THE MONEY ISSUE

WHICH PRICE IS RIGHT?

PREPARE FOR THE COMING REVOLUTION IN HOW BUSINESS SETS PRICES

It is an urgent question: How can we increase profits if we can't raise prices? The answer demands revolutionary thinking—new insights about strategy and human behavior, turbocharged with software, mathematics, and rapid-fire experimentation. Is your company ready to master the new era of pricing? Are you prepared to pay the price of failure?

By Charles Fishman

AIRLINE TICKETS cost 40% less than they did 25 years ago. A two-liter bottle of Diet Coke often has the same price tag as it did in 1985. Light-bulbs, laptops, heck, even the "cost" of a mortgage—all are at historic lows. It's been a good 20 years to be a consumer.

But for companies, the pressure is on. Most companies are desperate to raise prices. And virtually every company has the same lament: We can't. Customers won't stand for it. Competitors will undercut us. And technology will disrupt us—again. Jack Welch saw it back in 1996, when he famously complained, "There is no pricing power at all." The environment is even tougher today.

Anyone who sells anything knows that price is the pivot of business, the ultimate leverage. If you can raise prices—even a bit—you can increase profits dramatically. If you can't raise prices, you feel like your business is struggling, regardless of what is happening with cost, quality, or service.

Meanwhile, anyone who buys anything knows that almost nothing has a single price anymore. Want to know the price of something? Well, you get back a series of questions: Who are you? How long have you been a customer? How much are you buying? How good are you at unblinking negotiation? Did you bring your frequent-shopper card?

So I set out on a mission: to enter the hidden world of prices and pricers. I wanted to talk candidly with the smartest experts, the savviest executives, and the most nimble tacticians about the most urgent subject in business today: pricing. I sensed trouble when the first person I called to interview said after a few minutes, "Wait. I hear typing. I always get nervous when I hear typing." Next came a woman from American Airlines. She kept repeating the official position: "Absolutely not. We just don't discuss prices." Finally, she pleaded, "If I talk about prices, I could go to jail." The spokeswoman for a telecom company said, "We're not going to talk about prices, and the fact that we're not going to talk about it is off the record. You can't use the fact that we won't talk about prices in a story."

But it was not until I traveled to Chicago, to a Professional Pricing Society conference, that I got a full picture of how sensitive the subject is. On my first day, I was asked to leave the trade-show exhibits—the place where vendors beg for attention. A guard was posted at the door, in case I tried to slip in. On the second day, Eric Mitchell, president of the PPS, spotted me standing in the lobby outside the meeting rooms and scowled. I would approach someone and introduce myself, and Mitchell would tag along and stand with his arms crossed as I asked questions. Eventually, his dignity overcame his paranoia, and he assigned an aide to follow me. It didn't matter. Shortly, I was approached by a man who was large enough to play nose tackle for the Chicago Bears. Leval worked security for Marriott. He was extremely polite, and he told me that I would be leaving the hotel. *Immediately*.

So there I was, standing in a biting breeze on Michigan Avenue, wondering what it is about prices that makes otherwise reasonable businesspeople so paranoid. One factor is strategic secrecy: Prices are so important to business that most executives don't want to disclose what they know. But the bigger factor, I came to appreciate, is fear of embarrassment: Most executives are surprisingly in the dark when it comes to setting prices. They guess; they say a prayer; they cross their fingers. They are afraid to disclose what they *don't* know.

Kent Monroe, a professor at the University of Illinois at Urbana-Champaign, is one of the deans of pricing. He's been teaching the subject for nearly 37 years, and he knows that sloppy thinking about pricing is widespread across the U.S. economy. Both consumers and businesspeople assume that price has everything to do with cost. *Wrong*. "You have to know the cost so that you can understand the profitability implications of price," says Monroe, "but not for the purpose of setting price." Businesspeople assume that if they are in a competitive situation, and prices drop, they have to match. *Wrong*. "The natural tendency to match is foolish," he says. Executives who are devoted to using "data" in all kinds of other arenas think it's perfectly acceptable to set prices based on "history" or "experience" or "instinct." *Wrong again*.

Monroe tells a pricing story that shows how even the simplest situation can confound accepted wisdom about prices. "A company is making two versions of the same product," says Monroe. "One has a little more gold and foil on it, but they're essentially the same. One is $14.95; the other is $18.95." Not surprisingly, the $14.95 item is selling better. It's also the lower-profit product.

"Then a competitor comes in with a third product. Again, it's essentially the same thing, but a fancier version. And it's much higher priced: $34.95."

For our original company, asks Monroe, "what becomes the best-seller? Why, the $18.95 version, of course."

It's a small story, but it's true. In fact, you can *feel* how right Monroe is. "The point," he says, "is that economic theory says that can't happen. But it does."

The neat curves and crisp laws of supply and demand, elasticity, and rational behavior that everyone learns in microeconomics class don't work in the real world.

Business is at the start of a new era of pricing. This era is being shaped by a new set of insights into business strategy and human behavior, and these insights are turbocharged with software, mathematics, and rapid experimentation. The result is what might be called "scientific pricing." There is even a blossoming industry of a dozen companies that offer scientific-pricing services.

Changes in pricing will alter every part of the economy. The way that business gets done will change, and companies will flourish or be crushed based in part on their ability to grasp and master the new science of pricing. Among those already using the new techniques are Best Buy, DHL, Ford Motor Co., the Home Depot, JC Penney, Safeway, Saks, Staples, UPS, and Winn-Dixie. General Electric, perhaps taking Jack Welch's warnings to heart, is not only working with at least two different pricing companies—it has also invested in one.

PRICE CHECK (I): BEFORE THE BAR CODE

The oldest records of prices ever found are clay tablets with pictographic symbols found in a town known as Uruk, in what was ancient Sumer and what is now southern Iraq. These price records are from 3300 BC—they've survived 5,300 years. The documents—records of payment for barley and wheat, for sheep, and for beer—are really receipts. "Uruk was a large city, at a minimum 40,000 people," says UCLA professor Robert Englund, one of the few experts on the Uruk documents. "So some of the quantities are very high—hundreds of thousands of pounds of barley, for instance."

But here's the really remarkable thing. The earliest Uruk tablets aren't just the oldest pricing records ever found. They are the oldest examples of human *writing* yet discovered. In other words, when humans first took stylus to wet clay, the first thing that they were compelled to record was... prices.

INSIDE A PERMANENT PRICE WAR: "YOU'RE ONLY AS SMART AS YOUR DUMBEST COMPETITOR"

If there are pioneers in the world of scientific pricing, they are the airlines. In the 25 years since deregulation, the airlines have honed an obsession with prices—their own and each other's—that is legendary. We all live with the seemingly bizarre inconsistencies that result, such as two people on the same plane, sitting across the aisle from each other, one of whom paid $290 to fly from New York to Miami, one of whom paid $1,290. We also benefit from the pricing obsession: With just a little bit of planning, you can fly for the same price today that you did in 1980.

The airlines know full well that we are puzzled by the frantic pricing and repricing that they do—puzzled, that is, when we aren't infuriated. Jim Compton, senior vice president of pricing and revenue management at Continental Airlines, not only wasn't scared of going to jail if he talked about prices, he was happy to pull back the curtain, to show fliers what he and his 150-person staff are up against. "I do not set the prices," says Compton, a patient, thoughtful man. "The market sets prices." That's point one. Point two: "I have a really perishable product. It's gone when the door of the plane closes. An empty seat is lost revenue."

But here's the first of many oddities of airline pricing. Most other perishable products—milk, bananas, trendy sweaters—get cheaper the closer they are to being "expired." Airline seats get more valuable the closer they get to being "expired." The most valuable airline seat is the one that somebody *must have* an hour before takeoff and is willing to pay almost any price for. Unlike a banana, an airline seat gets more profitable with time—right up to the moment it goes from being worth $1,000 one-way to being worth $0.

Here's how Compton and his colleagues think about this: You always want that seat available to sell at full price—just in case someone wants it. You want to sell every seat on the plane, except that you also want to have a handful left at the very end, for your most profitable (not to mention most grateful) customers.

The airlines could easily sell out every seat, every flight, every day. They'd price 'em pretty low, book 'em up, and wait for takeoff. But that would mean there'd never be any seats available two or three weeks before a flight took off. How exasperated are we to call and find no seats three days out? What if there were no seats three *weeks* out?

When you understand that dilemma, all of a sudden, airline prices don't seem so exploitive. Although all of the seats on that New York– Miami flight are going to the same place, they aren't the same product. You pay less when you commit to a ticket four weeks in advance; Continental assumes a risk for holding a seat until the end—and wants to be paid a lot to balance the times when saving that last seat for you means that the seat flies empty. A ticket sold a month out and a ticket sold a day out are very different things.

The complexity required to pursue this balance is mind-boggling. Continental launches about 2,000 flights every day. Each flight has between 10 and 20 prices. Continental starts booking flights 330 days in advance, and every flying day is different from every other flying day. Monday is a different kind of day than Tuesday; the Wednesday before Thanksgiving is different from the Wednesday before that. At any given moment, Jim Compton and Continental may have nearly 7 million prices in the market.

And that's just the beginning. All of those prices need to be managed, all the time. All of the major airlines (except Southwest) participate in a joint fare-publishing enterprise called ATPCO. ATPCO collects fares and rules (such as advance-purchase requirements, refundability, and so on) from each airline. ATPCO then publishes those fares back out to the airlines and to the reservation services. In the 1980s, fare changes were filed once a day. If someone changed fares, you found out on Monday and filed your competitive response on Tuesday. ATPCO was closed on weekends. Now ATPCO accepts fare changes three times every weekday—at 9 AM, 11:30 AM, and 7 PM Central Time—and once each on Saturday and Sunday. From 5 fare changes a week to 17.

As much as it can look like a kind of silly game—why not just take a pass on a couple of those changes?—it's not. "If a sale comes in at 7 PM from a competitor," says Continental's senior director of pricing, Bob Lancaster, "and you miss the 9 AM filing the next morning—you don't get your changes in until 11:30—you're in trouble." So when Continental has 7 million prices in the market, those prices can change not just every day, but several *times* a day. Typically, says Lancaster, the airlines collectively change 75,000 prices a day. On the morning after someone files a 7 PM sale, there might be 400,000 price changes across the markets.

This frantic tail chasing—which is done with the help of sophisticated computers and software that predicts ticket demand the way "models" predict the weather—is not lost on the smart people who do it. The wry, informal motto of the Continental pricing department is: "You're only as smart as your dumbest competitor." If some airline is taking prices on the Atlanta-Houston route into the ditch, then by gosh, Continental is going right down into the ditch with 'em. Usually.

It's easy to be cynical about the airlines; they could do many things better. But they also live in a business environment that would wilt the rest of us—and might soon. In the airline industry, every competitor knows the price of every product that every other competitor offers and knows instantly of any changes. How would you fare if your competitors knew your prices, and your price changes, automatically?

In the airline business, every customer instantly knows every fare available, and a ticket from any airline is equally easy to buy. How would your business fare if your customers instantly knew the prices of your competitors—and could buy their products just as easily as yours?

"Are we addicted to the complexity of our pricing?" asks Continental's chief economist, Paul Thomas. "Yes, we are. But we aren't naive about it. We talk about it all the time."

And this complexity that goes with what the airlines do—this is what's going to sweep through the rest of the economy. Because in just the past few years, the kind of software that the airlines use has become available to any company.

PRICE CHECK (II): SHOPPING FOR AMERICA

Cindy Whittington is standing in a sea of women's coats in a department store in suburban Washington, DC. It is the thick of the Christmas-shopping season, and there are 29 racks of winter coats—perhaps 700 in all. Whittington has a pencil in her teeth, a three-ring binder on her left arm, and a look of calm determination in her eye. She's shopping, and the fate of the nation is balanced on her arm along with her binder.

Whittington is gathering prices used to calculate the U.S. Consumer Price Index. The mood of the stock market, the wages of millions of union workers, and the Social Security checks of nearly 50 million retirees all depend on the CPI. Given the complexity of the consumer economy, the way that the CPI is assembled remains oddly handcrafted. Some 80,000 prices are gathered each month, mostly in person, by 400 people like Cindy Whittington. For the moment, the prices are recorded on paper and keypunched into computers, although pricers will get touch-screen laptops later this year.

It is, in fact, the very complexity of the economy that sends people out into the stores every month. The goal of the CPI is to measure an unchanging (or at least slowly evolving) basket of goods—so that when Whittington plunges into the women's coats this season, she's got a detailed description of the four coats she's seeking. "My friends are very envious, because I get to go 'shopping' for a living," she says. "But it's not shopping, it's pricing." Still, Whittington says she spends so much time in stores, her friends call her "the queen of the deals."

As for the CPI itself, what's the price of that statistic? In an annual economy of $10.2 trillion, measuring the CPI costs $50 million—18 cents a year for each U.S. consumer.

THE SMART WAY TO LOWER PRICES: DISCOUNT LESS, BUT DISCOUNT SOONER

According to a recent study, 63% of noncouture clothing sold in the United States in 2002 was on sale. One way or another, if you're in apparel, managing markdowns matters. Over the years, clothing retailers have gone from being local shops to national chains, and buyers often haven't visited the stores that they are buying for. And even though the buyers have computers on their desks, the buying and pricing process has remained remarkably unchanged in half a century.

"Most retail companies still do a lot of things manually," says Steven Schwartz, senior vice president of planning and allocation at the Casual Male Retail Group, a chain of 475 clothing stores. "Our buyers and planners got reports on sales and inventory weekly," says Schwartz. "And they evaluated those reports, looking for what was selling, what to discount, and deciding the markdown. But they were going through paper 12 inches thick. We took a markdown. If it worked, great. If it didn't work, we took another markdown."

A couple of years ago, Schwartz began to look for a better way, and he found a half-dozen companies offering software to automate the markdown process. It works somewhat like airline-pricing software: The computers absorb several years' worth of data, look at what's in stores and how it's selling, and spit out recommendations for prices on specific clothing items. Casual Male picked ProfitLogic, a company based in Cambridge, Massachusetts that is also working with the Home Depot, JC Penney, and Old Navy. During the first year, Casual Male did a test across six departments in all of its stores. Schwartz's buyers would tell the ProfitLogic software what inventory they wanted to move, what the price was, and, most importantly, when Casual Male wanted to be sold-out (or when the chain wanted to have a certain amount left to be sold at its outlet chain).

ProfitLogic's system not only gave guidance on what to discount, and by how much, it also allowed Casual Male's buyers to ask their own questions, like, "What happens if we mark down 10% instead of 20%?"

The software inspired one basic change in the Casual Male markdown world: Discount less, but discount a lot sooner. "Merchants tend to get emotionally committed to what they buy," says David Boyce, ProfitLogic's vice president of marketing. "Buyers pick styles, colors. In general, they get it right, but once in a while, they don't. They always say, 'Just one more week! It will sell!'"

At Casual Male, the results were immediate. "Sell throughs"—selling all of something—"were much faster, much sooner," says Schwartz. The clothing was still on sale—but not as deeply discounted as it would have been a month later in the season. Schwartz is protective about the exact improvement in profitability. But in June 2002, the software was rolled out for all items at all stores—after Casual Male upgraded its national point-of-sale system.

Saks, with $6.5 billion in sales, is using similar software designed by a ProfitLogic competitor, Spotlight Solutions. After a test done during Christmas 2001, Saks rolled out the software widely this past Christmas. Like at Casual Male, the system is recommending smaller markdowns, but sooner. "What has surprised me," says Bill Franks, CIO of Saks, "is the accuracy of the software's algorithm predicting sales if we move the price. It is uncanny how accurate the software is."

Franks thinks that as the software becomes commonplace, it could have an unintended effect: that of lowering list prices. "What we've had to do up to now is overprice things at the beginning, to compensate for underpricing at the end of the season," he explains. "Ultimately, everything may be a little cheaper, because we won't have to absorb the cost of those deep markdowns at the end."

PRICE CHECK (III): HOW MUCH FOR A COKE?

One of the great moments in the history of price foolishness involved Coca-Cola. On October 28, 1999, the *New York Times* reported that Coke was testing a vending machine that could sense the outside temperature and "automatically raise prices for its drinks in hot weather."

The story came from Coke's then-chairman, Douglas Ivester. He was describing the technology to a Brazilian magazine, bragging that it could increase price during a sports championship in summer heat "when it is fair that it should be more expensive." Coke confirmed the testing; Pepsi said that it would never "exploit" customers in hot weather.

The story ran around the world and was met with outrage. On the day that the story broke, Coke backpedaled furiously, a spokesman saying of temperature-controlled pricing, "We don't see [that] happening anytime soon, if ever."

Of course, Ivester was right according to economic theory and market experience. His customers *already* paid a wild variety of prices for Coke, depending on the setting. What Ivester got wrong was the human part, the perception of price. Consider what the reaction might have been to this headline: "Coke testing machine that automatically discounts prices in cool weather." The tale of the temperature-controlled Coke machine is now taught in business schools across the country.

THE NEW SCIENCE OF PRICING: TEST AND TEST AGAIN

Larry Warnock has only been a new-wave scientific pricer for a few months, but he talks with the zeal of a convert—a zeal that comes from having discovered after 20 years in business something that's been sitting there all along. "How do companies set their prices?" asks Warnock. "Three ways. There's cost-plus. There's 'because my competitor did it.' And then there's what we call OTA pricing. Politely, that's 'out of the air.' Companies say, 'We price what the market will bear.' But they do nothing to *measure* what the market will bear."

Warnock is an executive vice president at Zilliant, an Austin, Texas-based company at the forefront of measuring what the market will bear. Zilliant's offices hardly seem to sit at the epicenter of a strategic revolution. The workspace is pedestrian. The software, however, is not. Zilliant pulls together a growing body of math that can analyze huge amounts of data and then use even more math to predict human behavior in the face of price changes. This isn't the kind of problem solving that even most math-team alumni have any experience with. Zilliant's chief scientist, Ahmet Kuyumcu, sent along a couple of algorithms of the sort that Zilliant uses. Here's one: $P_{win}(R)=\Sigma_N f_N \chi P(R)^N$.

The leap isn't just the computing power, though, or the math. The real leap of Zilliant, and its competitors, is a shrug of modesty. Zilliant says, We're not actually going to get the price *right*. What we're going to do is *look for* the right price.

Zilliant's software runs experiments. You pick a goal—maximizing total profits, for instance—and then you start selling stuff, the *same* stuff, in fact, just at slightly different prices. You don't just take a flier and raise your prices 5% and see if anyone flees to a competitor; you don't just drop your prices 15% and hope that the price brings in 20% more business. You test, you sell, you gather data—you see what works. Then you change your prices—maybe 4% up, maybe 6% down—when you know what's going to happen.

Small changes can make all the difference: Jim Compton and his colleagues at Continental Airlines boarded 44 million passengers in 2001, at an average ticket price of $193. Charging two bucks more per ticket would have swung the firm to profit. That's a price change of 1.04%.

Scientific pricing is really pricing using the scientific method. Let's not guess what's going to happen; let's change prices in a controlled way, watch what happens, then change prices for real after that. And by the way, we'll begin the next set of experiments the next day.

These experiments can reshape how and what companies charge for their services. One of Zilliant's first customers was DHL, the $6 billion-a-year shipping firm. DHL hadn't changed its list prices in five years, and its walk-up (or call-up) business was shrinking in the face of competition from FedEx and UPS.

The typical way that DHL might adjust prices would be to do a market-research study—to *ask* consumers whether they'd ship a five-pound package from Houston to Lyons, France for, say, $81. How about $71? The problem is instantly clear. A "study" like that is marginally better than a guess. As Aman Adinew, director of pricing and yield management for DHL North America, was considering his options, he stumbled onto Zilliant.

"I saw a huge difference between this software and the [survey]," says Adinew. "It is actually testing my customers. They call; we quote a price; they are actually shipping." In DHL's case, the Zilliant software measures something just as important: customers who called, got a quote, and *didn't* ship—a failed price.

The stakes were huge. In the international markets where they competed, FedEx and UPS were underpricing DHL by 20% to 30%. But DHL has a strong international reputation. Did it need to match those discounts to hold its customers? Would less of a discount do the job?

The scale of the problem, in ordinary terms, was vast. DHL was looking at prices in 43 different markets (United States to Mexico, for instance, or United States to Japan), in a range of weights. Just the basic price grid had hundreds of boxes—and DHL needed to test prices in every market for every product.

And the deadline was brutal. DHL and Zilliant talked in September 2001. Prices had to be set by December 17, to make the price-change date of February 1. After Adinew hired Zilliant, the company got its software installed at DHL's Tempe, Arizona call center in 14 days.

The Zilliant software would sit behind DHL's own systems, randomly offering customers the "experimental" prices, then recording the results. "We're taking real orders," says Adinew. "If something happens, and they shut it down, well," he laughs, "I wouldn't be talking to you right now."

Adinew and his staff had guesses about where raising and lowering rates would change volume and profitability. But Zilliant tested a range of prices for every product and every market, just to see. In the end, the system gathered tens of thousands of data points. DHL wound up changing hundreds of prices. And there were plenty of surprises. "Most of our prices went down," says Adinew. "But did we have to match the competition? Not at all." In fact, by lowering prices just a bit, DHL's "ad hoc" business not only stabilized, it grew. People were willing to pay more for DHL.

One key measure of the success of DHL's walk-up rates is the "quote-to-book" ratio. Of people who call to get a quote, how many actually ship? Before the Zilliant test, the number was about 17%. The new prices have increased the ratio to nearly 25% who call and ship. Revenue is up and profitability is up—in the shipping business, in a recession. "That's the beauty of it," says Adinew. The Zilliant experiment paid for itself, he says, "ten thousand times over. I can't tell you the number, but it's huge."

Prices make the world's economy go round. OPEC looks like it's about power; it's really about price. CNBC looks like it's about business; it's really a TV network devoted to prices. Even money, for all its ostensible power, is just a solvent for price. And yet, for all their significance, prices have most often been taken for granted. Scientific pricing ends that.

Adinew, with his airline background, knows the power of what he did. "This was no guessing game," he says. "We will never do this the old way again. This is science." DHL is now starting to use the Zilliant software across all kinds of other segments of its business. And Adinew has seen the future: "In 10 years, no major company will be able to survive without this kind of software. You just won't be able to compete."

Charles Fishman (cnfish@mindspring.com), a FAST COMPANY senior editor, considers himself "extremely price sensitive." His colleagues just think he's cheap.