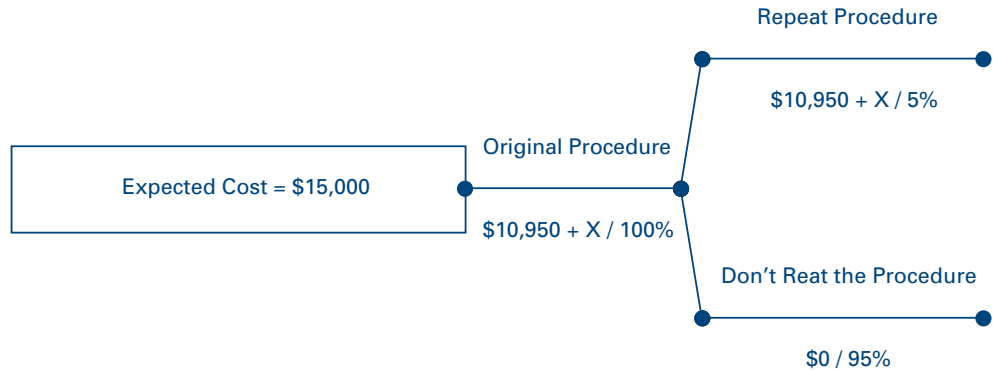
**Exhibit 1-3** Expected Total Costs for Standard Metal Stent Implantation



**Expected Costs = Cost of Original Procedure X Frequency +  
Cost of Repeat Procedure X Frequency +  
Cost of Not Repeating Procedure X Frequency**

**Expected Costs = (\$12,000)(100%) + (\$12,000)(25%) + (\$0)(75%)**

To calculate the differential value of Cypher in comparison to a standard metal stent, we can repeat the calculation after adjusting for the change in the rate of restenosis using the price of the stent as an unknown while holding the expected total cost constant. In this case, the total expected cost is still \$15,000. We use the same total expected cost because we are attempting to identify the price of Cypher which will leave customers indifferent between the new product and its nearest comparable alternative. We have identified the price of a single surgical implant procedure with a standard metal stent at \$12,000, of which the standard metal stent constitutes \$1,050. Thus, the cost of the procedure not including the choice of stent is \$13,950 (\$13,950 = \$15,000 – \$1,050). Since we don't know the potential price of the drug eluting stent, let this be the unknown we are trying to solve for and denote it with X in Exhibit 1-4.

**Exhibit 1-4** Exchange Value for Drug Eluting Stent

$$\begin{aligned} \text{Expected Cost} &= \$15,000 \\ &= (\$10,950 + X)(100\%) + (\$10,950 + X)(5\%) + (\$0)(95\%) \end{aligned}$$

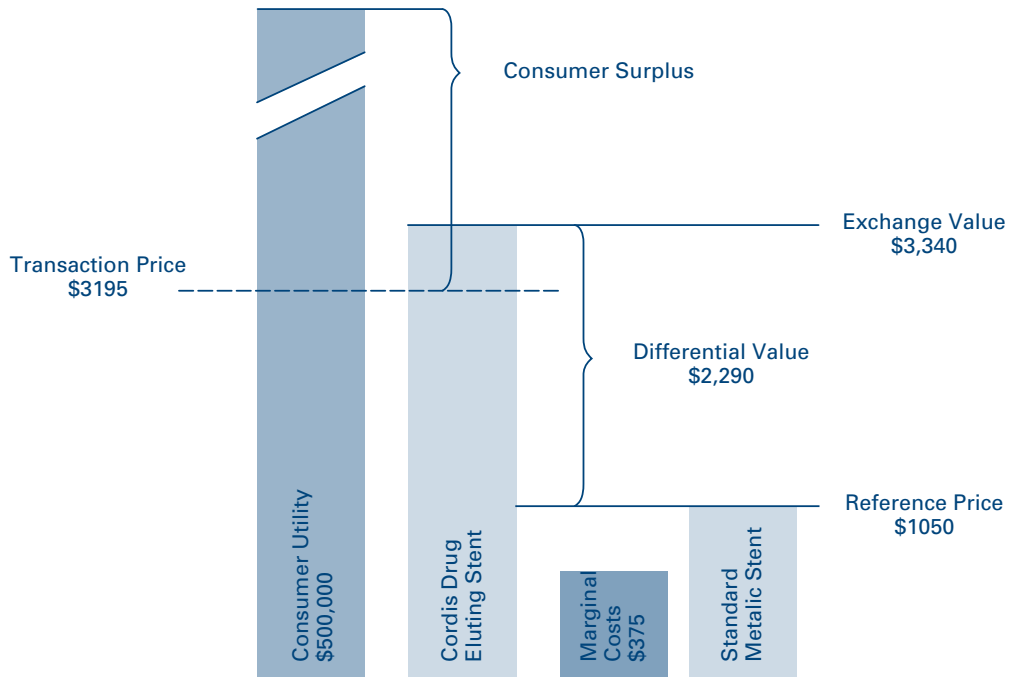
After a little algebra, the probability tree analysis reveals the exchange value of the drug eluting stent to be \$3,340. If the exchange value is \$3,340 and the comparable alternative is priced at \$1,050, we can calculate the differential value to be \$2,290 (\$2,290 = \$3,340 - \$1,050).

This model does not include many of the other sources of value delivered by the creation of a drug eluting stent. The value of lost time to the patient in repeating the procedure, the peace of mind in reducing the potential that the operation will fail, and the reduction in risk of death are all significant sources of value. Customers may be willing to pay much more than the calculated exchange value for a drug eluting stent based on these more personal issues. On a purely economic basis, we can feel confident that the exchange value calculated is therefore reasonable, if not a conservative estimate of the potential price of Cypher.

**PRICING IN PROPORTION TO VALUE**

From the hard extreme boundaries, we know that Cordis must price Cypher between the marginal costs of \$375 and the customer utility estimated to be \$500,000. From the softer narrow boundaries we suspect that Cordis should price Cypher higher than its nearest comparable alternative at \$1,050 because it will deliver more value. From a simple exchange value model, we suspect that any price below \$3,340 should be appealing. See Exhibit 1-5 Price Boundaries for Superior Goods: Cypher.

By strategically considering comparable alternatives and their differential value to calculate the exchange value, we have reduced our uncertainty in pricing from a factor greater than a thousand to something closer to three. Clearly, exchange value models grounded in considerations of comparable alternatives and differential value are far more useful for providing pricing guidance than simple considerations of marginal costs or customer utility. In fact, for many pricing decisions, marginal costs and customer utility have relatively little use in setting prices. Identifying competing products and substitutes and understanding why customers will judge them to be inferior or superior is a far more accurate approach to pricing.

**Exhibit 1-5 Price Boundaries for Superior Goods: Cypher**

At what price did Cordis executives release Cypher? As a compromise to the needs of insurers and government bodies and the needs of the firm, Cypher was released with a list price of \$3,195.<sup>8</sup>

At \$3,195, Cypher was priced much higher than its marginal costs and much lower than the consumer utility delivered. Likewise, \$3,195 is higher than Cypher's nearest comparable inferior alternative and lower than its exchange value.

Priced at \$3,195, Cypher was roughly three times the price of its competitors. Would customers balk at this new price? Not at all. In the nine months after its release, the Cypher stent raised Cordis's market share from less than 10% to more than 60% in the U.S. national market...<sup>9,10</sup>

Financially, Cypher was a runaway success for Cordis, earning the firm billions of dollars. Clearly, pricing anywhere near marginal costs would have forfeited a tremendous profit opportunity, reducing the required income to continue developing blockbuster innovations. At the opposite boundary, researchers have examined the pricing decisions of highly successful entrepreneurs and found they tend to price as near to the exchange value as possible, much like the executives of Cordis did with Cypher.<sup>11</sup>

The release price of Cypher represents an acceptable compromise of the needs of Cordis, insurance companies, and governmental bodies. At this price, the circle of stakeholders has been improved. Investors are rewarded for their risk taking. Employees are rewarded for contributing their talents and initiative to developing new solutions to customer needs by continued employment and potentially bonuses. And not only do customers have a slightly more cost-effective treatment of coronary heart disease, but patients can be expected to enjoy a longer, healthier life.



## Setting Prices

For revolutionary products like Cypher, exchange value models have proven to be highly cost effective and time efficient means for determining the boundaries of a good price. Executives are plagued with a dearth of information and customers lack the insight necessary to make informed comments about pricing decisions for revolutionary products. As such, exchange value calculators create clarity in an otherwise informational abyss. The form of the exchange value model will change depending on the benefits of delivered by the product, yet the overall approach of identifying comparable alternatives, understanding the differences in benefits, and calculating the differential value can be repeated for almost any pricing challenge.

For more evolutionary products or even mature commodity products, exchange value models fail to provide a sufficiently narrow range of prices for decision making. With these types of products, research based techniques that more directly measure customer preferences and other economic factors are required.

In all cases, the range of a good price is bound at the extremes between marginal costs and consumer surplus, and bound in a narrower sense by the exchange value determined by comparable alternatives adjusted for its differential value. A price that meets the criteria of lying within these boundaries will leave all stakeholders better off, and that is the mark of a good price.

## Summary

- Pricing is a strategic challenge with direct impact on profitability requiring a breadth of information and the right perspective to balance competing agendas.
- The **science of pricing** refers to the act of gathering information, conducting quantitative analysis, and revealing an accurate understanding of the range of prices likely to yield positive results.
- The **art of pricing** refers to the ability to influence consumer price acceptance, adapt pricing structures to shift the competitive playing field, and align pricing strategy to the competitive strategy, marketing strategy, and industrial policy.
- Good prices are those which leave both the firm and its customers better after the transaction than before. The extreme range of good prices is bounded by marginal costs from below and customer utility from above. A narrower range of prices is bound by the price of the nearest inferior alternative from below and the exchange value from above.
- Differential value is quantified from the increase or decrease in benefits delivered by the product under investigation in comparison to those delivered by the comparable alternative.
- The exchange value is the price of the comparable alternative plus the differential value.
- For revolutionary products, simple Exchange Value Calculators are often the most efficient means of quantifying the boundaries of a good price.
- Equipped with quantified price boundaries, executives are able couple their aggression for profits with an understanding of the value they deliver to customers in order to make better pricing decisions.

## Exercises

1. Assume a firm produces an industrial product at a variable cost of \$8,500 and has fixed costs of \$25,000 per week. Currently, the firm sells 20 units per week priced at \$10,625.
  - a. What is the current profitability of the firm?
  - b. What is the improvement to profitability if variable costs are reduced by 1% holding all else constant?
  - c. What is the improvement to profitability if fixed costs are reduced by 1% holding all else constant?
  - d. What is the improvement to profitability if units sold are increased by 1% on average holding all else constant?
  - e. What is the improvement to profitability if price is increased by 1% holding all else constant?
  - f. In isolation, improving which aspect of the firm will have the largest positive impact on profits? Variable costs, fixed costs, units sold, or prices?
2. Assume a firm produces a consumer product at a variable cost of \$7.25 and has fixed costs of \$75,000 per month. Currently, the firm sells 14,000 units per month priced at \$14.00.
  - a. What is the current profitability of the firm?
  - b. What is the harm to profitability if variable costs rise by 1% holding all else constant?
  - c. What is the harm to profitability if fixed costs rise by 1% holding all else constant?
  - d. What is the harm to profitability if units sold decreases by 1% holding all else constant?
  - e. What is the harm to profitability if prices fall by 1% holding all else constant?
  - f. In isolation, failing to manage which aspect of the firm will have the greatest harm on profits? Variable costs, fixed costs, units sold, or prices?
3. Old Product is sold at \$5 and Improved Product delivers \$2 more in value to customers than Old Product. Improved Product costs \$3 per unit to make.
  - a. What is the price of the nearest comparable alternative for Improved Product?
  - b. What is the differential value of Improved Product in comparison to Old Product?
  - c. What is the exchange value of Improved Product?
  - d. Where range of prices would you suggest to executives for pricing Improved Product?
4. Old Product is sold at \$27 and Reduced Product is less functional than Old Product to the point that it delivers \$6 less value to customers than Old Product. Reduced Product costs \$10 to make.
  - a. What is the price of the nearest comparable alternative for Reduced Product?
  - b. What is the differential value of Reduced Product in comparison to Old Product?
  - c. What is the exchange value of Reduced Product?
  - d. Where range of prices would you suggest to executives for pricing Reduced Product?

5. A competitor sells heavy machinery priced at \$14,000. Your firm has been working to enter the heavy machinery market and has developed a new product with a marginal cost of \$8500. Your firm's new machine is in some ways superior to its competitors and in other ways inferior. Its speed is limited which reduces the value to customers by \$1000 per engine. However, it requires less maintenance delivering labor savings of \$3500 per engine.
  - a. What is the price of the nearest comparable alternative for Reduced Product?
  - b. What is the differential value of Reduced Product in comparison to Old Product?
  - c. What is the exchange value of Reduced Product?
  - d. Where range of prices would you suggest to executives for pricing Reduced Product?
6. In 2005, GE released its Evolution Series locomotive engine which delivered revolutionary savings in fuel over the lifetime of use. It has been estimated that fuel savings were roughly 1,000,000 gallons per year. At the time of its release, GE and other competitors were selling numerous locomotives priced near \$2 MM.
  - a. What is the price of the nearest comparable alternative for the GE Evolution Locomotive?
  - b. If diesel is priced at \$2.50 per gallon, what is the value of fuel savings of the GE Evolution Locomotive in the first year alone?
  - c. Based on the fuel savings in the first year alone, what is the exchange value of a GE Evolution Locomotive?
  - d. If Union Pacific operates locomotives for 15 years and uses a discount rate of 8%, what is the present value of fuel savings of operating a GE Evolution Locomotive over 15 years?
  - e. If customers face additional maintenance costs with a GE Evolution Locomotive of \$100,000 per year, using the same 8% discount rate what is the present value of the additional maintenance costs of a GE Evolution Locomotive over 15 years?
  - f. Based on the fuel savings over the lifetime of operation and the increased maintenance costs, what is the differential value of a GE Evolution Locomotive in comparison to existing locomotives? What is the exchange value of a GE Evolution Locomotive?
7. In the 1990, Itron introduced new automatic meter reading (AMR) solutions to the North American utility market. AMR was a revolutionary product in the 1990s that completely changed the challenge of reading electric meters. Prior to AMR products, utilities were forced to read meters manually at a cost of approximately \$1.00 per meter read. After the release of AMR products, the cost of reading a meter went to roughly zero. Utilities faced steep switching costs for adopting AMR over manual meter reads. Installing an AMR module a skilled technician to individually visit each home. Assume the costs to install an AMR solution is \$50 per meter. For the sake of this exercise, assume the above estimates are accurate and the marginal cost to produce an AMR module is \$12.
  - a. What is the annual cost per meter to a utility for manual meter reading? For AMR?
  - b. Assume utilities use a 6% discount rate to evaluate new purchases. Over the 10 year lifespan of an AMR solution, what are the cost savings per meter?
  - c. What is price of the nearest comparable alternative to AMR for a utility?

- d. What is the differential value of AMR to its nearest comparable alternative?
- e. What is the exchange value of a standard AMR solution in North America?
- f. In most of Europe, utilities read their meters only once per year. What is the exchange value of a standard AMR solution in Europe? Should Itron have pursued the European market in the 1990's? Should Itron have pursued the European market in the 1990's?

## Appendix 1 Inferior Goods

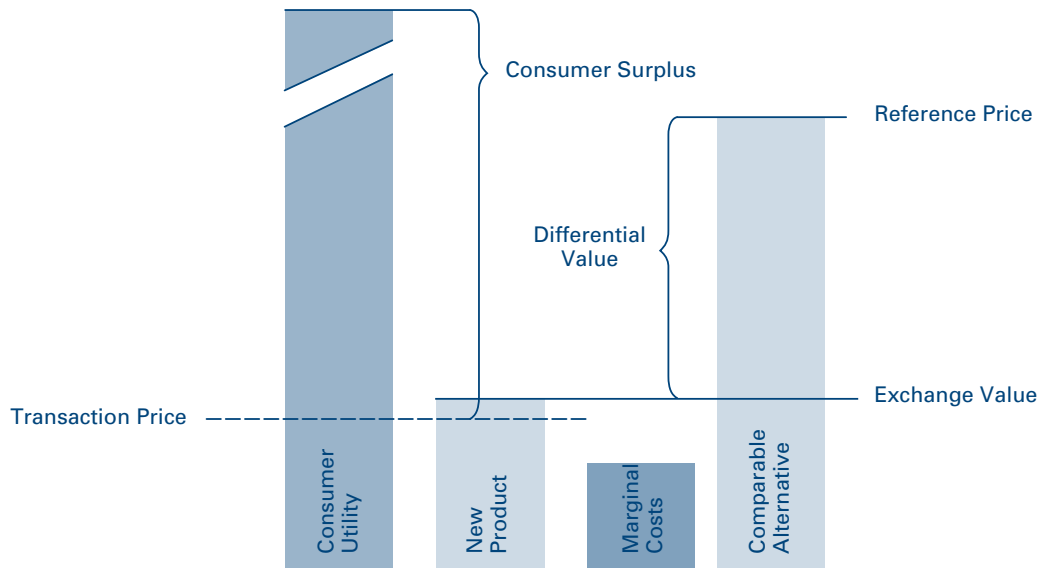
### 1

Assumed in the evaluation of the boundaries of a good price was that the nearest comparable alternative was, in some way, inferior. Often however, the existing comparable alternatives are superior. When the existing products are superior to the new product, the approach to identifying the boundaries of a good price must be slightly altered.

Inferior products are routinely developed and marketed. In construction, some of the features and benefits of existing products are removed in order to make a cheaper alternative. Fortunes have been made by stripping out unnecessary benefits in order to deliver the product desired by customers, so it is worthwhile to consider the boundaries of a good price for these products as well.

The analysis of the boundaries is somewhat similar in the case of marketing an inferior good as it is in the case of marketing a superior good. The key difference is that the differential value is negative. Thus, the exchange value will be less than the price of the nearest comparable alternative. The hard boundaries of marginal costs and customer utility do not change in concept. With an inferior good, the boundaries of a good price now lie between the exchange value and the marginal costs. See Exhibit 1-6 Price Boundaries for Inferior Goods.

**Exhibit 1-6** Price Boundaries for Inferior Goods



## Notes

- <sup>1</sup> Tim J. Smith, “The Transaction Landscape,” *Hawks, Seagulls, and Mice: Paradigms for Systematically Growing Revenue in Business Markets*, (Lincoln, NE.: iUniverse, 2006): 6-27.
- <sup>2</sup> Michael V. Marn, Eric V. Roegner, and Craig C. Zawada, “Introduction,” *The Price Advantage*, (Hoboken, NJ.: John Wiley & Sons, Inc., 2004): 4-6.
- <sup>3</sup> Exchange value models are discussed in a variety of settings including Robert J. Dolan, “Pricing: A Value-Based Approach,” HBS No. 9-500-071 (Boston: Harvard Business School Publishing, 1999). Gerald E. Smith, Thomas T. Nagle. “A Question of Value,” *Marketing Management* 14, no. 4 (July 2005): 38-43.
- <sup>4</sup> U.S. Food and Drug Administration (April 24, 2003). “FDA Approves Drug-Eluting Stent for Clogged Heart Arteries”. Press Release (<http://www.fda.gov/bbs/topics/NEWS/2003/NEW00896.html>) retrieved on 4 January 2009.
- <sup>5</sup> Lawton R. Burns, ed., “Devices and Information Technologies,” in *The Business of Healthcare Innovation* (New York, NY.: Cambridge University Press, 2005): 288-289.
- <sup>6</sup> Tim J. Smith, “Communicate the Value,” *Hawks, Seagulls, and Mice: Paradigms for Systematically Growing Revenue in Business Markets*, (Lincoln, NE.: iUniverse, 2006): 160-174.
- <sup>7</sup> Reported total procedure costs vary from a low above \$9,000 and a high below \$30,000. The value we are using in this text is acceptable for demonstrating the usefulness of an exchange value model in pricing. See Jason Ryan and David J. Cohen, “Are Drug-Eluting Stents Cost-Effective?: It depends on Whom You Ask,” *Circulation* 114 (2006): 1736-1744.
- <sup>8</sup> “J&J Tells Doctors of Cypher Stent Clots”, *Los Angeles Times* (July 9, 2003). (<http://articles.latimes.com/2003/jul/09/business/fi-rup9.10>) retrieved on 4 January 2009.
- <sup>9</sup> Organ Gurel, “Drug-Eluting Stent Market: \$5 Billion Turning on a Dime” *Midwest Business.com* (July 24, 2006). (<http://www.midwestbusiness.com/news/viewnews.asp?newsletterID=15086>) retrieved on 4 January 2009.
- <sup>10</sup> Cordis Corporation, a Johnson & Johnson Company (January 20, 2004). “CYPHER Sirolimus-Eluting Coronary Stent: Delivers on Clinical Promise.” Press Release ([http://www.cordis.com/active/crdus/en\\_US/html/cordis/downloads/press/FINALCYPHER\\_Milestone\\_Release\\_1\\_20\\_041.pdf](http://www.cordis.com/active/crdus/en_US/html/cordis/downloads/press/FINALCYPHER_Milestone_Release_1_20_041.pdf)) retrieved on 4 January 2009.
- <sup>11</sup> Stuart Read, Nicholas Dew, Saras D. Sarasvathy, Michael Song, & Robert Wiltbank, “Marketing Under Uncertainty: The Logic of an Effectual Approach,” *Journal of Marketing*, 73 (May 2009): 1-18.